Environmental Permit Application Supporting Statement

Great Yarmouth Decommissioning Facility (Inner)

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This document acts as the supporting statement for the application of an Installation Permit for the Great Yarmouth Decommissioning Facility (Inner)

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Permit Application Supporting Statement

This document accompanies the application made by Veolia ES (UK) Ltd to apply for an Installation Permit for the Great Yarmouth Decommissioning Facility (Inner).

This application is made under the Environmental Permitting (England & Wales) Regulations 2016. The application seeks to include the following listed activities:

- 5.3 Part A (1) a (iv) - Disposal or Recovery of Hazardous waste >10t/day involving repackaging: covering the removal of oils and other hazardous materials from the structures and repackaging into barrels, IBCs and other suitable containers prior to temporary storage on site.
- 5.6 Part A (1) a - Temporary storage of Hazardous waste >50t/day: covering the hazardous materials that will have to be removed off the structures and temporarily stored in the dedicated Hazardous Waste Storage Area prior to removal off site.

As DAAs to the installation:

- Cleaning of tanks and pipework from the 5.3 Activity: covering the removal of residues from tanks and pipework removed from the structures.
- Temporary storage of hazardous and non-hazardous WEEE, pending recovery at an off site facility.

Waste Operation

- Physical Treatment of non-hazardous waste covering the manual dismantling of offshore and onshore structures, ELVs and wind turbines.
- Mixed Metal Recycling Site including the temporary storage of non-hazardous waste pending recovery or disposal off site: covering the storage of waste metal and separate fractions of plastics, wood, textiles, insulation materials etc.

The site is located at the following address:

South Beach Parade

Great Yarmouth

Norfolk

NR30 3GY

The site is centred on National Grid Reference: TG 53147 04575

The boundary of the installation is shown in red on Plan 01 and the location of the site is set out in Plan 02, both drawings in Appendix A. The outline general arrangement of the site is shown on the site plan (ref: GYDF-2-PLAN-01) provided in Appendix B.

Pre-application reference: EPR/HP3806PG has been given for this application.

NON TECHNICAL SUMMARY

Veolia, part of the Veolia Environmental Group is the UK's leading waste management company. Veolia has been operating in the UK since 1990 and employs around 12,000 people across the wide spectrum of the environmental services that are central to the expanding low carbon economy. Conscious of environmental and social responsibilities, Veolia promote the use of sustainable waste treatment methods to recover valuable raw materials. Veolia has invested over £1 billion in the UK's recycling and waste infrastructure and is renowned for integrated waste management solutions.

Veolia's core business in the UK is in the provision of integrated waste management and environmental services to local communities and industry with over a third of the UK's population benefit from Veolia's services which it provides through more than one hundred Local Authorities across the UK, including long term contracts in Merseyside, Sheffield, Nottinghamshire, Shropshire, Staffordshire, Leeds, Hampshire, East Sussex/ Brighton and Hove, West Berkshire, London Borough of Southwark and Hertfordshire. It provides a range of services including refuse collection, recycling, composting, waste treatment and street cleansing on behalf of local authorities and businesses. VES operates a network of recycling, composting, transfer and other treatment facilities along with a network of energy recovery facilities and strategic landfills to support the services it provides to both its public and private sector clients.

Veolia has extensive experience of assessing, developing and operating a wide range of robust waste treatment technologies which it provides as a bespoke solution to meet the needs and requirements of its clients. This includes delivering bespoke treatments to manage certain wastes produced by industrial customers.

Veolia ES (UK) Limited trading as Veolia is seeking to expand it's existing decommissioning business and add an additional facility at Great Yarmouth – to be known as the **'Inner'** site as it is more in-land. There is already a permitted Decommissioning facility in the immediate area (EPR/BB3808TU – to be referenced as the **'Existing**' site in this document to add clarification) and the Inner site seeks to replicate the activities at Veolia's existing operation on South Beach Parade. This is in response to the increase in predicted waste tonnages that are expected in future.

Veolia propose to use the Inner site for the receipt of marine vessels and structures (including platforms, jackets, rigs, wind turbines and similar units) for decommissioning, dismantling,

disposal and recycling. In addition to the dismantling of onshore structures such as wind turbines and ELVs i.e. train carriages.

The intention is that each item to be dismantled will be treated as an individual project, such that all methods and risk assessments are carried out on a case by case basis.

Before arrival at the quayside, an inventory of the materials contained within the structure is obtained to allow the production of a waste management plan for that structure.

Once landed on the quayside area of the site, the item will be inspected to ensure that it is consistent with the waste inventory, and that it is safe for the proposed decommissioning. From here it will be transported the short distance via road to the new site.

Where appropriate, hazardous substances such as oils, fluorescent tubes, capacitors and mercury switches are removed. These will be repackaged (if necessary) and stored on site in the dedicated Hazardous Waste Storage Area/Wash Bay, which is appropriately bunded, prior to being transferred to a suitably licensed facility.

At present it is not proposed to manage Naturally Occurring Radioactive Material (NORM) at the Inner site. This waste will be managed by Veolia's existing Radioactive Substances (RSR) Permit (EPR/EB3595DZ) held at the Existing site.

Once depolluted, any reusable items (such as working pumps) are removed. Then the item is stripped of any other readily accessible materials (like doors, fixtures and fittings), the item is then ready for dismantling.

In general, Veolia primarily use method BS6187. This method weakens the structure and then it is pulled at a pre-determined point to bring about collapse. This allows a controlled destruction of the structure (primarily the Jackets), without having to use explosives. Other techniques employed on the Topsides include high-reach excavators with specialist shearing equipment and removing small items using hot and cold cutting techniques and lifting operations.

Once collapsed, the components are cut into easy to handle lengths and then segregated into different materials to await collection for recovery.

Dedicated bunded areas will be used for storage of the structures, which may have the potential to cause leaks and spillages. Surface water run-off from the sealed drainage areas will be

managed by a surface water management system and discharged to sewer. At the time of writing a sewer connection application has been submitted to Anglian Water (ref: ALD-0068671) and a Trade Effluent Application to Business Stream. Details of the surface water management system have yet to be finalised. An indicative layout of the drainage system is set out in plan ref: GYDF-S2-PLAN-01 in Appendix B. Plan ref: 333792-1 (also in Appendix B) from Anglian Water sets out the location of the combined sewer on South Denes Road which would be the location of effluent drainage route to sewer.

Surface water collected from the Hazardous Waste Storage Area will be tankered off site to an appropriately permitted waste management facility.

It is anticipated the facility could handle up to 150,000 tonnes of structures for decommissioning per year. There are a significant amount of platforms in the Southern North Sea which are reaching the end of their lives, and these will need to be decommissioned in an environmentally safe manner.

Veolia currently has three other decommissioning facilities for oil and gas structures. These are at Greenhead Base and Dales Voe on the Shetland Islands and at Great Yarmouth (as mentioned earlier). The geographic spread of these sites means that Veolia can cover much of the North Sea area.

At these sites, in other decommissioning projects which have been undertaken we have managed to obtain a reuse, recycling and recovery rate of greater than 90% of the weight of the structures being dismantled.

OPERATING TECHNIQUES

A summary of the proposed management techniques are provided below. Further details, in relation to how these techniques constitute BAT are provided in the BAT Tables in Appendix H.

Veolia are proposing to operate a decommissioning facility covering an area in the order of 11,200m^2 that will service the needs of the offshore industry as the UK sector's existing infrastructure comes to end of life. The management system and techniques that have been successfully employed at our other facilities will be applied at Great Yarmouth. More specifically the company will operate a management system covering health, safety, environment as well as quality assurance. The management system is accredited to ISO 14001 and ISO 9001. The procedures are referenced throughout the BAT tables in Appendix H.

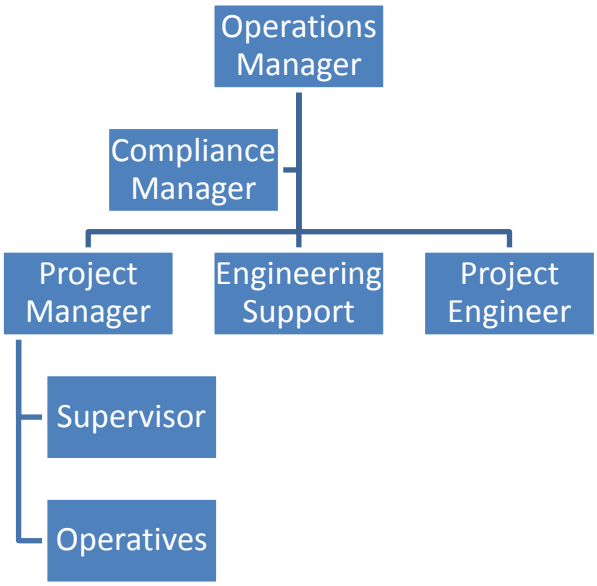
The (draft) procedures that set out the context of the management processes that will be applied at the facility, but which are not included with this application are:

- T4-GYDFI-000 Great Yarmouth Decommissioning Facility - Procedure overview
- T4-GYDFI-001 Great Yarmouth Decommissioning Facility - Permit working plan
- T4-GYDFI-002 Great Yarmouth Decommissioning Facility - Odour management plan
- T4-GYDFI-003 Great Yarmouth Decommissioning Facility - Water sampling, Monitoring and management procedure
- T4-GYDFI-004 Great Yarmouth Decommissioning Facility - Noise and Vibration management plan
- T4-GYDFI-005 Great Yarmouth - Completing Environmental monitoring reports procedure
- T4-GYDFI-006 Great Yarmouth Decommissioning Facility - Traffic management plan
- T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan
- T4-GYDFI-008 Great Yarmouth Decommissioning Facility - Marine growth management plan
- T4-GYDFI-009 Great Yarmouth Decommissioning Facility - Procedure dealing with water from the wash bay and bunds
- T4-GYDFI-010 Great Yarmouth Decommissioning Facility - Quality Health, Safety, Security and Environment plan (QHSSE)
- T4-GYDFI-011 Contractor and visitors' information for working and visiting Veolia Great Yarmouth
- T4-GYDFI-015 Great Yarmouth Decommissioning Facility - Ground Pollution Monitoring Plan

These procedures provide the management framework for the site and are already independently audited for the respective ISO accreditations, therefore it was not considered necessary to include with this application. These procedures will be available for review at the site on request.

An indicative management structure is shown below in Figure 1.

Figure 1: Management Organisational Structure



The activities proposed by Veolia essentially involve the identification and classification of wastes arising from the dismantling of offshore structures, their transfer to shore, dismantling, further treatment to remove contaminants (if required) and then storage prior to removal off site. Where possible the principles of the waste management hierarchy are implemented with disposal in landfill seen as a final option. An overview of the process is shown in Appendix D.

Operations at the site will typically take place from 07.00 to 19.00 Monday to Friday and Saturday 07.00 to 19.00 as well as on a Sunday as required. However there may be time-restricted projects that require longer shifts to be used. Unloading of heavy lifting vessels and barges may be required to extend outside these hours.

In addition to the decommissioning / engineering activities at the site a surface water management system comprising Class 1 interceptor to manage runoff from the sealed drainage areas will be installed. As yet the details of the drainage system have yet to be finalised but the site is currently surfaced with concrete and has a drainage system in place to manage rainfall runoff. This will be modified to allow effluent generated by the operation to be discharged to sewer. At the time of

writing a sewer connection application has been submitted to Anglian Water (ref: ALD-0068671) and a Trade Effluent Application to Business Stream. Details of the surface water management system will be provided prior to commencement of operations at this site. An indicative layout of the drainage system is set out in plan ref: GYDF-S2-PLAN-01 in Appendix B. Plan ref: 333792-1 (also in Appendix B) from Anglian Water sets out the location of the combined sewer on South Denes Road which would be the location of effluent drainage route to sewer.

Pre-Planning

Notification will be made to relevant authorities of the intended work scope by the Client/Vessel Operator. In the case of vessels, the Maritime and Coastguard Agency (MCA) and East Port will be contacted to discuss the vessels flag state, whether it will be manned or towed, its location geographically and whether the vessel is detained or not. Relevant authorisations/ exemptions may need to be obtained at this time from the MCA and East Port.

Before the arrival of a structure at the facility, an inventory of all materials and waste types onboard will be obtained. This is to determine the quantity and types of both hazardous and non-hazardous materials and wastes within the units, so that the appropriate arrangements can be implemented for the removal, storage and disposal of the materials and wastes by specialist licensed wastes carriers. This will be used to update the Waste Map which forms part of the Waste Management Plan procedure.

Details of the nature of antifouling treatments applied to the unit and the history of the unit's recent use will be requested prior to acceptance. This will allow an initial assessment to be made of the potential risks associated with the presence of TBT antifouling treatments or foreign invasive species on the hull, legs or jackets of the units, so that Veolia can ensure that additional precautions are taken on receipt of the unit in order to minimise potential environmental impacts.

A check will be made on relevant permits, consents and licences held to ensure that they are all in place for the proposed work and that conditions will not be exceeded. Discussions will take place with the relevant authorities in regard of this.

Contract Award

Once it has been determined that the contract can be undertaken, preparatory work will begin on site.

Notification of asbestos removal operations will be made to the Health and Safety Executive as appropriate.

If required an International Ship and Port Facility Security Code (ISPS) Security Declaration will be forwarded by the Vessels Shipping Agent. Dangerous Substances in Harbour Areas Regulations 1987 and Harbour Master acceptance of vessel (Shipping Agent). This operation will be completed in conjunction with the Shipping Agent and the Harbour Master. Where needed a declaration of waste on vessel under Merchant Shipping (Port waste Reception Facilities) Regulations 2003 will be made.

If CDM applies the Health and Safety Executive will be informed.

Structures may either be towed or arrived at the recycling facility under their own power. Platforms and modules will typically be transferred to site whole or in sections on floating barges or heavy lift vessels with suitable support frames and grillages installed to support the unit, if required. The barges will be moored on the quayside or in the dock; the unit will then be moved using self propelled modular trailers (SPMT) via road to the Inner site.

Operations and Controls

All work will be carried out in accordance with relevant legislation and the Veolia's QSSHE Plan.

Decommissioning will only take place in the areas designated for recycling activities, see site layout drawing in Appendix A.

Project Execution Plan

A detailed Project Execution Plan will be developed (if required by the Client) for any project to be undertaken at the Facility.

The Project Execution Plan may include the following:

- Engineering Design Calculations
- Operational Outline Strategy
- Outline Method
- Sub-contractor Management

All the above documents will be live documents throughout the duration of the project.

Arrival and Off Loading the Structures

The structures may either be towed or arrive at the recycling facility under their own power. Platforms and modules will typically be transferred to site whole or in sections on floating barges or heavy lift vessels with suitable support frames and grillages installed to support the unit.

The barges will be moored on the quayside or in the dock facility. The unit will then be moved to the site for dismantling. The mooring of barges will be done with the interaction of the pilot and contract personnel/ tug equipment.

Hazardous Substances

After the structures have been off loaded, an initial assessment of the units will be undertaken (All access to units will be controlled by permits to work), this will include verification sampling and surveying, and gas free work for confined spaces. Hazardous substances will be removed from units in accordance with the Waste Management Plan (set out in Appendix E). The following will be removed, repackaged into suitable containers and stored in the Hazardous Waste Storage Area until removal by appropriated licensed contractor.

- Any transformers containing liquid PCB's.
- Any equipment containing ozone depleting substances
- Fluorescent tubes.
- Sodium lamps
- Capacitors containing PCB's
- Batteries will be removed and segregated in accordance with the appropriate legislative requirements.
- Oils and lubricants.
- Oil contaminated water.
- Fuel
- WEEE
- Cylinders

Management of Liquids

Any unknown liquids will be tested by a chemist prior to removal to ensure that they can be handled, disposed of, or recycled in a safe and environmentally sound manner in accordance with legislative requirements.

All chemicals, oils and liquids will be removed as part of the decommissioning works. This will be done by transferring bulk oil directly into a road tanker. Small quantities of liquids will be drained into suitable containers and stored in the Hazardous Waste Storage Area.

Further treatment of oil-contaminated liquids may take place to minimise hazardous waste arisings and to reuse water. It is envisaged that this will be done with hired in equipment, details of which are not available at present.

All equipment used for removal of liquids i.e. pumps, valves, hoses, connections and containers will be to approved British Standards. All equipment used will be tested and inspected in accordance with the manufactures instructions.

An Emergency Management Plan will deal with any spillages, including the use of approved oil dispersants and skimmers from a suitable vessel in the event of an oil spill.

The Emergency Response Team will undergo training on how to implement the Emergency Management Plan. This will include the use of local spill and drip trays when containment is broken.

Stripping of Marine Growth

The stripping of the marine growth and subsequent storage will be in accordance with the Marine Growth Management Plan. An initial assessment of marine growth and stripping will be conducted, where required.

Stripping of marine growth will take place on hard standing.

Asbestos

All asbestos identification, handling and removal will be done in accordance with Control of Asbestos Regulations 2012, where required a specialist licensed asbestos removal company will be used for asbestos removal works. The subcontractor will provide a method statement, risk

assessment and quality plan to Veolia for approval prior to the commencement operations. Any relevant notifications will be made to the Health and Safety Executive of the removal operations.

Decommissioning

Prior to commencing dismantling works on the structure, the following safety points will be explained to the workforce involved with future works:-

- Risk Assessment and Method Statement (RAMS)
- Safe working conditions.
- Work permits being issued (if required).
- Emergency Management Plan.

Prior to dismantling works commencing, any reusable equipment will be marked clearly and identified by the Project Manager. These items will be lifted out for reuse during the dismantling works.

Method of Working

Following the removal of the hazardous waste material, a soft strip will be undertaken to remove all easily accessible, non-metallic items (such as doors, fixtures, fitting etc).

During the pre-planning phases of dismantling, the project manager will carry out a survey, and a high level assessment of the structures for the following information, which will be required prior to the development of detailed method statements and risk assessments:-

- Structural integrity of the module to identify the main steel girders for cutting.
- Height of the structure ensuring the cutting shear can operate accordance to safe working procedures.
- Identify if there may be any pre weakening techniques needed in accordance to BS 6187 Code of Practice for demolition.

The units will then be dismantled using some of the following proven methods such as:

- Pre-Weakening cutting techniques (BS 6187 Code of Practice for demolition)

- Wire rope pulling (BS 6187 Code of Practice for demolition)
- High Reach excavators fitted with a specialist shear attachment.
- Lifting operations using small piece removal techniques.

When complete the support blocks and grillage will be rearranged as necessary in preparation for receipt of next unit, if suitable / required.

Final Documentation Package

A site diary and the Daily Check Sheet will be kept by the site manager; these will contain the following information:

- A description of activities carried out on-Site;
- Any problems or incidents on-Site;
- Adverse conditions;
- Complaints Received;
- Weather;
- Defects to plant or equipment;
- State of surfaces, bunds;
- State of storage areas;
- State of access roads;
- State of security fence;
- General housekeeping;
- Any mud and debris, noise, dust, odour observed; and
- Remedial actions taken.

A final documentation package will be produced and may comprise of the following elements:

- Inspection reports
- Weekly reports
- Weight control summary
- Disposal certificates and consignment notes
- Certification and disposal routes

Incident reports will be managed in the Company's electronic database, in accordance with Procedure ref: SYS/2/027.

Site Plans are set out in Appendix A and an indicative Site Drainage Plan in Appendix B.

EWC Codes for waste that is likely to be accepted at the site is set out in Appendix C

ACCIDENT MANAGEMENT PLAN

Veolia operates its sites to an ISO14001 certificated management system which is audited internally at least once per annum and subsequently audited by our external provider on a time rotational basis. The management system includes procedures for the prevention and management of accidents along with emergency management planning.

The relevant operation documents have been included in Appendix E to this document. A site specific Fire Management Plan has yet to be finalised as water supply details are not know. However a draft document has been included in Appendix F which follows the agreed FPP requirements for Veolia's Existing site at Great Yarmouth. This will be finalised prior to the commencement of site operations.

FUGITIVE RELEASE MANAGEMENT PLAN

Procedure reference T4-GYDFI-001: Great Yarmouth Permit Working Plan, covers the management of fugitive releases.

Control of Mud and Debris

Due to the nature of the activities, it is unlikely that mud or debris will be transferred out of the site. If mud or debris is found on the approach road; then it will be manually removed, or a road sweeper will be employed, if necessary.

Mud from subsea structures will be removed as soon as practically possible to prevent any mud spreading on site.

Control, Monitoring and Reporting of Dusts and Particulates

Monitoring of dust and particulates from all operational areas is carried out visually on a daily basis as part of the Daily Site Inspections. The specific controls in place are as follows:

(a) Areas of Impermeable Pavement

There is the potential for dust to become airborne in dry periods through the movement of vehicles and mobile plant. This will be controlled by sweeping the roads and areas of impermeable pavement and by spraying with water, as required. The natural weather being wet helps to keep the dust under control.

(b) From process waste

There is the potential for dust to become airborne during handling waste and processing waste, main type of waste been handled will be scrap metal, during dry weather period water will be sprayed, after cutting has taken place good housekeeping.

Control, Monitoring and Reporting of Litter

Monitoring of litter from all operational areas is carried out visually on a daily basis as part of the Daily Site Inspections. Litter is unlikely as the main waste being handled is metal. The specific controls in place are as follows:

(a) Old PPE and packaging

Good housekeeping, secure bins with lid available on site at key areas i.e. stores and workplace.

(b) General waste and light waste

To be stored in containers which have closed lids or skips with sheets, full containers to be removed from site as soon as practically possible.

Leaks and Spillages

The site is inspected for leaks and spillages as part of the Daily and Monthly Site Inspection Checklists as determined by the Veolia BMS (SYS/2/015), daily site inspection checklist ref T4-GYDFI-001-01 - Daily site inspection checklist- Great Yarmouth

Fuel is stored in double skin bunded containers capable of holding 110% of the total storage capacity of the fuel container. Any minor spills will be soaked up with a suitable absorbent material.

Hazardous waste will be stored in suitable drums in the bunded area or bunded container and spill kit will be available in the area.

Waste batteries containing acid are stored in a specially designed 'battery bank' in the hazardous waste storage area. Any acid spillages will be neutralised with suitable materials.

Chemical storage cabinet has a built-in bund to contain any leaks.

Septic tanks will be monitored to prevent any over filling, monitoring to allow time to arrange collection. Monitoring will be recorded on the T4-GYDFI-001-01 – Daily site inspection checklist-Great Yarmouth.

During projects / campaigns, temporary bunds may be put in place to contain any possible leaks / spillages. These areas will be checked on a daily basis.

Leak and Spillage Action Plan

1. Any minor leak or spillage will be absorbed with granules which are stored on site.
2. The used granules will be placed in a drum, ready for disposal. They will be labelled with details of the waste and logged on the site waste log.
3. For a leak or spillage causing any hardcore / stones to be contaminated the material will be removed for cleaning / disposal.
4. If a large quantity of liquid (e.g. over five litres) is spilled; the area will be isolated and the absorbent granules will be used to mop it up.
5. Traffic will be diverted around the spill until it is remediated.
6. The used granules will be collected as per step 2 above
7. The source of the leak will be identified and action will be taken to stop this and prevent its reoccurrence.
8. For spills/leakages, all actions taken will be recorded in the site diary and reported as per Veolia BMS (SYS/2/037 Reporting Accidents Incidents Near Misses and Enforcement Authority Communications). The event will be reported to EA if a breach to the Permit conditions.

ODOUR MANAGEMENT PLAN

The likelihood of odour from the facility causing a risk to the environment is considered to be low.

There is little potential for odour to be generated from this process as generally malodorous material will not be handled through the proposed development.

It is to be noted that the site is suitably located away from sensitive receptors (which are the residential properties located approximately 500m away and the nearest school at 800m away).

A draft Odour Management Plan (T4-GYDFI-002 Great Yarmouth Decommissioning Facility – Odour Management Plan) is set out in Appendix I.

NOISE MANAGEMENT PLAN

There is already background noise levels across the site which is located within an established industrial area.

Residential properties are a significant distance from the site (approximately 500 meters) and there are a number of intervening structures and buildings which further screen the site, including potential development land to the north.

The noise levels generated by the expansion of the site are not considered to introduce any significant new sources of noise or vibration to those already located at the Great Yarmouth Decommissioning Facility.

Noise sources associated with scrap metal processing and movements are mitigated in the (Draft) Noise and Vibration Management Plan (T4-GYDFI-004 Great Yarmouth Decommissioning Facility - Noise and Vibration Management Plan) is set out in Appendix J.

The noise generated from the vehicles travelling to and from the development will also be negligible principally due to the small number of vehicles accessing the site throughout the day and travelling at slow speed from the northern security gate on South Beach Parade.

In summary, it is considered that there will be some increase in road traffic noise as a result of the development and operation but any impact would be negligible if detectable at all (i.e. no discernible change in noise conditions).

Given the above it is not considered necessary for any specific measures to be adopted with a view to minimising noise generated by the proposed activities. However best practice measures will continue to be implemented across the site, including:

- HGV drivers will be instructed to avoid leaving engines running or excessive revving of engines;
- Modern and well-maintained plant will be used at all times, conforming to required standards; and
- Equipment including vehicles will be shut down when not in use.

TYPES AND AMOUNTS OF RAW MATERIALS

Only a small volume of raw materials are necessary for the facility, with those used consisting primarily of water for cleaning, fuel for plant and electricity for equipment and office facilities. It is anticipated that diesel will be stored at the site in a tank and in a mobile bowser for use by mobile plant and equipment. There are also a number of cleaning chemicals and oils and greases used in the dismantling process – but these are generally in small volumes (< 1000 litres by vol.) and stored within pressurised containers or stored within chemical cabinets within dedicated storage areas.

Flammable gases for burning equipment will be stored in cages when not in use.

Further treatment of oil-contaminated liquids may take place to minimise hazardous waste arisings and to reuse water. It is envisaged that this will be done with hired in equipment, details of which are not available at present.

Water will also be used, in small quantities for domestic purposes within the office building. Other raw materials include the following (based on usage at other Veolia Decommissioning sites):

- Diesel for mobile plant and generators – approx. 30,000 litres
- Unleaded petrol for hand tools (e.g. grinders) – approx. 120 litres
- Oxy Propane for hot cutting – approx. 10,500 kg
- Propane for hot cutting – approx. 1,600 kg

EMISSIONS TO AIR, WATER AND LAND

There are no hazardous substances emitted to land or groundwater. Please see Site Condition Report in Appendix M for further information.

In order to ensure that pollutants are not able to enter the groundwater or harbour, all dismantling will take place on a sealed surface; this operational area will also be the location for the Hazardous Waste Storage Area, mobile fuel tank, clean scrap storage, an area for felling of structures prior to dismantling and an area where offices, accommodation and car parking are located. This area will be graded to ensure surface waters and associated drains are directed to the surface water management system, comprising of an oil interceptor to provide a treated effluent for discharge to sewer.

An indicative site layout is set out in Appendix B, however as mentioned earlier details of the final system have yet to be finalised,

The only emission point at the facility will be the discharge to sewer that consist of treated surface water runoff that will be collected through the existing surface water management system.

MONITORING

As per the emissions inventory the key emission is the discharge of treated surface water/effluent to sewer and this is reflected in the approach to environmental monitoring for the operation of the site.

Monitoring of the trade effluent is done in accordance with the requirements of the Trade Effluent Consent (application submitted September 2019).

The aim of the site monitoring is to regularly check the site to ensure its performance and confirm that our operations do not have a detrimental effect to the local environment or harm to human health. It is also important to ensure good housekeeping and that site remains tidy and compliant in accordance with the permit conditions. The site is inspected daily. The responsibility for this lies with the Project Manager or nominated deputy.

The basic principle is that during the course of the working week, measures will be implemented as specified below, as and when necessary, and a number of daily and monthly inspections of the site will be carried out (and as a minimum as required as per Procedure "SYS/2/015 Monitoring and Review of Location Office Health, Safety, Environment and Insurance Risk")

As a minimum, the following will be assessed:

- Dust and particulates
- Odour
- Noise
- Pests and scavengers
- Litter
- Spillages and leaks
- Water quality – interceptor monitoring

Document T4-GYDFI-001-01 – Daily site inspection checklist- Great Yarmouth will be completed to monitor the site and boundary to comply with the permit requirements in line with Procedure "SYS/2/015 Monitoring and Review of Location Office Health, Safety, Environment and Insurance Risk". Actions and concerns will be recorded and reported to the project manager and also on RIVO as per procedure "SYS/2/037 Reporting Accidents Incidents Near Misses and Enforcement Authority Communications" and also any environmental concerns / events will be reported.

ENVIRONMENTAL RISK ASSESSMENT

A qualitative Environmental Risk Assessment for the Great Yarmouth Decommissioning Facility operation is provided in Appendix G. At the time of writing an H1 assessment for discharges to sewer has been commissioned but not yet finalized. This will be completed prior to site operations commencing.

Prior to any unit's arrival at the site, an inventory of all materials on board will be obtained from the client in order to update the Waste Map for the site. The Waste Management Plan will describe procedures for the handling, storage and disposal for all wastes and materials to be generated during the project.

All wastes handled during the project will be segregated in accordance with the controlled Waste Regulations 2012 and the Hazardous Waste Regulations 2005.

Re-use, recycling and recovery of wastes and materials will be practiced in accordance with the waste hierarchy. Dedicated bunded areas will be used on the quayside for any parts of the decommissioning project which have the potential to cause spills or leaks; this will be determined by risk assessment. An area will be laid out for the materials that are to be removed and recycled/recovered and those that are wastes, the area will be set up for the segregation of waste streams and to ensure that non-compatible waste streams are kept apart. A quarantine area will be set up for the storage of unknown substances that are awaiting identification, as required. This will be in the Hazardous Waste Storage Area.

All waste management contractors used for the project will be appropriately licensed.

Where there is a potential for spills or leaks, processes will be conducted in bunded areas and/or spill kits sited as determined necessary by the risk assessments.

Oil storage on site will be in accordance with the Control of Pollution (Oil Storage (England) Regulations 2001) which requires all oil containers above 200 litres to have secondary containment to 110%.

ENERGY EFFICIENCY

As the site is not operational estimated energy use data has been derived from the other Veolia Decommissioning sites. As the site becomes operation energy data will be collected and can then be used to asses overall consumption. Estimated data for the site is shown in Table 1 below.

The main energy source will be imported electricity to the site. There are no other direct energy sources proposed for use at the site other than the use of diesel for mobile plant and equipment.

Electricity is used primarily to operate the following areas:

- Offices
- Surface Water Management
- Site lighting
- Plant and Equipment (including use of mobile generators)

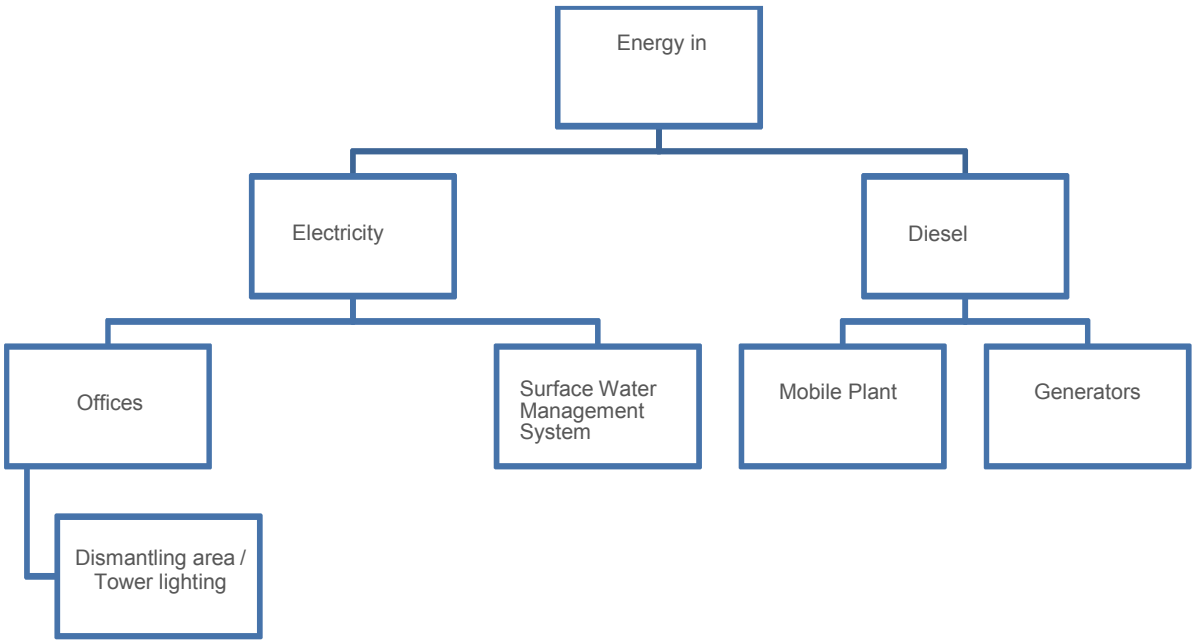
Table 1: Estimated Annual Energy Use

Energy Source	Consumption Per year[1]
Electricity (public supply)	2,300 KwH
Water	170 m^3

[1] for calendar year based on other Veolia Decommissioning Facilities

Typical energy uses are set out in Figure 2.

Figure 2: Typical energy uses



All staff induction includes an environmental induction which provides information about saving and prevention of wasting energy resources as per procedure HS/2/018 Induction Training and Awareness.

Additional energy controls are listed in Table 2 below.

Table 2: Energy Controls

Energy Type	**Activates / Equipment**	**Controls for savings / preventing wasting energy**
Diesel / petrol	Mobile plant	• Turned off when not in use • Right equipment to be used for the right task • Lights and air con turned off when not required. • Servicing / inspection • Repairs / damages carried out when required.
Diesel / petrol	Hand held Equipment	• Turned off when not in use

		• Right equipment to be used for the right task • Servicing / inspection • Repairs / damages carried out when required.
Diesel / petrol	Generator	• Turned off when not in use • Servicing / inspection • Repairs / damages carried out when required.
Electric	Lights, heaters and office / welfare equipment	• Lights and equipment turn off when not in use. • Heater to be turned off when not required. • Heater turn on a low heat if required to avoid frozen pipes. • Low power bulbs
Oxy / propane	Hot cutting burning	• Reviewing options of using machine for cutting metal • Turned off when not in use • Cutting plan to ensure no unnecessary cutting
Water	Damping down to prevent dust	• Monitoring to ensure no additional water is used for dampening down. • Review weather forecast before using water.
Water	Welfare	• Use of plugs in sinks avoiding wasting running water • Site inspections for leaks

AVOIDANCE OF WASTE PRODUCTION FROM THE ACTIVITY

A summary of the proposed activities and measures to reduce waste arising and emissions in relation to BAT are set out below.

Material Recovery and Disposal

All materials will be sorted into separate waste streams in the materials recycling area in accordance with the Waste Management Plan, this includes:

- Separation of metals for recycling
- Separation of cables for stripping and recycling
- Segregation of compatible and non-compatible wastes;
- Hazardous materials in allocated hazardous waste storage area;
- Non-hazardous materials;
- Waste liquids in designated bonded containers;
- Quarantine for unknowns.

All materials will be identified.

Method of transport for recovery and disposal will be determined on a project basis with due regard for the environment.

In order to fully comply with Duty of Care requirements, all waste materials sent for final disposal will be tracked and the method of recovery or disposal identified, weights will be obtained for all consignments at the point of recycling/disposal.

Waste Consignment Notes will be used in accordance with legislative requirements.

Process Flow Diagram is set out in Appendix D.

Normal activities

As noted above the site will be operated using documented management system and managed by suitably experienced and qualified management team.

The installation activities will comprise of the disassembly, sorting, segregation and storage of waste materials, either for recovery for recycling, disposal or re-use. Offshore platforms are comprised of Jackets (which are the underwater legs and structure for the rig / platform) and Topsides which are comprised of modular components providing the various facilities of the platform.

Much of the waste generated in the dismantling process can be recycled with typical recycling rates of >90% for topsides and 98% for jackets. A range of recovered wastes are produced which are non-hazardous (e.g. metal, plastics and wood), however a small percentage of wastes are hazardous and must be managed accordingly.

Each decommissioning project is unique in the process that is applied, but generally structures will be brought to the site by Heavy Lifting Vessel (HLV) or vessel / barge, offloaded to the quayside using on- board cranes. The heavy lifting vessels will only be able to access the deep water berth at the north east of the facility. Vessel / barge off-loading is likely to be the most common form of delivery to the facility.

Some waste will be delivered to site in suitable containers.

This initial stage of the decommissioning project is critical as it establishes the requirements for the whole process. The pre-planning timescale varies depending on the scale and complexity of the decommissioning project, from a number of weeks to over a year. Time invested in pre-planning helps to ensure that waste arriving to the site can be adequately planned for (i.e. with sufficient lead-in times) and experience has shown that relatively small amounts of materials require to be quarantined prior to acceptance or rejection.

Prior to contract award Veolia will require information regarding what waste materials are present on the structure to be decommissioned. This information allows the facility Site Manager to prepare in advance for the wastes they will receive. The wastes are stored appropriately to their hazard/contamination risk and labelled to display their key characteristics (if deemed hazardous). When piece small methodology is used a transport manifest will follow each waste container. When reversed installation methodology is used a transport manifest will also follow waste containers, but in addition a hazardous material inventory document will be prepared for each module.

The materials arriving at the facility are classified in accordance with the Waste Management regulations as either hazardous or non-hazardous or inert.

Once the wastes are received to the site at the quay side they are processed on the tarmacked Decommissioning slab area. Activities here include cold and hot cutting of steel and metals to more manageable sizes, stripping out of hazardous materials (e.g. asbestos) and removal of non- hazardous wastes. Marine growth may also removed, by physical processes, at this point. Wastes are then transferred to their relevant storage area prior to removal off site. A list of typical waste fractions on a Topside accepted at the site is provided in Table 3 below.

Table 3: Estimated waste split received at the facility (for a Topside)

Fraction	% of total
Clean steel and metals for recycling	86
WEEE	1
Non-metals for recycle (wood, plastic, concrete etc.)	1
Components sold for re-use (turbines, generators, etc.)	3
Hazardous waste sent for recovery	7
Hazardous waste to disposal facility	1
General waste to approved landfill	1
Total	100

Where scrap metal waste has been identified as containing potentially hazardous materials these are transferred to the Hazardous Waste Storage Area.

Storage will be in a suitable container unit or skip depending on the nature of the material with exception of clean inert steel which will be stored on the designated open storage area. Hazardous wastes are stored within the Hazardous Waste Storage Area and labelled.

All waste fractions are dispatched, to suitably licensed contractors, under the appropriate transfer consignment documents.

Abnormal activities

Should any wastes arrive at the site where their key characteristics are not known these are transferred to the Hazardous Waste Storage Area until further investigations confirmed the identity of the waste and hence appropriate, storage, handling and forward processing requirements.

Waste management

There are two separate waste streams applicable to the facility. The main stream (by volume) is waste handled as a result of the various wastes received that are then classified, sorted, treated where necessary and segregated prior to removal off site.

The second waste stream, which is a much smaller volume, is produced as a by-product of the operations at the facility and not imported as waste onto the site for processing. Typical wastes in this stream would be paper, waste oils/grease, small chemical containers and food.

Regardless of the stream all wastes will be sorted and segregated and recovered/disposed of to a suitably licensed contractor, using the principles of the waste hierarchy and opportunities

sought for re-use, recycling, and recovery sought rather than final disposal to landfill or incineration without energy recovery. In this regard much of the waste material leaving the facility will be recycled or recovered with limited final disposal of waste.

The majority of segregated wastes being removed from the facility will be transferred by vessel, although some small scale road haulage will be inevitable.

Appendix C sets out all the likely EWC codes that can foreseeably be accepted at the site, at one time or another. However given the highly variable nature of the structures, this list is intended to cover all eventualities.

Suitably licensed contractors have been identified, with discussions continuing as to which contractor(s) will be commissioned for the removal of materials from the site. Therefore it is not possible to fully confirm the disposal/recycling and recovery routes for waste material; however the possible disposal routes are shown in the Waste Map, in accordance with the Waste Management Plan.

All waste carriers used will be registered to carry the types of waste they remove from the site. Veolia will maintain a Duly of Care document table, in line with procedure SYS/02/018.

BAT ASSESSMENT FOR THE RECOVERY AND DISPOSAL OF HAZARDOUS AND NON HAZARDOUS WASTE

Activities at the site are covered by corporate and local procedures which form part of the Company's documented management system. Local procedures reflect amongst other things the requirements of the Sector Guidance Note S5.06: *Guidance for the Recovery and Disposal of Hazardous and Non-Hazardous Waste* and the *Waste Treatment BREF.*

Details set out in this Supporting Statement cover the main areas of the Sector Guidance. Separate assessments are provided in Appendix H, which sets out more detail against how pre-acceptance, acceptance and storage of waste constitutes BAT against the Sector Guidance Note and BREF. Note that the assessment against the BAT references only considers the General BAT conclusions (set out in Section 6.1) to be relevant for this operation. The site will not include mechanical shredders.

It should be recognised that given the nature of the operation, which is predominantly dismantling metallic structures, and the highly variable nature of the waste inputs, both in terms of type of material and amount, deviations from the guidance are inevitable. These are highlighted in the assessment.

Storage of hazardous waste will also comply with the principles set out in *HSG51: Storage of flammable liquids in container*s and *HSG71: Chemical Warehousing*, where appropriate.

TECHNICAL COMPETENCE

A Certificate of Technical Competence (awarded by WAMITAB) for the appropriate member of staff associated with the Great Yarmouth Decommissioning Facility operation is set out in Appendix K.

MANAGEMENT SYSTEM

Veolia ES (UK) Limited is a quality assured company with its sites registered under the Quality Management System ISO 9001, OHSAS 18001 and ISO 14001. A copy of the certificate is in Appendix E

The operational, monitoring and management procedures implemented on site are in accordance with the Veolia Management System and have been audited against the requirements of the standards detailed previously. A summary of the electronic live system is provided in Appendix E.

BASELINE REPORT

As part of the application, a Phase 1 Site Investigation Report (ref: 10444/R01) was prepared by Terraconsult Limited to establish the history and land use of the additional areas in order to determine the condition of the soils and groundwater in the area of the site. A copy of the report is set out in Appendix L.

In order to perform the Phase 1 assessment a number of sources were looked at;

- Historic maps for the site and surrounding areas
- Available desk based environmental site sensitivity source of information, including geological and hydrogeological records
- Available desk based geo-environmental information,

These were used to identify potential areas of environmental risk relating to current and historic land uses and allow the preparation of suitable conclusions and recommendations with regard to the Site's potential pollutant linkages and investigation requirements.

The Phase 1 Report recommends a series of intrusive investigations to determine baseline conditions.

Intrusive investigations were carried out in August 2019 including the installation of 3 boreholes. The results of this work are presented in the Phase 2 Report (ref: 10444/R02). A copy of the report is set out in Appendix L.

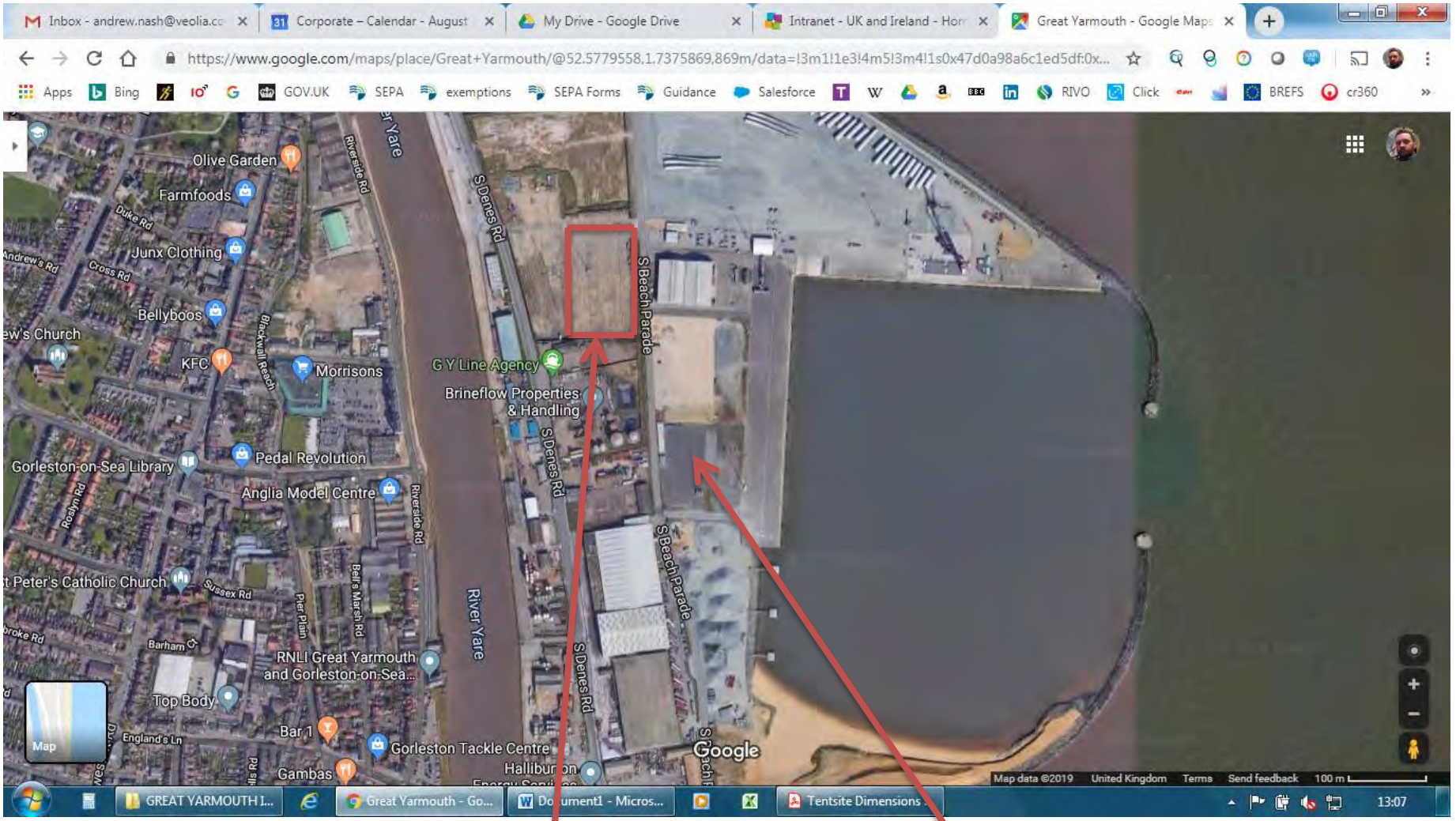
Section 1 to 3 of the Agency's Site Condition Report template are completed and this is set out in Appendix M.

APPENDIX A

SITE LOCATION PLANS

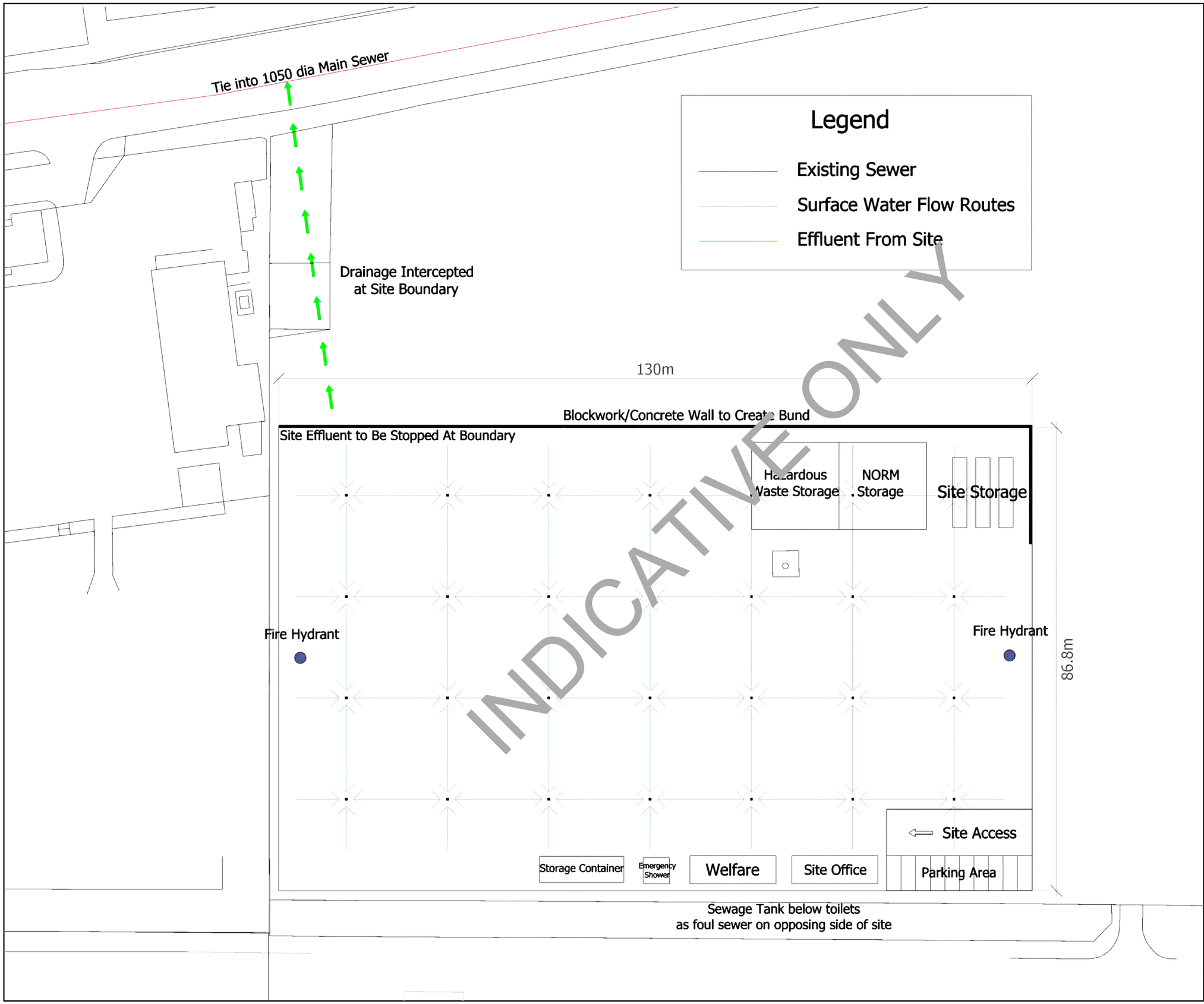
Plan 01: Site Location and Boundary

Plan 02: Site Location



APPENDIX B

INDICATIVE SITE DRAINAGE PLAN



INDICATIVE ONLY

GENERAL NOTES

Details

Drawing is for comment and information.

Precise location of routes of services are still to be determined, so not shown on this layout for clarity.

Number of parking spaces is approximate at this stage.

Size of office and welfare facilities are approximate at this stage. Office and welfare may be double stacked to save site space.

Positions of fire hydrants is indicative, and not confirmed until routs of water mains are confirmed.

PETERSON

PROJECT

Tent Site Expansion - Great Yarmouth Outer Harbour

CLIENT

Veolia Peterson Joint Venture

TITLE / DESCRIPTION

Proposed Site Layout for Comment

	DD/MM/YY	Drawn	REMARKS	Apprvd
A1	27/09/19	KB	Issued for Comment	JJ

Drawing No. **GYDF-S2-PLAN-01**

Rev. **A1**

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Data updated: 02/09/19

Scale: 1:1250 | Date: 19/09/19 | Wastewater Plan A2

Map Centre: 653106,304541 | Our Ref: 333792 - 1 | Powered by digdat

Foul Sewer
Surface Sewer
Combined Sewer
Final Effluent Sewer
Rising Main*
Private Sewer*
Decommissioned Sewer*

Outfall*
Inlet*
Manhole*

Sewage Treatment Works
Public Pumping Station
Decommissioned Pumping Station

*(Colour denotes effluent type)

andrew.nash@veolia.com

Tent Site

A2

love every drop
anglianwater

This plan is provided by Anglian Water pursuant its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2019 Ordnance Survey 100022432.This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting fror negligence.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0301	C	5.02	1.46	3.56
0401	C	4.64	2.32	2.32
0402	C	4.5	2.12	2.38
0403	C	4.8	2.29	2.51
0501	C	4.58	3.17	1.41
0502	C	4.47	3.27	1.2
0503	C	4.47	3.38	1.09
0504	C	4.1	1.88	2.22
0801	C	4.63	2.07	2.56
1201	C	4.93	-0.75	5.68
2201	C	4.67	-	-
2301	C	4.77	-	-
2401	C	4.7	-	-
2501	C	4.68	-	-
2601	C	4.65	-	-
2602	C	4.61	-	-
2701	C	4.64	-	-
2802	C	5.18	-	-
8202	C	-	-1.4	-
8205	C	1.72	-1.58	3.3
8301	C	-	-	-
8406	C	-	-	-
8410	C	2.22	-0.8	3.02
8411	C	2.43	-0.57	3
8502	C	-	-	1.085
8503	C	2.45	-0.17	2.62
9301	C	-	-	-
9302	C	-	-	-
9304	C	-	-	-
9305	C	-	-	-
9306	C	-	-	-
9307	C	-	-	-
9308	C	-	-	-
9601	C	3.88	1.719	2.161
9602	C	4.11	1.463	2.647
9603	C	4	1.64	2.36
9701	C	3.463	1.44	2.023
9703	C	2.97	0.14	2.83
9704	C	2.94	0.42	2.52
9705	C	3.49	1.307	2.183
9707	C	3.496	0.545	2.951
9708	C	3.8	0.88	2.92
9801	C	3.17	1.63	1.54
9803	C	3.12	0.445	2.675

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

APPENDIX C

EWC CODES

EWC Codes proposed for receipt, storage and handling at Great Yarmouth Decommissioning (Inner) Facility

EWC Codes

EWC codes to be accepted at the site are set out below. These are consistent with the wastes permitted under EPR/BB3808TU for Veolia's Existing Decommissioning Facility at Great Yarmouth.

Waste Code	Description
01 Wastes resulting from exploration, mining, quarrying and physical and chemical treatments of minerals	
01 05 Drilling Muds and other drilling wastes	
01 05 04	Freshwater drilling muds and wastes
01 05 05*	Oil-containing drilling muds and wastes
01 05 06*	Drilling muds and other drilling wastes containing dangerous substances
01 05 07	Barite-containing drilling muds and wastes other than those mentioned in 01 05 05 and 01 05 06
01 05 08	Chloride-containing drilling muds and wastes other than those mentioned in 01 05 05 and 01 05 06
01 05 99	Wastes not otherwise specified
02 Wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing	
02 01 Wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing	
02 01 04	Waste plastics (except packaging)
02 01 10	Waste metal
08 Wastes from MFSU of coatings (paints, varnishes and vitreous enamels), adhesives, sealants and prining inks	
08 01 Wastes from MFSU and removal of paints and varnish	
08 01 11*	Waste paint and varnish containing organic solvents or other hazardous substances
08 01 12	Waste paint and varnish other than those mentioned in 08 01 11
08 01 13*	Sludges from paint and varnish containing organic solvents or other hazardous substances
08 01 14	Sludges from paint and varnish other than those mentioned in 08 01 13
08 01 15*	Aqueous sludges containing paint and varnish containing organic solvents or other hazardous substances
08 01 16	Aqueous sludges containing paint and varnish other than those mentioned in 08 01 15
08 01 17*	Wastes from paint and varnish removal containing organic solvents or other hazardous substances
08 01 18	Wastes from paint and varnish removal other than those mentioned in 08 01 17
08 01 19*	Aqueous suspensions containing paint and varnish containing organic solvents or other hazardous substances
08 01 20	Aqueous suspensions containing paint and varnish other than those mentioned in 08 01 19
08 01 21*	Waste paint or varnish remover
08 03 Wastes from MFSU of printing inks	
08 03 17*	Waste printing toner containing hazardous substances
08 03 18	Waste printing toner other than those mentioned in 08 03 17
08 04 Wastes from MFSU of adhesives and sealants (including waterproofing products)	
08 04 09*	Waste adhesives and sealants containing organic solvents or other hazardous substances
08 04 10	Waste adhesives and sealants other than those mentioned in 08 04 09
08 04 11*	Adhesive and sealant sludges containing organic solvents or other hazardous substances
08 04 12	Adhesive and sealant sludges other than those mentioned in 08 04 11
08 04 13*	Aqueous sludges containing adhesives or sealants containing organic solvents or other hazardous

	substances
08 04 14	Aqueous sludges containing adhesives or sealants other than those mentioned in 08 04 13
08 04 15*	Aqueous liquid waste containing adhesives or sealants containing organic solvents or other hazardous substances
08 04 16	Aqueous liquid waste containing adhesives or sealants other than those mentioned in 08 04 15
08 04 17*	Rosin Oil
12 Wastes from shaping and physical and mechanical surface treatment of metals and plastics	
12 01 Wastes from shaping and physical and mechanical surface treatment of metals and plastics	
12 01 01	Ferrous metal filings and turnings
12 01 03	Non-ferrous metal filings and turnings
12 01 05	Plastics shavings and turnings
12 01 13	Welding wastes
13 Oil wastes and wastes of liquid fuels (except edible oils, 05 and 12)	
13 01 Waste hydraulic oil	
13 01 01*	Hydraulic oils, containing PCBs
13 01 04*	Chlorinated emulsions
13 01 05*	Non-chlorinated emulsions
13 01 09*	Mineral-based chlorinated hydraulic oils
13 01 10*	Mineral-based non- chlorinated hydraulic oils
13 01 11*	Synthetic hydraulic oils
13 01 12*	Readily biodegradeable hydraulic oils
13 01 13*	Other hydraulic oils
13 02 Waste engine, gear and lubricating oils	
13 02 04*	Mineral-based chlorinated engine, gear and lubricating oils
13 02 05*	Mineral-based non-chlorinated engine, gear and lubricating oils
13 02 06*	Synthetic engine, gear and lubricating oils
13 02 07*	Readily biodegradable engine, gear and lubricating oils
13 02 08*	Other engine, gear and lubricating oils
13 03 Waste insulating and heat transmission oils	
13 03 01*	Insulating or heat transmission oils containing PCBs
13 03 06*	Mineral-based chlorinated Insulating or heat transmission oils other than those mentioned in 13 03 01
13 03 07*	Mineral-based non-chlorinated Insulating or heat transmission oils
13 03 08*	Synthetic insulating or heat transmission oils
13 03 09*	Readily biodegradable insulating or heat transmission oils
13 03 10*	Other insulating or heat transmission oils
13 04 Bilge Oils	
13 04 03*	Bilge oils from other navigation
13 05 Oil/water separator contents	
13 05 01*	Solids from grit chambers and oil/water separators
13 05 02*	Sludges from oil/water separators
13 05 03*	Interceptor sludges
13 05 06*	Oil from oil/water separators
13 05 07*	Oily water from oil/water separators
13 05 08*	Mixtures of wastes from grit chambers and oil/water separators
13 07 Waste of liquid fuels	
13 07 01*	Fuel oil and diesel
13 07 02*	Petrol
13 07 03*	Other fuels (including mixtures)
14 Waste organic solvents, refrigerants and propellants (except 07 and 08)	

14 06 Waste organic solvents, refrigerants and foam/aerosol propellants	
14 06 01*	Chlorofluorocarbons, HCFC, HFC
14 06 02*	Other halogenated solvents and solvent mixtures
14 06 03*	Other solvents and solvent mixtures
15 Waste packaging; absorbents, wiping cloths, filter materials and protective clothing not otherwise specified.	
15 01 Packaging (including separately collected municipal packaging waste)	
15 01 01	Paper and cardboard packaging
15 01 02	Plastic packaging
15 01 03	Wooden packaging
15 01 04	Metallic packaging
15 01 05	Composite packaging
15 01 06	Mixed packaging
15 01 07	Glass packaging
15 01 09	Textile packaging
15 01 10*	Packaging containing residues or contaminated by hazardous substances
15 01 11*	Metallic packaging containing a dangerous solid porous matrix including empty pressure containers
15 02 Absorbents, filter materials, wiping cloths and protective clothing	
15 02 02*	Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances
15 02 03	Absorbents, filter materials, wiping cloths, and protective clothing other than those mentioned in 15 02 02
16 Waste not otherwise specified in the list.	
16 01 End-of-life vehicles from different means of transport (including off-road machinery) and wastes from dismantling end-of-life vehicles and vehicle maintenance.	
16 01 04*	End of life vehicles
16 01 06	End of life vehicles, containing neither liquids nor other hazardous components
16 01 07*	Oil filters
16 01 08*	Components containing mercury
16 01 09*	Components containing PCB's
16 01 10*	Explosive components (for example air bags)
16 01 11*	Brake pads containing asbestos
16 01 12	Brake pads other than those mentioned in 16 01 11
16 01 13*	Brake fluids
16 01 14*	Antifreeze fluids containing hazardous substances
16 01 15	Antifreeze fluids other than those mentioned in 16 01 14
16 01 16	Tanks for liquefied gas
16 01 17	Ferrous metal
16 01 18	Non-ferrous metal
16 01 19	Plastic
16 01 20	Glass
16 01 21*	Hazardous components other than those mentioned in 16 01 07 to 16 01 11 and 16 01 13 and 16 01 14
16 01 22	Components not otherwise specified
16 01 99	Wastes not otherwise specified
16 02 Waste from electrical and electronic equipment.	
16 02 09*	Transformers and capacitors containing PCBs
16 02 10*	Discarded equipment containing or contaminated by PCBs other than those mentioned in 16 02 09
16 02 11*	Discarded equipment containing chlorofluorocarbons, HCFC, HFC
16 02 12*	Discarded equipment containing free asbestos
16 02 13*	Discarded equipment containing hazardous components other than those mentioned in 16 02 09 to 16

	02 12
16 02 14*	Discarded equipment other than those mentioned in 16 02 09 to 16 02 13
16 02 15*	Hazardous components removed from discarded equipment
16 02 16*	Components removed from discarded equipment other than those mentioned in 16 02 15
16 04 Waste explosives	
16 04 03*	Other waste explosives
16 05 Gas in pressure containers and discarded chemicals	
16 05 04*	Gases in pressure containers (including halons) containing hazardous substances
16 05 05	Gases in pressure containers other than those mentioned in 16 05 04
16 05 06*	Laboratory chemicals, consisting or containing hazardous substances, including mixtures of laboratory chemicals
16 05 07*	Discarded inorganic chemicals consisting or containing hazardous substances
16 05 08*	Discarded organic chemicals consisting or containing hazardous substances
16 05 09	Discarded chemicals other than those mentioned in 16 05 06, 16 05 07 or 16 05 08
16 06 Batteries and accumulators	
16 06 01*	Lead batteries
16 06 02*	Ni-Cd batteries
16 06 03*	Mercury-containing batteries
16 06 04	Alkaline batteries (except 16 06 03)
16 06 05	Other batteries and accumulators
16 06 06*	Separately collected electrolyte from batteries and accumulators
16 07 Waste from transport tank, storage tank and barrel cleaning	
16 07 08*	Wastes containing oil
16 07 09*	Wastes containing other hazardous substances
16 10 Aqueous liquid wastes destined for off-site treatment	
16 10 01*	Aqueous liquid wastes containing hazardous substances
16 10 02	Aqueous liquid wastes other than those mentioned in 16 10 01
16 10 03*	Aqueous concentrates containing hazardous substances
16 10 04	Aqueous concentrates other than those mentioned in 16 10 03
17 Construction and Demolition wastes (including excavated soil from contaminated sites)	
17 01 Concrete, bricks, tiles and ceramics	
17 01 01	Concrete
17 01 02	Bricks
17 01 07	Mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06
17 02 Wood, glass and plastic	
17 02 01	Wood
17 02 02	Glass
17 02 03	Plastic
17 02 04*	Glass, plastic and wood containing or contaminated with dangerous substances
17 03 Bituminous mixtures, coal tar and tarred products	
17 03 01*	Bituminous mixtures, containing coal tar
17 03 02	Bituminous mixtures other than those mentioned in 17 03 01
17 03 03*	Coal tar and tarred products
17 04 Metals	
17 04 01	Copper, bronze, brass
17 04 02	Aluminium
17 04 03	Lead
17 04 04	Zinc

17 04 05	Iron and steel
17 04 06	Tin
17 04 07	Mixed metals
17 04 09*	Metal waste contaminated with dangerous substances
17 04 10*	Cables containing oil, coal tar and other dangerous substances
17 04 11	Cables other than those mentioned in 17 04 10
17 05 Soil (including excavated soil from contaminated sites), stones and dredging spoil	
17 05 05*	Copper, bronze, brass
17 05 06	Aluminium
17 06 Insulation materials and asbestos containing construction materials	
17 06 01*	Insulation materials containing asbestos
17 06 03*	Other insulation materials consisting of or containing dangerous substances
17 06 04	Insulation materials other than those mentioned in 17 06 01 and 17 06 03
17 06 05*	Construction materials containing asbestos
17 08 Gypsum-based construction material	
17 08 01*	Gypsum-based construction materials contaminated with hazardous substances
17 08 02	Gypsum-based construction materials other than those mentioned in 17 08 01
17 09 Other construction and demolition wastes	
17 09 01*	Construction and demolition wastes containing mercury
17 09 02*	Construction and demolition wastes containing PCB
17 09 03*	Other construction and demolition wastes (including mixed wastes) containing hazardous substances
17 09 04	Mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03
18 Waste from human or animal health care and/or related research (except kitchen and restaurant wastes not arising from immediate health care	
18 01 Wastes from natal care, diagnosis, treatment and prevention of disease in humans	
18 01 01	Sharps (except 18 01 03)
18 01 08*	Cytotoxic and cytostatic medicines
18 01 09	Medicines other than those mentioned in 18 01 08
19 Wastes from waste management facilities, off-site waste water treatment plants and the preparation of water intended for human consumption and water for industrial use	
19 12 Wastes from mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified	
19 12 02	Ferrous metal
19 12 03	Non-ferrous metal
19 12 04	Plastic and rubber
19 12 11*	Other wastes (including mixtures of materials) from mechanical treatment of waste containing hazardous substances
19 12 12	Other wastes (including mixtures of materials) from mechanical treatment of waste other than those mentioned in 19 12 11
20 Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including SEPA	
20 01 Separately collected fractions	
20 01 01	Paper and cardboard
20 01 02	Glass
20 01 10	Clothes
20 10 11	Textiles
20 01 21*	Fluorescent tubes and other mercury-containing waste
20 01 23*	Discarded equipment containing chlorofluorocarbons

20 01 25	Edible oil and fat
20 01 27*	Paint, inks, adhesives and resins containing hazardous substances
20 01 28	Paint, inks, adhesives and resins other than those mentioned in 20 01 27
20 01 29*	Detergents containing hazardous substances
20 01 30	Detergents other than those mentioned in 20 02 29
20 01 31*	Cytotoxic and cytostatic medicines
20 01 32	Medicines other than those mentioned in 20 01 31
20 01 33*	Batteries and accumulators included in 16 06 01, 16 06 02 and 16 06 03 and unsorted batteries and accumulators containing these batteries
20 01 34	Batteries and accumulators other than those mentioned in 20 01 33
20 01 35*	Discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components
20 01 36	Discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 and 20 01 35
20 01 37*	Wood containing dangerous substances
20 01 38	Wood other than that mentioned in 20 01 37
20 01 39	Plastics
20 01 40	Metals
20 03 Other municipal wastes	
20 03 01	Mixed municipal waste
20 03 04	Septic tank sludge
20 03 06	Waste from sewage cleaning
20 03 07	Bulky waste
20 03 99	Municipal wastes not otherwise specified

Hazardous material with the EWC codes listed above will be stored for transfer to a suitably licensed facility at any time. They will be stored in accordance with HS(G)71 where applicable. Overall, he wastes listed above are not different in nature or properties to those already permitted to be received, stored and processed at other Veolia decommissioning sites. Consequently their inclusion will not result in the introduction of new risks associated with activities expected to be carried on at the site.

The EWC list is extensive as there is potential for these wastes to arrive at the facility given the nature of the Topsides and the structures that could be accepted. We have catered for all eventualities as there is a likelihood (albeit small in some cases) that these wastes will be received in separate packaging/containers, having been separately collected off-shore.

1. *Coding Large Structures*

Large structures are generally delivered to the facility in two parts:

- Jackets - the legs of the platform which are comprise of metal
- Topside - the platform operation areas and accommodation blocks

However, on occasions the whole platform has been delivered as one structure, for example at Lutelandet, Norway.

Before the platforms are transported to Veolia

Before any Jackets or Topsides are delivered to our site they are dismantled from the oil / gas source and other cables / pipes.

The Topsides are than removed from the Jackets, this is also the same method when we get a whole platform, the only difference is the cut is completed lower on the Jackets.

Some projects require the Topsides to be removed at different stages, in more than two lifts, which required additional dismantling work.

EWC code classification for a Jacket

Waste material - Steel.

Activity - Waste is produced by dismantling the structure, which falls under –
17 CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)

Description – the waste is metal which falls under:
17 04 metals (including their alloys)

Sub – description - the metal is steel which falls under:
17 04 05 iron and steel

Conclusion – **17 04 05** iron and steel

EWC code classification for a Topside or Whole Platform

Please note these can weigh between 1,000 to 45,000 tonnes

Waste material - Construction is mainly steel, but the structure can contain a variety of materials and hazardous waste including:

- Plastic, rubber, cardboard
- ELV/marine vessels
- Tools (hand and portable)
- Kitchen and Accommodation equipment and WEEE
- Furniture (beds, chairs, tables etc.)
- Sometimes asbestos can be present in small amounts
- Fuel/Oils – in tanks and pipelines
- Transformers and batteries
- Containers of hazardous waste and lab smalls

Most of the weight is estimated at >95% Steel

Activity – Waste is produced by dismantling the structure, which falls under –
17 CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)

Description – the waste is mainly metal, with a variety of other materials, including hazardous waste, included.

Conclusion – **17 09 03*** other construction and demolition wastes (including mixed wastes) containing hazardous substances.

However, given the small percentage of hazardous wastes (generally <1% by weight) it could be argued that **17 09 04** Mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03 could also be valid. This would be preferable option given the non-hazardous nature of this waste code.

2. Coding Other Structures

Wind turbines
Wind turbines could be delivered to site from offshore wind turbine fields and also from the mainland.

Before any wind turbines are delivered to site from sea or land they will be dismantled into smaller sections which are listed below, with details of the material types and EWC code.

- Nacelle - which contains gearbox, generator and all ancillary equipment - EWC code **17 04 01** Copper, bronze, brass; most likely as a single unit - **17 04 09*** Metal waste with hazardous substance or **17 04 07** mixed metals (if hazardous waste drained/removed)
- Blades - GRP, Plywood, fibreglass and resin - EWC code **17 09 04** Mixed construction and demolition waste
- Column - metals - EWC codes **17 04 05** iron and steel, **17 04 02** aluminium or **17 04 07** mixed metals
- Cables - metals/plastic - EWC code **17 04 11** cable
- Base frame - metals - EWC codes **17 04 05** iron and steel, **17 04 02** aluminium or **17 04 07** mixed metals
- Base support/ foundations - Concrete - EWC code **17 01 01** Concrete
- Ancillary equipment - Frame/ casing - EWC codes **17 04 07** mixed metals or **17 09 04** Mixed construction and demolition waste. Also possibly **17 09 03*** other C&D wastes (including mixed wastes) containing dangerous substances.

Segregated parts from Nacelle

- Oils - any EWC code from sub-chapters **13 01, 13 02 or 13 03**
- Gearboxes and motors - EWC codes **17 04 09*** Metal waste with hazardous substance or **17 04 07** mixed metals (if hazardous waste drained/removed)
- Generator/Turbine - EWC codes **16 02 13*** and **20 01 35*** discarded electrical and electronic equipment or **16 02 14, 16 02 16** wastes from electrical and electronic equipment and **20 01 36** discarded electrical and electronic equipment

- Batteries - EWC code - All various EWC codes **16 06 01 to 16 06 06** also **20 01 33* & 20 01 34**
- Oil filters - EWC code **16 01 07*** oil filters
- Misc hazardous waste - EWC code **16 02 15*** hazardous components removed from discarded equipment **16 02 16** components removed from discarded equipment
- Light bulbs - EWC code **20 01 36** (standard bulbs) and **20 01 21*** fluorescent tubes and other mercury-containing waste
- Brake pads containing asbestos - EWC code -**16 01 11***
- Brake pads - EWC code - **16 01 12**
- Brake fluids - EWC code - **16 01 13***
- Antifreeze fluids containing hazardous substances - EWC code **16 01 14***
- Antifreeze fluid non-hazardous - EWC code **16 01 15**
- Transformers and capacitors containing PCBs - EWC code **16 02 09***
- Miscellaneous - **17 02 01** Wood, **17 02 02** Glass and **17 02 03** Plastic
- Insulation material consisting of or containing hazardous substances - **EWC code 17 06 03***
- Insulation material - **EWC code 17 06 04**
- Construction material containing asbestos - **EWC code 17 06 05***
- Construction and demolition waste PCB **- EWC code 17 0902***
- Other construction and demolition waste (including mixed waste) containing hazardous substances **17 09 03***
- Mixed construction and demolition waste **17 09 04**

Trains and train carriages

Trains and carriages - End of Life Vehicles - EWC codes for ELV non-hazardous and hazardous (**16-01-04** & **16-01-06***)

Other waste streams

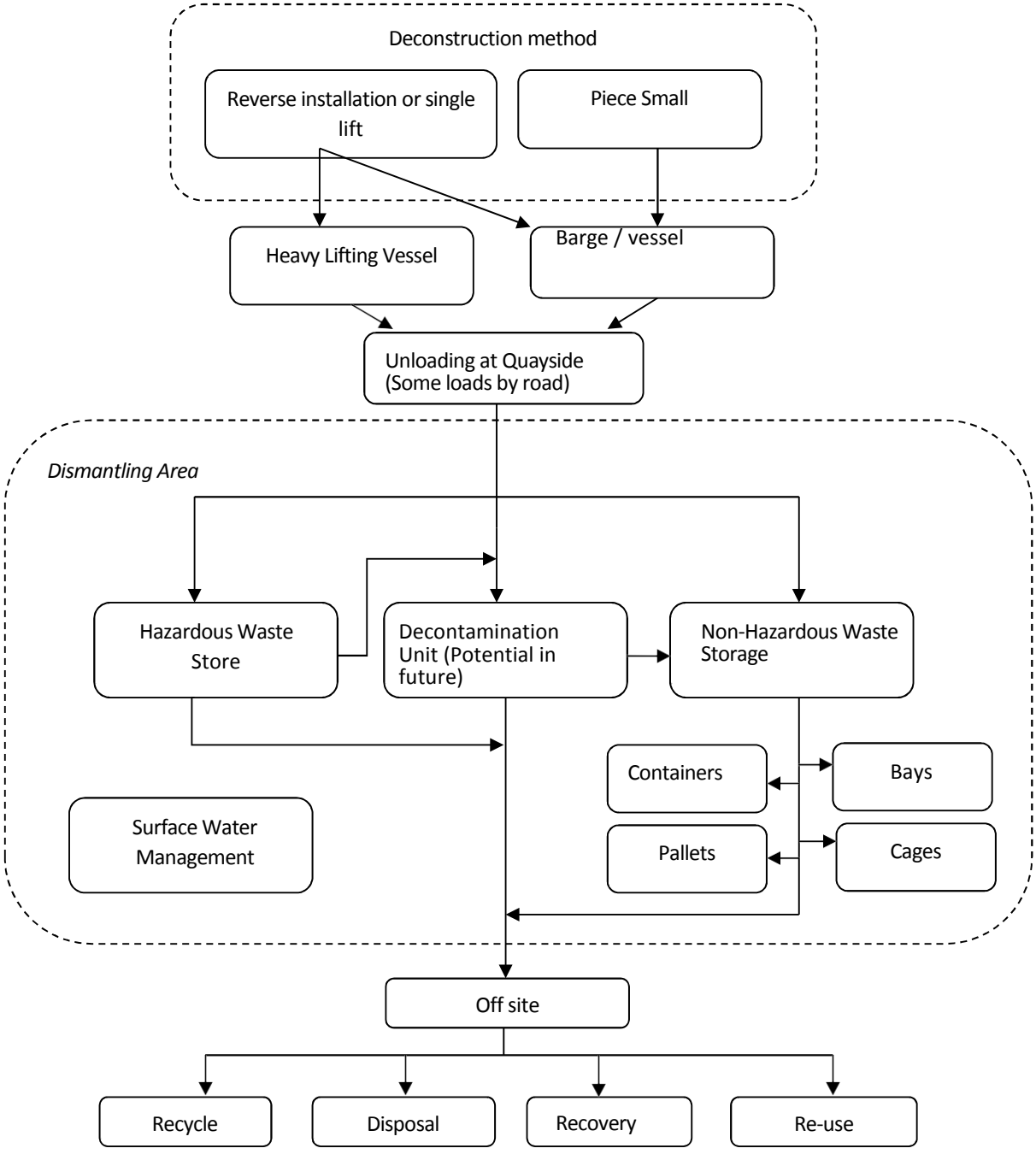
- Marine Growth - **17 09 04** Mixed construction and demolition waste or another code to be agreed

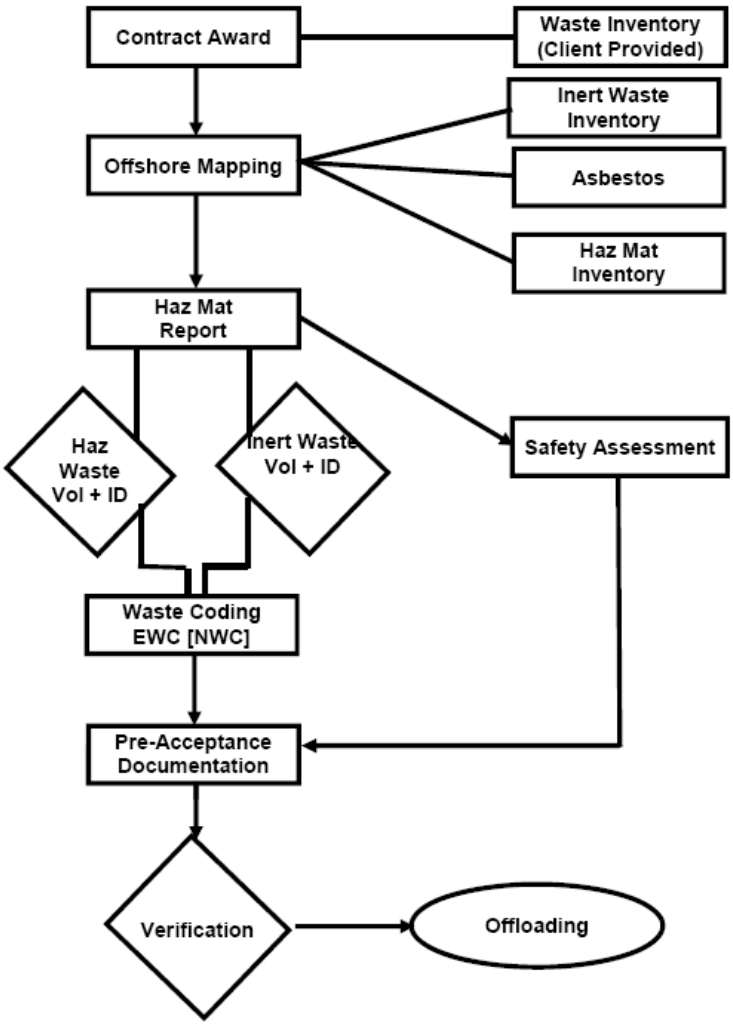
EWC Code Classification

EWC codes first chosen from chapter 17 CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES) based on the waste being produced from the dismantling of wind turbines.

APPENDIX D

PROCESS FLOW DIAGRAM


Deconstruction method
Reverse installation or single lift
Piece Small
Heavy Lifting Vessel
Barge / vessel
Unloading at Quayside (Some loads by road)
Dismantling Area
Hazardous Waste Store
Decontamination Unit (Potential in future)
Non-Hazardous Waste Storage
Containers
Bays
Surface Water Management
Pallets
Cages
Off site
Recycle
Disposal
Recovery
Re-use


Contract Award
Waste Inventory (Client Provided)
Inert Waste Inventory
Offshore Mapping
Asbestos
Haz Mat Inventory
Haz Mat Report
Haz Waste Vol + ID
Inert Waste Vol + ID
Safety Assessment
Waste Coding EWC [NWC]
Pre-Acceptance Documentation
Verification
Offloading

APPENDIX E

MANAGEMENT SYSTEM DOCUMENTS

Veolia UK is the leader in environmental solutions, Veolia provides a comprehensive range of waste, water and energy management services designed to build the circular economy and preserve scarce raw materials.

All the activities undertaken as part of the Company's business are carried out in a controlled and legal manner, so as to be safe, not to cause damage to or adversely impact the environment and to meet or exceed the expectations of our customers and stakeholders, including regulatory authorities. These activities are prescribed as a series of procedures which form part of Veolia's intranet based integrated management system, called the Business Management System (BMS).

THE BUSINESS MANAGEMENT SYSTEM (BMS)

The management system is designed to ensure that the business meets its objectives and commitment to the principles of continual improvement and covers the entire scope of Veolia's business activities.

The Business Management System is based on the sound principals of:

- **Say what we do** – Understand and describe how tasks are done
- **Do what we say** - Follow correct methods, deliver requirements
- **Prove it** – Record and maintain accurate records
- **Improve it** – Prevent failure, correct errors, learn and prevent recurrence

Cycle of **Plan – Do – Check - Act**

Accordingly, the system forms the basis of our system certification program and is consistent with relevant standards, including but not limited to:

- ISO 9001:2015 – Quality Management Systems
- ISO 14001:2015 – Environmental Management Systems
- OHAS 18001:2007 – Safety Management Systems
- ISO 22301:2012 – Business Continuity

The BMS comprises of four 'tiers' where:

- Tier 1 contains the Company's Policies.
- Tier 2 contains the procedures relevant to all aspects of the business including training, identification and evaluation of Environmental Aspects and Impacts, and Objectives and targets for continuous improvement (Copies of the master procedure lists for System, Environment and Health & Safety are attached).
- Tier 3 documents are specific to a particular business line; and
- Tier 4 contains site specific information.

All business representatives within Veolia work closely together to ensure that the information on the BMS reflects a standardised and coordinated approach to the way Veolia undertakes its business.

The BMS is the computer platform which allows all staff on site to 'tune in' and have access to the most up-to-date available information regarding Veolia policies and processes. Each member of staff in the structure will have a unique log on to view the BMS and will receive updates via a link on the BMS homepage.

POLICIES

The Company has documented Environment and Sustainability, Quality and Health and Safety Policies which are part of the BMS. These policies feed into the summarised Veolia Commitment statement.

Copies of the policies and statement are available on request.

The Policies are reviewed annually for continuing relevance, as part of our management system.

CERTIFICATION

The Company has certification to international standards for Environment, Business Continuity, Quality and Health and Safety. Copies of the Certificates are available on request.

Standard	Certificate No	Date of issue	Scope
ISO 9001:2015	LRQ 00008757	19 September 2017	Integrated resource management including waste collection, treatment, disposal and recycling

ISO 14001:2015	LRQ 00007106	19 September 2017	Integrated resource management including waste collection, treatment, disposal and recycling
OHSAS 18001:2007	LRQ 00007107	19 September 2017	Integrated resource management including waste collection, treatment, disposal and recycling
ISO 22301:2012	LRQ 10026101	9th August 2017	Business continuity management system for integrated resource management including waste collection, treatment, disposal and recycling

IDENTIFICATION OF ENVIRONMENTAL ASPECTS AND IMPACTS (Environmental Risk Assessment)

The Company has a documented procedure for the identification and evaluation of environmental risk across the business.

All aspects and impacts are identified using a scored risk assessment matrix

All aspects and impacts are regularly reviewed as part of the system.

OBJECTIVES AND TARGETS

The Company has a documented procedure for the identification, management and review of objectives and targets.

Veolia's objectives and targets are set at local, divisional and corporate level and also align with our parent company's goals.

INDUCTION AND TRAINING

The Company has documented procedures for inductions and training.

Environmental Induction / awareness training is given to all new employees.

All employees are given the relevant training to allow them to carry out their roles in a safe manner and undergo annual training appraisals and reviews to identify any further training requirements.

Most training is provided in-house by Veolia's own training centre, Campus Veolia. Courses provided by Campus include Environmental Awareness and Environmental Permitting.

COMMUNICATION

Quality, Health and Safety and Environment information is made available to employees through QHS and E Alerts, Toolbox talks, Environmental Briefings and awareness aids, such as desktop images. These initiatives help to raise operational environmental risks relevant to a particular business sector.

Meetings at site, divisional, support and senior management occurs at regular intervals, which includes a review and discussion of QHS and E matters.

REPORTING AND RECORDING OF QHS and E INFORMATION

Veolia uses an electronic intranet based reporting system, RIVO, to record all environmental and health and safety incidents, near misses, enforcement authority communications, complaints and results of audits. This allows all compliance and performance information to be visible and enables trends to be identified and appropriate action to be taken. RIVO releases automatic notifications to relevant staff within the business when an event is logged on the system.

The Company has a documented procedure for the reporting of non-conformances and complaints. The procedure also records the corrective action taken and the preventive measures to avoid reoccurrence.

In addition, the Company also requires operational depots to complete an annual environmental report for their location, 'Global Reporting'. This information allows Veolia to assess its environmental data, including resource consumption, carbon emissions and wastes managed.

PERMITS, LICENSES AND LEGISLATION

The waste industry is a highly regulated sector. Veolia maintains a register of all QHSE legislation relevant to its operations and of all permits and licenses held by it. Veolia regularly reviews current legislation with industry groups, regulatory bodies and internal staff to ensure that we are abreast of and implement appropriately any new legislative requirements that would effect our operations and our clients.

Each site keeps copies of permits and licenses relevant to its own operations. These permits are also held and maintained centrally on Salesforce.

AUDITS

Sites are subject to an annual internal QHSE audit by our dedicated audit team. The results of these audits are centralised on our RIVO system. Veolia sites are also subject to external audits by our certification body LRQA.

TIER 2 - Environment Procedures – Master List

Title	TIER 2 Reference	Proc Status	Issue Date	Owner
Identification and Evaluation of Environmental Aspects and Impacts	ENV/2/004	10	12/17	P. Farrow
Biodiversity Management	ENV/2/005	7	10/17	P. Farrow
Installation and Maintenance of Refrigeration and Air-conditioning Equipment which contain or are designed to contain HFC or HCFC Refrigerants	ENV/2/006	6	12/15	P. Farrow
GHG Tracker Procedure	ENV/2/007	6	11/15	P. Farrow
MCERTS – Requirements for the self-monitoring of Effluent Flow	ENV/2/009	4	08/17	P. Farrow

TIER 2 - H&S Procedures – Master List

Title	TIER 2 Reference	Proc Status	Issue Date	Owner	Author
Procedure for the Packaging, Carriage and Storage of Batteries	HS/2/001	7	05/14	A. Timperley	D Reynolds
Control of Substances Hazardous to Health	HS/2/002	8	10/14	R. Rayner	K Harrison
Noise Exposure Assessment	HS/2/003	9	05/14	S Johnson	F. Ferguson
Risk Assessment	HS/2/004	8	01/15	R Rayner	J Hawkins
Risk Assessment – New and Expectant Mothers and Young Persons	HS/2/005	7	10/14	J Hawkins	R Rayner
Management of Asbestos Containing Materials in Company Premises	HS/2/006	5	08/12	S Davey	G Hotson
Confined Spaces	HS/2/007	6	10/12	R. Rayner	
Provision and Use of Work Equipment Regulations (PUWER)	HS/2/008	5	05/14	S Davey	F. Ferguson
Lifting Operations and Lifting Equipment (LOLER)	HS/2/009	6	08/14	R. Rayner	N. Stilwell
Permit to Work	HS/2/010	11	07/14	G. Vickers	G. Hotson
Working at Height	HS/2/011	5	07/14	K Capper	T. Robins
Hand Arm Vibration	HS/2/012	7	08/14	S Johnson	R. Rayner
Assessment and Control of Contractors	HS/2/013	12	11/14	S Johnson	G Nolan
Working on the Highway	HS/2/014	4	12/15	R Cotterill	K Wylie
Induction Training & Awareness	HS/2/018	7	05/14	J Hawkins	R Rayner
Manual Handling	HS/2/020	5	06/14	J Hawkins	R Rayner
Mobile Phone Best Practice	HS/2/021	5	12/14	K Capper	A Bergquist
First Aid	HS/2/023	6	07/14	S. Johnson	P Buch
Display Screen Equipment – Risk Assessment	HS/2/024	5	07/14	S. Johnson	F Colfer
Provision and Use of Personal Protective Equipment	HS/2/026	7	03/15	K. Capper	G. Vickers
Lone Workers	HS/2/027	4	07/14	K Capper	A Bergquist
Fire Safety	HS/2/028	5	05/14	G. Hotson	G. Hotson
Monitoring & Measuring of H&S Performance	HS/2/030	3	10/12	A. Timperley	A. Timperley
Health, Safety and Environment Notification System (Internal)	HS/2/031	4	04/14	A. Timperley	A. Timperley

Electricity at Work	HS/2/032	6	07/14	S Davey	G Hotson
Construction Design and Management	HS/2/033	8	07/14	R. Monk	G. Vickers
Occupational Health	HS/2/035	6	07/14	S. Johnson	S Johnson
Title	**TIER 2 Reference**	**Proc Status**	**Issue Date**	**Owner**	**Author**
Modified Duties	HS/2/037	4	10/14	R. Cotterill	K. Wylie
Excavation Permit to Work	HS/2/038	3	09/13	R Cotterill	G Hotson
Ionising Radiation	HS/2/039	3	10/12	K Harrison	R. Rayner
QHSE Communication	HS/2/040	4	08/14	S. Davey	S. Davey
Workplace Transport Risk Assessment	HS/2/041	5	02/15	R Rayner	J Hawkins
Dangerous Substances and Explosive Atmospheres (DSEAR)	HS/2/042	3	04/14	A. Timperley	S Duroe
Violence and Aggression	HS/2/043	2	12/12	S. Johnson	M Bloodworth
Commercial, Municipal & Treatment Division – Round Significant Risk	HS/2/044	6	01/15	R Rayner	J Hawkins
Mobile Plant Operation	HS/2/045	4	11/13	K Capper	A Bergquist
Working Instruction for the Safe Use of Loading Ramps	HS/2/046	2	07/12	R Cotterill	K Wylie
Chemical Standards Procedure	HS/2/047	1	06/13	R. Rayner	K. Harrison
High and Ultra High Pressure Water Jetting and Pressure Washer Procedure	HS/2/048	4	10/14	K. Harrison	A. Dobson
Abrasive Blasting Procedure	HS/2/049	1	02/14	G. Smedley	K. Harrison
Abrasive Wheels and Grinding Machines	HS/2/051	2	10/14	T. Robins	F. Ferguson
Working Over or Near Water	HS/2/052	1	05/14	C. Phillips	F. Ferguson
Control of Welding, Cutting and Brazing Operations	HS/2/053	5	02/15	R. Rayner	K. Harrison
Legionella Control	HS/2/054	1	09/14	A. Timperley	R. Monk
Chemical Cleaning	HS/2/055	1	10/14	K. Harrison	D. Payne
Specification and use of RPE (including Facepiece Fit Testing)	HS/2/056	1	01/15	R. Cotterill	K. Harrison

TIER 2 – System Procedures – Master List

Title	TIER 2 Reference	Proc Status	Issue Date	Owner
Policy Manual	Management System Manual	10	05/14	C. Manser
Health & Safety Legislation & Other Requirements	SYS/2/001	6	10/14	C. Manser
Management Review	SYS/2/002	8	09/12	C. Manser
Objectives and Targets for Continuous Improvement	SYS/2/003	8	05/14	C. Manser
Management System Audit to ensure Continuous Improvement	SYS/2/004	8	04/14	C. Manser
Document Control and Records Management	SYS/2/005	8	09/14	C. Manser
Training	SYS/2/006	4	07/14	C. Manser
Complaints	SYS/2/007	6	05/14	C. Manser
Calibration and Maintenance of Testing and Measuring Equipment	SYS/2/011	6	07/14	G. Davies
Design Control, Validation and Verification	SYS/2/012	4	08/14	C. Manser
Monitoring and Review of Location/Office Health, Safety, Environment and Insurance Risk	SYS/2/15	7	10/13	G. Davies
Risk Management - Action Plan Procedure	SYS/2/016	1	09/14	D. Charman
Permitting and other statutory Environmental Licences	SYS/2/017	11	08/14	G. Davies
Waste Duty of Care	SYS/2/018	6	08/14	C. Manser
Annual Internal Environmental Reporting	SYS/2/019	5	02/15	C. Manser
Business Unit Manual	SYS/2/020	4	08/14	C. Manser
QHSE Due Diligence	SYS/2/024	3	08/14	G. Davies
Accident Prevention Plan	SYS/2/026	4	08/14	C. Manser
Emergency Management Plan	SYS/2/027	6	09/14	C. Manser
Business Continuity Plan	SYS/2/028	15	02/15	D. Charman
Management of Change	SYS/2/030	4	05/14	G. Davies
Integration of new sites/contracts into the Business Management System (BMS)	SYS/2/031	4	08/14	C. Manser
Self-Audit	SYS/2/033	3	08/14	C. Manser
Acquisition Due Diligence	SYS/2/035	3	09/14	C. Manser
BMS Content Management	SYS/2/036	2	09/14	C. Manser

Procedure for Reporting Accidents, Near Misses and Enforcement Authority Communications	SYS/2/037	6	06/14	G. Davies
Viewing Regulatory Documentation on Salesforce	SYS/2/038	3	09/14	P. Farrow
Title	**TIER 2 Reference**	**Proc Status**	**Issue Date**	**Owner**
BMS Documentation Folders	SYS/2/039	3	09/14	C. Manser
Customer Feedback Procedure	SYS/2/040	3	01/15	M. Hogan
Customer Service Improvement Plan	SYS/2/041	3	01/15	M. Hogan
Fire Protection Equipment - Impairment Handling Procedure	SYS/2/042	2	01/15	D. Charman
Procedure for the Control of Consultations	SYS/2/043	2	10/14	A. Timperley
Certificate of Technical Competency (CoTC)	SYS/2/045	1	03/14	P. Farrow
Procedure for Contract Closure	SYS/2/046	1	11/14	G. Graveson

GREAT YARMOUTH DECOMMISSIONING FACILITY (INNER) WASTE MANAGEMENT PLAN

T4-GYDFII-007

ISSUE 1 (DRAFT)

Great Yarmouth Decommissioning Facility (Inner) Waste Management Plan

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Great Yarmouth Decommissioning Facility (Inner) Waste Management Plan

1 INTRODUCTION

The Waste Management Plan provides information for the handling of waste at the Great Yarmouth Outer Harbour Decommissioning Facility in accordance with the site permits.

The document details the system that Veolia will use for the classification, segregation and storage of waste. It sets out the system that will be used to promote the effective handling of waste and ensure a consistent input of information to the environmental accounting system.

2 SCOPE

This document covers the requirements for complying with legislation, Veolia procedures and the Permit EPR/HP3806PG (Decommissioning) at:

Great Yarmouth Decommissioning Facility (Inner)
South Beach Parade
Great Yarmouth
Norfolk, NR30 3GY

This document has been developed by Veolia and shall remain live for the duration of the site with updates made as necessary in line with legislation and Veolia procedures.

This procedure does not cover waste been accepted from outside the UK or waste transport from sites outside the UK. This documents needs to be read in conjunction with any contract work scopes, as applicable. This waste management plan is based on receiving complete topsides modules and jackets and also intermediary waste streams such as skips and baskets.

3 REFERENCES

3.1 Permit EPR/HP3806PG
3.2 T4-GYDFI-001 Great Yarmouth Decommissioning Facility Permit working plan
3.3 T4-GYDFI-005 Great Yarmouth Decommissioning Facility - Completing Environmental monitoring reports procedure
3.4 T4-GYDFI-VP-001 Great Yarmouth Decommissioning Facility Incoming Data Requirement Procedure
3.5 T4-GYDFI-002 Great Yarmouth Decommissioning Facility Odour Management Plan
3.6 T4-GYDFI-008 Great Yarmouth Decommissioning Facility Marine Growth management plan
3.5 HS/2/002 Control of Substances Hazardous to Health (COSHH)/Chemical Agents
3.6 HS/2/001 Procedure for the Packaging Carriage Storage of Batteries
3.7 SYS/2/015 Monitoring and Review of Location Office Health, Safety, Environment and Insurance Risk
3.8 SYS/2/006 Training
3.9 SYS/2/037 Reporting Accidents Incidents Near Misses and Enforcement Authority Communications
3.10 ENV/2/004 Identification and Evaluation of Environmental Aspects and Impacts
3.11 Waste (England and Wales) Regulations SI 2011/988
3.12 Environmental Protection Act 1990 (EPA 1990).
3.12 Hazardous Waste (England and Wales) Regulations 2005 SI 2005 No.894 (as amended)
3.13 Decision 2000/532/EC the list of waste as amended by Decision 2014/955/EU
3.14 Hazardous Waste, Interpretation of the definition and classification of hazardous waste and its associated appendices “WM3” (Environment Agency) (the most recent version available on the Environment Agency website).
3.15 The Environmental Permitting (England and Wales) Regulations 2010 SI 2010 No.675

4 DEFINITIONS

NORM	Natural Occurring Radioactive Material
EWC	European Waste Code
QHSE	Quality Health Safety & Environment
WEEE	Waste Electrical & Electronic Equipment
RIVO	Electronic system for recording, tracking and monitoring environment and health and safety incidents and near misses.
COTC	Certificate of Technical Competence
Project Environmental Accounting Report	The report will record all waste incoming and outgoing and fuel / energy used to complete a project.
Outer Harbour	Great Yarmouth Decommissioning Facility

5 ROLES AND RESPONSIBILITIES

5.1 PROJECT MANAGER

The Project Manager will be responsible for the implementation of the Waste Management Plan. The job holder is responsible for planning, day-to-day running and organisation of the project and work on site, including the following tasks:

- Communication with the Client or Project Leader.
- Induction and training is in place for staff and contractors working on site.
- Environmental accounting report completed for the project / site

The Project Manager will also cover the requirements of the COTC holder; if the Project Manager does not hold this qualification the Project, Compliance & COTC Manager will cover this requirement.

5.2 SITE SUPERVISOR

The Site Supervisor is responsible for supervision of project activities. These will include safety and environmental inspections of materials to be received to the site, supervision of waste handling, storing and segregation activities and compliance with project and site operating procedures.

5.3 PROJECT COMPLIANCE AND COTC MANAGER

This role provides QHSE support to the project and compliance with the legal requirement to have a trained COTC manager. This is an off-site role, likely to be required periodically on site during key phases, such as project set up and initial phases, key milestones and changes to the work scope. The Manager is also able to assist in training, permitting, legislative and environmental requirements, as necessary, and auditing.

If the Project Manager does not hold a COTC certificate, the Project, Compliance & COTC Manager will cover the COTC requirements, and their attendance on-site will be in accordance with "*T4-GYDFII-001 Great Yarmouth Decommissioning Facility Permit Working Plan".*

6 TRAINING AND COMPETENCE

All personnel engaged in waste handling and segregation shall be provided with adequate training and awareness, as per the training matrix held centrally.

6.1 OPERATIONAL REQUIREMENTS

Veolia shall have experienced and competent staff on site at all times during the project.

Veolia shall have a designated technically competent person, holding a Certificate of Technical Competence (COTC) in Waste Management. This person is not required to be on site at all times, but will be available for project assistance ,as required, and will visit site at regular intervals as per *"T4-GYDFII-001 Great Yarmouth Decommissioning Facility Permit working plan procedure".*

6.2 STAFF TRAINING

Staff will be provided with training to understand the permit requirements, waste hierarchy and environmental requirements / controls as per *"T4-GYDFII-001 Great Yarmouth Decommissioning Facility Permit working plan"* procedure. Staff training will be documented in accordance with *SYS/2/006 Training procedure* and all records will be kept in their personal files, available for Client review.

7 WASTE OBJECTIVES AND TARGETS

All wastes, including hazardous waste, resulting as a consequence of the site projects will be handled as per established Veolia's procedures.

Veolia shall work towards maximising the re-use, recycling and recovery of all waste arisings; as per the waste hierarchy triangle set out below and will minimise the disposal of wastes; taking into account cost and environmental benefits.

Each project re-use, recycling & recovery target will be confirmed in the project Key Performance Indicated report.

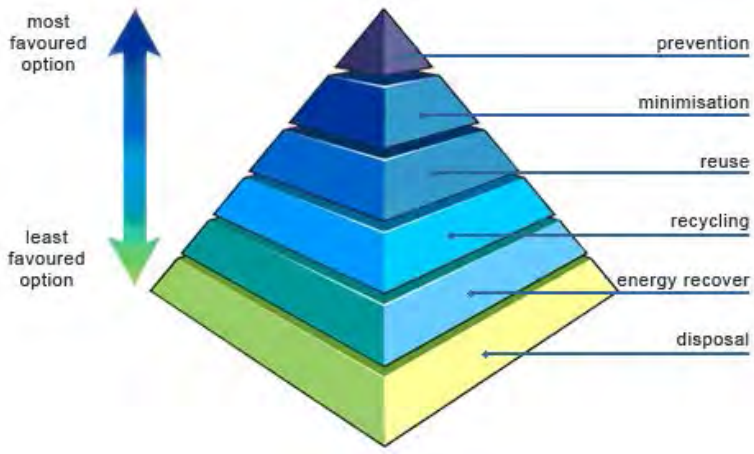

Figure 1: The Waste Hierarchy Triangle

The main objective is to reduce the amount of waste being disposed at landfill by implementing efficient re-use/recycling measures.

All waste streams will be handled in compliance with relevant legislation and as per the facilities Permit / Authorisation issued by Environment Agency.

The "Project Environmental Accounting Report" will provide details of the Re-use, Recycling, Recovery and Disposal figures in accordance with "*T4-GYDFII-005 Great Yarmouth Decommissioning Facility - Completing Environmental monitoring reports"* procedure.

8 WASTE ACCEPTANCE

Before Veolia agrees to accept any waste, the expected tonnage and type of waste must be reviewed with regards to the permit, waste already accepted and waste planned to be accepted. Veolia needs to ensure that site does not receive more waste than the permit allowance for the given annual period.

Before waste comes to site the Project Manager will provide a copy of the "T4-GYDFII-VP-001 Great Yarmouth Decommissioning Facility Incoming Waste Data Requirement Procedure" to the Client / Marine Contractor asking them to provide waste information before the vessel arrives to site. This provides information and allows the Project Manager to ensure the site is ready to accept the waste, In addition, it allows a 2nd review prior waste acceptance.

Waste movement documentation, which is required for accepting responsibility of the waste, involves:

- Waste Transfer Notes - when accepting waste classed as non-hazardous
- Consignment Note – when accepting hazardous waste in accordance with legislation
- Dangerous Goods Note – for wastes and materials classified as dangerous for transport (NB: for hazardous waste this can be replaced by the consignment note)
- All waste accepted by sea to have a manifest. Also a ships survey report to confirm the net weight if possible or a weight from the crane / fork lift truck.

When the waste arrives to site the supervisor will check the waste movement documents to ensure they are completed correctly, and that the amount and description of the waste is correctly recorded. Visual checks shall be completed, which include checking for leaks and loose items.

Samples may be taken for subsequent analysis to confirm that wastes are classified correctly and are permitted to be accepted on-site.

Waste must be able to be identified, before accepting, example hazardous drums must be labelled and waste containing NORM must display a NORM label.

Additional information regarding Waste Transfer Notes and Consignment Notes is available in procedure "*SYS/2/018 Duty Of Care"*

All incoming waste will be recorded on the Project Environmental report as per procedure *"T4-GYDFII-005 Great Yarmouth Decommissioning Facility Completing Environmental monitoring reports procedure"*

Waste items will be assessed before being stored/allocated a holding location on site; the assessment will take the following in to consideration.

- Is the waste hazardous
- Risk of escaping waste
- Fire risk
- Radioactivity
- Waste hazards and physical controls for sharp and loose items

8.1 REFUSAL, REJECTION

Waste must be refused entry in the following instances,

(a) Inadequate or incorrect Waste movement documentation.
(b) Waste types not acceptable at the facility.

For wastes that are refused, details must be recorded on Rivo Safeguard also the Project Manager, National Operations Manager, Compliance & COTC Manager and the Project Single Point of Contact will be informed.

The following information must be recorded:

- The reason why you rejected the waste
- The description or classification of the waste, if known.
- The name of the producer, holder, consignor and carrier
- If hazardous a copy of the new consignment note number for the rejected waste

A copy of the following will be provided to the carrier and also to the client, producer, holder and consignor.

The carrier needs to be reminded of their duty of care to inform the Environment Agency immediately (03708 506 506)

Project Single Point of Contact will inform the client of any issue by phone and also by sending a report or email to confirm all issues / events.

All waste rejected must be reported on the consignee returns.

After rejecting the hazardous waste, it can be later accepted on a new Consignment note, if completed correctly and the waste complies with the permit conditions.

After rejecting the non-hazardous waste, it can be later accepted on a new Waste Transfer Note, if completed correctly and the waste complies with the permit conditions.

8.2 NON-CONFORMING WASTE

For waste accepted on site which is found to be non-conforming to the site permit, it will be reported on Rivo Safeguard as per procedure *"SYS/2/037 Reporting Accidents Incidents Near Misses and Enforcement Authority Communications*". In addition, the Project Manager, National Operations Manager, Project Compliance & COTC Manager and the Project Single Point of Contact will be informed.

If the waste can be traced back to the waste carrier, holder and producer, the Project Single Point of Contact will inform the clients, carrier or holder by phone and also by sending a report or email to confirm all issues / events.

9 CLASSIFICATION, SEGREGATION AND STORAGE OF WASTE

Segregation of waste will enable Veolia to re-use/recycle/recover the largest proportion of the different fractions of waste generated through the project.

9.1 WASTE CLASSIFICATION

The hazardous or non-hazardous code selection must be done in accordance with the methodology set out in Decision 2000/532/EC. Further guidance on classification can be found in the Environment Agencies guidance document WM3. The EWC codes will be used when waste is moved from site and will be recorded on the Waste Transfer Notes and Consignment notes.

Note as waste is changed, treated and processed the EWC code will change from the code when the waste came in.

9.2 SEGREGATION AND STORAGE OF WASTE

All waste will be assessed to ensure safe storage, to prevent any waste escaping and causing damage to the environment, nature and to humans.

Waste will be segregated to achieve the waste objectives and targets (waste hierarchy) and also to allow safe handling and movements.

Identified hazardous waste shall be drummed / containerised, as appropriate, labelled and stored in a designated hazardous waste bund.

Non-hazardous waste such as wood, plastic, concrete, marine growth (i.e. seaweed, shell fish) ferrous metal and non-ferrous metal shall be sorted and segregated in the yard. Waste generated during the operations shall be segregated and stored in dedicated containers / stock piles held in

the waste storage area. The waste stored shall be in compliance with the *Great Yarmouth Decommissioning Facility Odour Management Plan (T4-GYDFII-002)*.

Segregated waste in containers must be able to be identified. This will be done by a site map or signage (or both), and additional information will be required to identify the procedure of the waste in the event of 2 or more operations taking place.

For hazardous waste and wastes containing NORM a unique identification number must be affixed to or inscribed on each container or pallet, which can be related to onsite computerised waste tracking system that will confirm which hazardous waste are on site.

10 HANDLING HAZARDOUS WASTE

The multi-disciplined team will be trained on identification and handling of hazardous materials. During the decontamination phase it is probable that unknown waste may be found. Samples shall be taken and sent to third party laboratories for analysis. Whilst samples are being analysed, the unknown materials will be held in the secure hazardous waste storage area.

Incompatible hazardous wastes will not to be mixed together, and will be clearly marked with content as well as classification numbers referring to European Waste Code. Waste must be segregated, packed and stored according to specifications given in this plan.

Consignments of hazardous waste removed from the Decommissioning Facility for disposal, treatment or recycling will be accompanied by the statutory Hazardous Waste consignment note in accordance with *SYS/2/0018 Duty of Care Procedure*.

The following guidelines shall be applied for managing hazardous waste:

- Hazardous waste shall not be mixed with each other or with other waste categories

- Containers with hazardous waste are only to be filled 90% of capacity and no more than 200kg before closing, to avoid the risk of leakage, pressure, been over load or damage to the container.
- Use only approved and undamaged containers that are suitable for the waste
- All containers should be clearly marked with content and identification number.

10.1 TYPICAL HAZARDOUS WASTE MATERIAL TYPES

Below is a typical list of hazardous waste which are related to the decommissioning work and waste handled on site, information is also provided about storage and the waste outcome.

10.1.1 Liquid Hydrocarbons

Hydrocarbons will be collected in drums or IBC's. Depending on level of contamination they will be sent for recycling as fuel oil or energy recovery.

10.1.2 Refrigerants (FREON 'S, CFC)

Chlorofluorocarbons (CFC) shall be sealed in gas flasks and sent for destruction.

Where facilities are to be disconnected, deconstructed or where there otherwise is a risk for leakage the refrigerants will be drained in-situ.

10.1.3 Firefighting agents (Halon, FM200, CO2 etc)

Bottles shall be inspected, collected and stored prior to disposal. Where facilities are to be disconnected, deconstructed or where there otherwise is a risk for leakage the fire fighting agents must be drained in-situ.

10.1.4 Equipment or Materials containing PCB

Polychlorinated Biphenyls (PCB) shall be sent for destruction through high temperature incineration or suitable treatment/recycling outlets shall be sourced during the project execution phase. This includes PCB in electrical equipment (capacitors) and possibly transformer oil, vinyl

floor finish, certain building sealant, windows and others. PCB contaminated items must be packed in drums or other suitable containers. Possibly PCB contaminated transformer oil must be packed in appropriate drums or IBC containers.

10.1.5 Asbestos

Only trained and certified personnel shall work with asbestos or asbestos related materials in line with the specific regulations applicable to this type of work. All asbestos waste shall be double bagged and stored in dedicated containers before being sent for disposal at an approved landfill.

10.1.6 Batteries

All discarded batteries, regardless of whether the batteries contain hazardous substances or not, shall be managed in accordance with *HS/2/001 Procedure for the Packaging Carriage Storage of Batteries*. Batteries containing Lithium will be segregated and handled separately from all other batteries and other waste.

10.1.7 Fluorescent Light Tubes and lamps

Fluorescent light tubes and lamps will be removed and stored for disposal, prior to any demolition activities, to reduce the risk of breakage. Sodium high pressure lamps might contain mercury and must be separately taken care of, along with fluorescent tubes. Tubes and bulbs will be stored in dedicated containers.

10.1.8 Electrical Switches containing Mercury

These switches should be specially removed, if possible, and sent for mercury recycling through approved facilities. They can be packed in drums or other suitable containers. Switches not removed, will follow electrical equipment for handling at specialist recycling facilities. Breakage of the small glass ampoule must be avoided, and equipment suspected to contain mercury switches should be handled with care.

10.1.9 Silicone Oil (From Transformers)

Silicone oil will be collected in drums or IBC's. Depending on levels of contamination it will be sent for destruction (incineration) or used in energy recovery as fuel oil. Analysis will be performed to verify that the oil is not contaminated by PCB above given regulatory levels.

10.1.10 WEEE (WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT)

WEE contains environmental pollutants and shall be sorted as a separate waste category. WEE will be disassembled and components containing environmental pollutants will be handled through the hazardous waste system, while non – hazardous components will be recovered. It is important to pack and store WEE well to prevent breakage, to protect shore handling personnel and prevent leakage of environmental pollutants. Batteries mounted inside discarded equipment are defined as WEE and need to be removed from the equipment before shipment to shore.

10.1.11 Packaging Waste

Packaging containing residues of products, which are classified as hazardous waste, will be handled as hazardous waste. Empty packaging that should be classified as hazardous waste is, for example, cans or bags that have contained a toxic, corrosive product or a product harmful to health.

The following types of packaging should be handled as hazardous waste: Any container containing residues of paint, oil, solvent or other chemicals.

If the hazardous containers are sealed they can be stored on a pallet. If not, they must be contained in a sealed container.

10.2 PACKAGING AND LABELLING OF HAZARDOUS MATERIALS AND WASTE

There are certain aspects to be aware of while packing hazardous wastes in general. Packaging must be stable, using suitable pallets, drums, IBC's etc.

Packing of items susceptible to breakage/damage must be protected accordingly; examples are mercury switches, etc.

Packaging and labelling of wastes will be performed in accordance with the provisions laid down in ADR and will use standard ADR approved drums, IBC's etc. This ensures safe handling and transportation, as per Veolia's procedure Technical Assessors part A – C, OPS/2/002A.

11 HANDLING OF NON-HAZARDOUS WASTE

Waste will be segregated and stored in suitable containers, which will be secured, to stop any waste from escaping, if required, i.e. light waste, cardboard.

Items, which can be re-used, will be stored in a secure / designated area. Electrical items will be stored in the container to protect them from the weather.

Waste containers will be labelled; or signage will be in place to ensure containers are identified.

Large / heavy items of waste i.e. metal, concrete will be stockpiled in designated locations.

All waste management facilities utilised for the disposal and/or recovery/recycling of wastes generated from the facility will be approved by Veolia as per the procedure *Management and Administration of Subcontractors (HS/02/013*).

Efforts will be made to use proximate waste management facilities.

Copies of the Waste Management Licences, Exemptions and PPC Permits for approved third party sites will be compiled and held in the register at the facility office.

11.1 TYPICAL NON - HAZARDOUS WASTE MATERIAL TYPES

Below is a typical list of non-hazardous waste which are related to the decommissioning work and waste handled on site, information is also provided about storage and the waste outcome.

11.1.1 Metals

Scrap metal will be processed by cutting down to 2 x 5 foot sections ready and stock piled before moving from site. Metal will be recycled.

11.1.2 Marine Growth

All marine growth is to be collected and stored on site until the time waste can be sent for disposal.

Additional information regarding managing Marine growth is confirmed in *T4-GYDFII-008 Great Yarmouth Decommissioning Facility Marine Growth management plan.*

Special consideration will be taken to minimise odours and the use of odour suppressants should be considered in accordance with "*T4-GYDFI-002 Great Yarmouth Decommissioning Facility Odour Management Plan".*

Any hard corals (e.g. Lophelia pertusa) observed on recovered equipment will be removed from the equipment, segregated and sent to landfill for disposal. No re-use/recycling of coral is permitted as it is a CITES (Convention on International Trade in Endangered Species of Wild Flora and Fauna) listed endangered species.

11.1.3 CONCRETE/ GROUT

Concrete/Grout will be used for aggregate purposes, to be recycled for construction purposes. Concrete must be stripped of all steel reinforcement before it is re-used as crushed aggregate. If required, the waste will be used as landfill cover.

11.1.4 Wood

Uncontaminated wood shall be sorted and delivered for recovery. Wood items containing larger metal parts must be sorted separately. Impregnated wood shall be handled separately and be declared as hazardous waste.

Wood will be collected and recycled to create wood items / wood chip or to create energy at the local Waste to Energy Facility.

11.1.5 Plastics

Plastics will be stock piled; light plastic will be contained to prevent waste escaping.

All plastic will be recycled, if not possible due to the quantity or type of plastic recovery for energy will be considered.

12 HANDLING AND DISPOSAL OF RADIOACTIVE MATERIALS

Handling and disposal of radioactive materials will be managed in accordance with "*T4-GYDFI-014 Great Yarmouth Decommissioning Facility Managing Radioactive Waste."*

13 WASTE MOVEMENTS FROM SITE

13.1 THIRD PARTY ASSESSMENTS

Before the waste is moved from the site to be re-used / sold permission must be gained from Decommissioning General Manager, who may require permission from the Client/Company.

Before waste is moved to a third party recycling, recovery or disposal site the Project Manager must arrange a third party audit to ensure the site is suitable as per procedure *SYS/2/018 Duty of Care.*

13.2 WASTE MOVEMENT DOCUMENTS CONTROL

The following waste movement document will be completed for all waste movement from site:

- Waste Transfer notes – for Non-Hazardous waste
- Consignment notes – for Hazardous waste
- All documentation will be provided by the waste haulage company (Veolia, Peterson or 3rd Party), who must hold a current Waste Carriers License.
- All documents will be completed in accordance with *SYS/2/018 Duty of Care procedure*.
- Waste Transfer notes – will be kept for 10 years
- Consignment notes – will be kept for 10 years

- Dangerous good note is required, the Dangerous Goods Safety Adviser will confirm if required when completing the assessment of the waste, these will be required for transporting Asbestos and NORM

14 MATERIAL TRACKING AND ENVIRONMENTAL ACCOUNTING

The following reports will be completed with information about waste in accordance with "*T4-GYDFI-005 Great Yarmouth Decommissioning Facility - Completing Environmental monitoring reports procedure".*

- Veolia Green office spreadsheet
- Enablon Veolia Annual Internal Environmental report (Veolia tier 2 procedure requirement)
- Project Environmental report [Excel Spreadsheet]
- Environment Agency Quarterly waste returns to comply with Environment Agency permit EPR/BB3808TU
- Quarterly hazardous waste returns to comply with Environment Agency permit EPR/BB3808TU

The Great Yarmouth site does not have access to a weighbridge. In order to get an accurate weight for the waste arriving at the site, the waste shall be weighed using one of the following methods; by cranes, forklifts and for large structures a ship / vessel survey report will be completed.

Material moved from site will be weighed before leaving or a copy of the weight taken by the weighbridge must be obtained from the facility accepting the materials from Veolia Decommissioning Facility. The Third party waste management assessment table, confirms which

facility has a weighbridge. Veolia sites who will accept material from site all have access to a weighbridge for materials.

15 TRANSBOUNDARY SHIPMENT OF WASTE

Waste transport abroad is not expected directly from site. If required, the condition of the "International Shipments policy" must be adhered. Reference to be made from the government procedure found at *https://www.gov.uk/guidance/importing-and-exporting-waste*.

16 WASTE MAPPING TABLE

Waste mapping table will provide details for the waste recycling, recovery and disposal routes.

The waste map (appendix A) is a live document, to be updated with details of new sites which will help achieve meeting the waste objectives / Waste Hierarchy. Updating is based on experience (i.e. actual waste streams received) and business opportunities with regards to (new) subcontractors. The goal is achieving or exceeding waste objectives. The waste objective is to move the waste higher up the waste hierarchy and recycle where possible rather than dispose.

The waste mapping table includes the following information:

- EWC codes
- Description of waste
- Recycling, Recovery and Disposal site name and address
- Waste Management License / permit reference number
- Disposal / recycling codes as per appendix B

17 APPENDICES

Appendix A – Waste mapping table (Available in Great Yarmouth QHSE planner)

Appendix B – Disposal / recycling codes

17.1 APPENDIX A – WASTE MAPPING TABLE

17.2 APPENDIX B – DISPOSAL / RECYCLING CODES

17.2.1 Disposal operations

Code	Description
D01	Deposit into or onto land
D02	Land Treatment
D03	Deep injection
D04	Surface impoundment
D05	Specially engineered landfill
D06	Release into a water body except seas/oceans
D07	Release into seas/oceans including seabed insertion
D08	Biological treatment not specified elsewhere which results in final compounds or

	mixtures which are disposed of by any of the operations numbered D01 to D12
D09	Phyico-chemical treatment not specified elsewhere which results in final compounds or mixtures which are disposed of by any of the operations numbered D01 to D12
D10	Incineration on land
D11	Incineration at sea
D12	Permanent storage
D13	Blending or mixing prior to submission to any of the operations numbered D01 to D12
D14	Repackaging prior to submission to any of the operations numbered D01 to D13
D15	Storage pending any of the operations numbered D01 to D14 (excluding temporary storage pending collection on the site where it is produced).

17.2.2 Recovery operations

R01	Use principally as a fuel or other means to generate energy
R02	Solvent reclamation/regeneration
R03	Recycling/reclamation of organic substances which are not sued as solvents (including composting and other biological transformation processes)
R04	Recycling/reclamation of metals and metal compounds
R05	Recycling/reclamation of other inorganic materials
R06	Regeneration of acids or bases
R07	Recovery of components used for pollution abatement
R08	Recovery of components from catalysts
R09	Oil refining or other re-uses of oil
R10	Land treatment resulting in benefit to agriculture or ecolgoical improvement
R11	Use of wastes obtained from any of the operations numbered R01 to R10
R12	Exchange of wastes for submission to any of the operations numbered R01 to R11
R13	Storage of wastes pending any of the operations numbered R01 to R12 (excluding temporary storage pending collection on the site where it is produced).

APPENDIX F

FIRE PREVENTION PLAN (DRAFT)

Fire Prevention Plan (DRAFT) Great Yarmouth Decommissioning Facility (Inner)

September 2019

Version 1

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1. Operation Overview

Veolia ES (UK) Limited trading as Veolia is seeking to expand it's existing decommissioning business and add an additional facility at Great Yarmouth – to be known as the **'Inner'** site as it is more in-land. There is already a permitted Decommissioning facility in the immediate area (EPR/BB3808TU – to be referenced as the **'Existing**' site in this document to add clarification) and the Inner site seeks to replicate the activities at Veolia's existing operation on South Beach Parade. This is in response to the increase in predicted waste tonnages that are expected in future.

Veolia propose to use the Inner site for the receipt of marine vessels and structures (including platforms, jackets, rigs, wind turbines and similar units) for decommissioning, dismantling, disposal and recycling. In addition to the dismantling of onshore structures such as wind turbines and ELVs i.e. train carriages.

The intention is that each item to be dismantled will be treated as an individual project, such that all methods and risk assessments are carried out on a case by case basis.

Before arrival at the quayside, an inventory of the materials contained within the structure is obtained to allow the production of a waste management plan for that structure.

Once landed at the site, the item will be inspected to ensure that it is consistent with the waste inventory, and that it is safe for the proposed decommissioning. From here it will be transported the short distance via road to the new site.

Where appropriate, hazardous substances such as oils, fluorescent tubes, capacitors and mercury switches are removed. These will be repackaged (if necessary) and stored on site in the dedicated Hazardous Waste Storage Area/Wash Bay, which is appropriately bunded, prior to being transferred to a suitably licensed facility.

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At present it is not proposed to manage Naturally Occurring Radioactive Material (NORM) at the Inner site. This waste will be managed by Veolia's existing Radioactive Substances (RSR) Permit (EPR/EB3595DZ) held at the Existing site.

Once depolluted, any reusable items (such as working pumps) are removed. Then the item is stripped of any other readily accessible materials (like doors, fixtures and fittings), the item is then ready for dismantling.

In general, Veolia primarily use method BS6187. This method weakens the structure and then it is pulled at a pre-determined point to bring about collapse. This allows a controlled destruction of the structure (primarily the Jackets), without having to use explosives. Other techniques employed on the Topsides include high-reach excavators with specialist shearing equipment and removing small items using hot and cold cutting techniques and lifting operations.

Once collapsed, the components are cut into easy to handle lengths and then segregated into different materials to await collection for recovery.

Dedicated bunded areas will be used for storage of the structures, which may have the potential to cause leaks and spillages. Surface water run-off from the sealed drainage areas will be managed by a surface water management system and discharged to sewer. At the time of writing a sewer connection application has been submitted to Anglian Water (ref: ALD-0068671) and a Trade Effluent Application to Business Stream.

Surface water collected from the Hazardous Waste Storage Area and Wash Bay will be dealt with in accordance with a tier 4 procedure. The water from wash bays and bunds procedure T4-GYDFI-009.

It is anticipated the facility could handle up to 150,000 tonnes of structures for decommissioning per year. There are a significant amount of platforms in the Southern North Sea which are reaching the end of their lives, and these will need to be decommissioned in an environmentally safe manner.

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Veolia currently has three other decommissioning facilities for oil and gas structures. These are at Greenhead Base and Dales Voe on the Shetland Islands and at Great Yarmouth (as mentioned earlier). The geographic spread of these sites means that Veolia can cover much of the North Sea area.

At these sites, in other decommissioning projects which have been undertaken we have managed to obtain a reuse, recycling and recovery rate of greater than 96% of the weight of the structures being dismantled.

The location and indicative general arrangement of the facility is shown on the site plans (ref No. GYDF-S2-PLAN-01 and PLAN01) provided in Appendix A. The activities will be carried out within the permitted boundary which is shown in red on the PLAN01.

Given that the marine structures are largely made up of metal (>90% on average) and once they have been depolluted and dismantled, we do not consider the clean processed metal stockpiles fall within the scope of combustible waste as defined by the Fire Prevention Guidance. Consequently these piles will be excluded from the requirements of the Fire Prevention Plan (FPP). The FPP is therefore written with the management of the separated WEEE, plastics, wood and general waste, that make up <5% of the input material and the oil-contaminated metals, that have been removed from the structures and are yet to be processed (approximately 1%) in mind. These materials will be stored separately and be subject to close management to reduce both storage times (prior to removal off site) and potential for fire risk.

We also consider the complete structures as they are stored on the site (prior to dismantling) within the scope of the FPP. However given that their size and volume will exceed the maximum pile sizes, as set out in the Guidance, we offer alternative measures to monitor and manage potential fires within these ‘waste piles’.

This Fire Prevention Plan (FPP) incorporates measures designed to meet the following objectives:

- Minimise the likelihood of a fire happening;

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- Aim for a fire to be extinguished within 4 hours; and
- Minimise the spread of fire within the site and to neighbouring sites.

This FPP identifies measures to be employed to reduce the likelihood of fires from the handling, treatment and storage, and management, of all wastes received at the Facility. In addition, the Plan identifies measures to be employed in the event of a fire in order to limit the damage caused to the environment or human health.

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2. Detailed Process Stages

2.1 Waste Inputs

It is proposed that the facility would accept up to approximately 150,000 tonnes/yr of marine and on-shore structures for disassembly, sorting, segregation and storage of waste materials, either for recovery for recycling, disposal or re-use. Offshore platforms are comprised of Jackets (which are the underwater legs and structure for the rig / platform) and Topsides which are comprised of modular components providing the various facilities of the platform.

It is estimated that up to 20 structures, ranging from 0.5 to 45,000 tonnes, will be stored at any one time awaiting dismantling. Furthermore there is likely to be smaller piles of contaminated metals (such as flow lines) and suitable containers with WEEE, plastics, wood and general waste stored at the site.

Combustible wastes will be processed in an efficient manner to ensure prompt turnaround to reduce any possible odour and / or heat build-up. Storage on site pending off site reuse, recovery or disposal will be temporary.

The site will be designed to treat up to 150,000 tonnes/yr. The estimated yield is shown in Table 1.

Table 1: Estimated tonnages

	Approximate yield
Clean steel and metals for recycling	86%
WEEE	1%
Non-metals for recycling (wood, plastic, concrete etc)	1%
Components sold for re-use (turbines, generators etc)	3%
Hazardous waste for recovery	7%
Hazardous waste for disposal	1%
General waste for disposal	1%

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Any hazardous waste or incorrectly declared streams will be stored within the hazardous waste storage area and dealt with in line with local procedures and guidance as detailed in the management system.

A full risk assessment for handling wastes is undertaken prior to opening any new facility. However the following is an outline of possible risks and the control measures that will be introduced to minimise any risk as far as reasonably practicable.

Perceived Risk	Rating	Proposed Control measures
Hot Load on vehicle at disposal point	Low	• Types of waste received at site are unlikely to contain hot loads • Pre-acceptance inventory setting out waste types on the structure • Waste inspection on arrival at site. • Fire fighting equipment with trained staff
Flammable / Reactive waste streams	Low	• Waste segregated off shore prior to arrival at site, in accordance with appropriate transport regs. • Pre-acceptance inventory setting out waste types on the structure • Waste inspection on arrival at site. • Remove any identified flammable materials and quarantine
Heat Build up within waste stream	Low	• Minimal amounts of combustible waste will be stored within the facility
Explosion caused by friction of blade edging	Low	• Types of waste received at site are unlikely to generate explosion of any kind • All activities carried out side • Fire Fighting equipment
Processing of metal wastes	Med	• Mechanical cutting to be used in preference to hot cutting • Trained members of staff • Risk Assessments and Method Statements (RAMS) in place before work commences. • Permit to Work for Hot Works • Fire Fighting equipment • Fire Watchers in place when carrying out Hot Works

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2.2 Processing (new operation)

All materials will be sorted into separate waste streams in the materials recycling area in accordance with the appropriate management plan, this includes:

- Separation of metals for recovery and reuse
- Separation of cables for recovery and reuse
- Segregation of compatible and incompatible wastes;
- Hazardous materials in allocated hazardous waste storage area;
- Non-hazardous materials;
- Waste liquids in designated containers;
- Quarantine for unknowns.

NB: Large structures could take many months to dismantle fully, therefore segregation many be done over a long period of time.

Method of transport for recovery and disposal will be determined on a project basis with due regard for the environment.

In order to fully comply with Duty of Care requirements, all waste materials sent for final disposal will be tracked and the method of recovery or disposal identified, weights will be obtained for all consignments at the point of recycling/disposal.

Waste Consignment Notes, Waste Transfer Notes and Dangerous Good Notes will be used in accordance with legislative requirements.

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Normal activities

As noted above the site will be operated using documented management system and managed by suitably experienced and qualified management team.

The installation activities will comprise of the disassembly, sorting, segregation and storage of waste materials, either for recovery for recycling, disposal or re-use. Offshore platforms are comprised of Jackets (which are the underwater legs and structure for the rig / platform) and Topsides which are

comprised of modular components providing the various facilities of the platform. Also waste may arrive in containers.

Much of the waste generated in the dismantling process can be recycled with typical recycling rates of 94% for topsides and 98% for jackets. A range of recovered wastes are produced which are inert and non-hazardous (e.g. metal, plastics and wood), however a small percentage of wastes are hazardous and must be managed accordingly.

Each decommissioning project is unique in the process that is applied, but generally structures will be brought to the site by Heavy Lifting Vessel (HLV) or vessel / barge, offloaded to the quayside using cranes. The heavy lifting vessels will only be able to access the deep water berth at the north east of the facility. Vessel / barge off-loading is likely to be the most common form of delivery to the facility.

This initial stage of the decommissioning project is critical as it establishes the requirements for the whole process. The pre-planning timescale varies depending on the scale and complexity of the decommissioning project, from a number of weeks to over a year. Time invested in pre-planning helps to ensure that waste arriving to the site can be adequately planned for (i.e. with sufficient lead-in times) and experience has shown that relatively small amounts of materials required to be quarantined prior to acceptance or rejection.

On contract award a number of audits are carried out to determine, in more detail, what waste materials are present on the structure to be decommissioned. This information allows the facility Site Manager to prepare in advance for the wastes they will receive. The wastes are stored appropriately to their hazard/contamination risk and labelled to display their key characteristics. When piece small methodology is used a transport manifest will follow each waste container. When reversed installation methodology is used a transport manifest will also follow waste containers, but in addition a hazardous material inventory document will be prepared for each module.

The materials arriving at the facility are classified in accordance with the Waste Management regulations as either hazardous or non-hazardous or inert.

Once the wastes are received to the site at the quay side they are processed at the site. Activities here include cold and hot cutting of steel and metals to more manageable sizes, stripping out of hazardous materials (e.g. asbestos) and removal of non- hazardous wastes. Marine algal growth is also removed, by physical processes, at this point. Wastes are then transferred to their relevant storage area prior to removal off site.

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Where scrap metal waste has been identified as containing potentially hazardous materials these are transferred to the Hazardous Waste Storage Area or designated storage area prior to removal off site.

Storage may be on pallets, in cages and container units or skips depending on the nature of the material with the exception of clean inert steel which will be stored in bays on the designated open storage area. All wastes storage areas are labelled. Hazardous wastes are stored within the Hazardous Waste Storage Area.

All waste fractions are dispatched, to suitably licensed contractors, under the appropriate transfer consignment documents.

Abnormal activities

Should any wastes arrive at the site where their key characteristics are not known these are transferred to the Hazardous Waste Storage Area to a holding area or Quarantine area until further investigations confirmed the identity of the waste and hence appropriate, storage, handling and forward processing requirements.

Waste management

There are two separate waste streams applicable to the facility. The mainstream (by volume) is waste handled as a result of the various wastes received that are then classified, sorted, treated where necessary and segregated prior to removal off site.

The second waste stream, which is a much smaller volume, is produced as a by-product of the operations at the facility and not imported as waste onto the site for processing. Typical wastes in this stream would be paper, waste oils/grease, small chemical containers and food.

Regardless of the stream all wastes will be sorted and segregated and disposed of to a suitably licensed contractor, using the principles of the waste hierarchy and opportunities sought for re-use, recycling, and recovery sought rather than final disposal to landfill or incineration without energy

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recovery. In this regard much of the waste material leaving the facility will be recycled or recovered with limited final disposal of waste.

The majority of segregated wastes being removed from the facility will be transferred by vessel, although some small scale road haulage will be inevitable.

Suitably licensed contractors have been identified, with discussions continuing as to which contractor(s) will be commissioned for the removal of materials from the site. Therefore it is not possible to fully confirm the disposal/recycling and recovery routes for waste material.

All waste carriers used will be registered to carry the types of waste they remove from the site. Veolia will maintain a database of "approved" waste management contractors and waste carriers that can be used to remove waste from the proposed facility. The database will be reviewed and waste management facilities audited on a regular basis and any contractors not performing will be removed or substituted.

2.3 Control of ignition sources

Perceived Risk	Rating	Proposed Control measures
Arson or vandalism	Low	• Site perimeter enclosed with security fencing and locked gates out of hours • CCTV surveillance and call out outside of operation hours to be considered • Harbour access controlled by manned security
Self-Combustion and hot loads	Low	• Waste acceptance procedures and inspection of incoming loads for any signs of smoke. • Hot loads are unlikely to be an issue, but will be quarantined as necessary • Minimising storage times, where applicable. • All operations carried out outside
Dust	Low	• Work carried out outside • Minimal potential for dust to arise due to the nature of the activities carried out on site. • Good housekeeping to prevent dust build up.

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		Daily Inspections. • Dust Management Procedure
Plant/equipment failure	Low	• Plant and equipment maintained in line with manufacturers recommendations and corporate procedures. • Alternative plant can be hired in at short notice should it be required. • Prompt reporting of faulty equipment/machinery
Flammable items	Low	• Mobile Fuel tanks are bunded • Flammable stores for temporary storage of small items of flammable waste
Electrical faults	Low	• All building electrics fitted and certified by qualified electrician and maintained in line with manufacturers recommendations • Prompt reporting of faulty equipment/machinery • Portable equipment testing
Naked lights/discarded smoking material	Low	• No smoking permitted on site and reinforced with signage.
Hot works	Low	• Permit to work and hot work permit system in place as part of Veolia Management System.
Use of industrial heaters	n/a	• Not used on site.
Spark detection systems	n/a	• Not used on site.
Hot Exhausts	Low	• Plant not parked near waste and maintained in line with manufacturer's warranty • Traffic Management Plan • Veolia Fleet replacement policy
Incompatible wastes	Low	• Gas containers and flammable items to be stored appropriately on site.

Ignition sources will be located at least 6m away from combustible wastes, with the exception of hot works used to dismantle metal wastes (but under permit to work controls).

As part of staff training they will be given specific training on how to deal with fuel spillages. Spill kits will be provided at various stations across the site and within site plant. The site has an Emergency Response Team to deal with spillages.

With regards to training, we would include an overview of the Fire Prevention Plan and Emergency Management Plan as part of the staff induction pack.

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There will also be appointed Fire Marshalls, who will undergo the relevant FPP training. This includes all the above and basic firefighting with hose / extinguishers.

The site emergency response team will complete a fire safety awareness course that will cover prevention techniques and basic understanding of firefighting equipment.

2.4 Storage & loading

2.4.1 Structures awaiting processing

As discussed in part 1 above, incoming topside structures will be considered as part of this FPP despite their size and weight exceeding the maximum pile size guidelines. Measures to detect fires in the first place, minimise the potential for them to occur and limiting fire spread and environmental harm if they occur will be detailed in the following sections.

Any combustible waste will be removed prior to hot works being carried out in the vicinity to minimise the potential for fire to occur and spread.

Structures will be stored with separation between them of at least 6m to minimise the risk of fire spreading and to enable access to deal with them, if they occur.

It should be noted that structures will be >90% clean metal, however there will be fractions of non-hazardous and hazardous materials, some of which will be combustible.

2.4.2 Wood, WEEE, Plastic and General Waste Residues

As part of the dismantling process a soft strip will remove plastics, wood, WEEE and general waste. This waste will be stored in separate skips prior to recover or disposal off site. The location of these skips may change, depending upon operations.

Storage times will be minimised as much as practicable.

These measures will ensure that in the event of a fire, it can be managed effectively and quickly to ensure burn time is limited to <3-4 hrs.

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2.4.3 Contaminated Metals (ferrous and non-ferrous)

The process will separate contaminated metals (including pipework) off the platform from clean scrap. These residues will be stored in various piles awaiting decontamination, cutting and transport off site. The location of these piles will vary to fit in with site operations, however the appropriate separation distances will be observed at all times.

Other residues such as plastic will be removed and stored separately.

Maximum stockpile size will be approximately as follows, however It is important that flexibility is maintained in respect of the actual size of any stockpile, subject to the limits imposed by the Table.

Waste pile	Max length (m)	Max Depth (m)	Max Height (m)	Max volume (m^3)
Contaminated Metal (<150mm)	6.5	6.5	4	170
Contaminated Metal (>150mm)	6	10	3	180

The piles will be separated by a 6m separation distance.

Storage times will be minimised as much as practicable. By limiting the time over which waste materials are stored, and providing suitable separation distances between each individual stockpile, the Facility limits the potential for the outbreak or spread of a fire.

2.5 Storage Duration

The nature of the decommissioning of an off-shore installation is such that the Facility seeks to dismantle and process each received load as quickly as is reasonably practicable, in anticipation of the next load from the offshore installation. However, the decommissioning of an entire large offshore installation could be expected to take between 6-12 months.

Where a decommissioning contract is complete, the Facility is cleared as quickly as is reasonably practicable in order to allow for the inspection, cleaning and maintenance/remedial works (if required). This process is undertaken prior to the acceptance of any new structure.

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No combustible waste is stored for a period of longer than three months at the Facility. As such, and given the nature of the materials to be stored at the site, no shading of the stockpiles is considered necessary.

2.6 Security & Access

The permitted area is securely fenced. In addition the site will have CCTV coverage. Access to the harbour is restricted by the Port Authority.

The local Fire Service will be consulted.

All plant will be parked away from material stored on site and the access road will be kept clear at all times.

The nearest fire station is approximately 1.7 miles away at Friars Lane. Access to the site can be reached at all times of day.

2.7 Fire Detection and Suppression Systems

The site does not have a fire detection system. However, during operational hours Fire Wardens will be used and inspections will be completed after any hot works, in line with permit to work requirements. It should also be noted that hot works carried out on the structure itself will be concluded at least 3 hours prior to the end of the shift to allow sufficient inspections to be carried out.

During out of hours the site benefits from security patrols by the Port Authority.

All operations will be carried out outside, which may lessen the potential for fire to occur.

The site has mains water connection but at the time of writing we need to confirm the water supply volumes, hence this document is Draft.

Based on operations at the Existing site at Great Yarmouth we envisage that the water supply requirements would be as follows for the contaminated metals piles:

- 1,200 l/min for >150mm
- 1,130 l/min for <150mm

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In addition, a bowser (approx. 2,000 litres) will be kept on site and used to supplement firefighting measures set out in this document.

In addition to mains water for suppression of fire in the waste piles, we will utilise the following measures on the structures:

- IBCs filled with water and mobile pumps at various locations around the structure
- Fire extinguishers in place during hot work
- On a project by project basis additional water pumps (utilising sea water) will be considered as part of the fire risk assessment

The site also has access to sand which can be used on the contaminated metal piles and (following assessment) used to suppress fire in the skips.

To following summarises the management techniques for handling potentially combustible material:

- Combustible waste stored in skips
- Isolated piles of contaminated metals on the ground
- Minimal storage times
- Fire detection and suppression procedures on the structures

2.8 Quarantine Area

The quarantine area will be mobile depending on the location of operations and storage of wastes.

The quarantine zone has been designed so that a 6m area around the perimeter of any burning or unburnt material can be maintained at all times.

The quarantine bay has been sized to deal with the 50% of the largest contaminated metal waste pile on site (180m^3).

2.9 Monitoring

In addition to the monitoring stated above during hot works, daily site inspections will be carried out during operational hours.

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Mobile plant and equipment inspections will also be carried out.

2.10 Fire Fighting Strategy

In the event of a fire taking place within the permitted area, the most effective fire strategy would be to extinguish any fire as soon as possible and therefore a 'Controlled burn' would not be a favourable option.

The Fire Service have the option to enter the site to tackle the fire.

Firefighting equipment will be located in various locations around the site, on the structure(s) and within the welfare buildings to manage small fires that may arise as a result of the operation; in the case of a large fire, the evacuation plan will be put in place to exit the site and allow the fire service to intervene.

All mobile fuel tanks are stored away from the operation activities. The site plan also clearly shows access for fire fighting crews and engines.

The location of the hydrants are shown on the site plan.

Daily monitoring and site inspections are carried out which include the integrity of all fire equipment including fire alarms and fire extinguishers. Fire alarms are tested weekly and fire drills are carried out six monthly.

The site also maintains a Fire Log.

An inspection of the waste piles stored at the site will be carried out at the start of each shift.

The management techniques described in his plan would ensue that in the event of a fire this would be controlled and limit burn times to <3-4 hrs.

Training will be provided as described above and Fire Wardens appointed to ensure adherence to the Plan.

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2.11 Training

The Emergency Response Team will be trained on how to prevent fires on site, how to identify fire risks and how to spot fires on site. Whilst the permitted activities are undertaken, there will always be at least one, suitably trained, operations staff member on-site.

All staff are provided with information and training on fire prevention, protection requirements and action to be taken in the event of fire. New members of staff are given information or training on:

Procedures and their personal responsibilities to prevent and protect against outbreaks of fire;

- What action to take if they discover a fire;
- How to raise the alarm, the location of manual call points, and the procedure for contacting the Fire and Rescue Service and the EA;
- What action to take immediately upon hearing the fire alarm;
- The location and safe use of portable or other fire extinguishing equipment
- The location of escape routes from their place of work including those routes not used regularly for normal access and egress
- Their responsibility to direct or escort visitors and contractors in their charge to escape routes (and in the case of disabled persons to the nearest useable escape route or refuge)
- The importance of keeping closed all fire doors to limit the spread of fire, heat or smoke
- How to safely isolate or shutdown plant or equipment, where appropriate
- The importance of good housekeeping in preventing the outbreak of fire and limiting its effects

All employees are given basic fire safety information and training covering the above elements during their site induction.

Fire safety and emergency information for visitors and contractors will be provided at security or reception where they are required to sign-in and during the site induction.

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All staff undertaking roles that have specific responsibilities under this Fire Prevention Plan are given additional instruction and training appropriate to that role.

Staff who carry out fire risk assessments are provided with sufficient information and training as required to ensure their competence.

All staff and contractors working on site are made aware and understand the contents of the Fire Prevention Plan and the procedures that are in place in the event of a fire on site.

Six-monthly fire drills and exercises are undertaken. Such drills will include ensuring how well the FPP works and that all staff understand all of the requirements of it.

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3. Environmental Considerations

3.1 Drainage & Firewater Management

The site will be designed so that any fire water applied to the structure, or combustible waste piles and/or skips will be contained and managed by the surface water management system. The water will be retained within the site, before being pumped to sewer (if compliant with the Trade Effluent Consent) or tankered off site. Surface water run-off from the sealed drainage areas will be managed by a surface water management system and discharged to sewer. At the time of writing a sewer connection application has been submitted to Anglian Water (ref: ALD-0068671) and a Trade Effluent Application to Business Stream. Details of the surface water management system have yet to be finalised.

All potential combustible waste will be stored in small piles or skips within the decom pad. The pad itself and surface water system will be designed to cope with the demands of 1,200l/min water supply over 3 hours (216m^3). We do not envisage that a fire in a skip holding recyclates or general waste or a small pile of contaminated metal will burn for greater than 3 hours and therefore the firewater retention capacity of the decom pad is deemed to be sufficient. However in the event that additional time (and water) is required to put a fire out, then firewater in the interceptor could be pumped out and used back on the fire. Consequently additional pumps will be held on site for this purpose.

If required, additional storage tanks or road tankers will be made available to assist with removing firewater once a fire has been extinguished, in order to get the facility operational again.

The topsides which contain combustible wastes are subject to a series of alternative measures to prevent fires and dealing with fires. Because combustible waste would not be piled up in this situation but rather held in situ it is difficult to calculate how much water (or indeed fire extinguisher) would be needed. It is also difficult to predict whether or not the firewater would be contained on the structure or not.

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Indicative details of the surface water system for the site are shown on plan ref: GYDF-S2-PLAN-01.

3.2 Amenity Issues

The area surrounding the site is predominantly industrial in nature, with a large aggregate storage and distribution premises to the south of the site and industrial premises to the north and west. The location of sensitive receptors is set out on plan ref: VES_DT_YARM_200_002 in Appendix B. Note that is based on the Existing site at Great Yarmouth and will be updated.

Should any fire create large amounts of smoke to be blown off site, the Manager/Supervisor will contact the Port Authority – Peels Port.

The nearest watercourses is the River Yare, classified as a Primary River it is located 163 m west of site and flows north to south into the North Sea.

The North Sea mean high water level is located at 100 m east of site within the harbour. The site is shown to be in Flood Zone I in the western half of the site, whilst the east of the site is within a Flood Zone II and III moving further east. The Flood Zone I indicates an annual probability of flooding of less than 1 in 1000 (0.1%) from nearby from rivers or seas. The Flood Zone II and III indicate an annual probability of flooding of between 1 in 1000 and 1 in 200 and greater than 1 in 200 from the sea respectively, since this is based on tidal models.

The site is located within 63 m and 64m respectively of a Zone 2 and Zone 3 Flood and within 50m of an area susceptible to groundwater flooding from an unconfined bedrock aquifer. Based on the geological setting the highest susceptibility is acknowledged to be of limited potential with a low confidence rating.

3.3 Contingency measures and Removal of Residual Material

In the event of a fire, the site will be closed.

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Following the extinguishing of a fire and only when the site is cleared of all fire damaged wastes, fire water and the infrastructure repaired, checked and drainage systems cleaned and reinstated will the site be in a position to re-open. Prior to re-opening the local Environment Agency officer will be contacted and evidence provided to demonstrate the site is fit for purpose.

Fire damaged wastes can be directed to the nearest appropriate facility after assessment.

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4. Site Specific Documentation

4.1 Emergency Management Plan

Site Name	Great Yarmouth Decommissioning Facility (Inner)		Environmental Permit Reference: EPR/ HP3806PG
Address: and Grid Reference	South Beach Parade Great Yarmouth Norfolk NR30 3GY The site is centred on National Grid Reference: TG 53147 04575		
Operating Hours	07:00 – 19:00 (may change due to work activates)		
Facility Type:	Decommissioning and hazardous waste material transfer station adjacent to quayside.	No of Staff Site: Office:	Site: 1 – 15 Office: 1 -5
Site Manager	Ian Gilleard Mick Andrew Ian Porter	Telephone:	07787 154765 07919 376319 07730 415048
Route From Nearest Main Junction **From Norwich take A47 east. Once in Great Yarmouth take the A149 south then at the next roundabout the B1141 which in turn meets the A1243 for 1.5 miles south. Take a left down Hartmann Road then right at the junction on to South Beach parade. Sign in at the manned security gate before proceeding 100m to the site.**			
RESPONSIBILITIES/CONTACTS **In the event of an emergency/incident contact:**			
Emergency Co-ordinator 1	Ian Gilleard	Telephone:	07787 154765
Emergency Co-ordinator 2	Mick Andrew	Telephone:	07919 376319
Area Manager	Mark Andrew	Telephone:	07786 151129

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General Manager	Simon Davies	Telephone:	07826 874284
Business Line Director	Ian Williams	Telephone:	07793 467152
QHSE Manager	Keith Harrison	Telephone	07721 862 251
Crisis Hotline	08450 710755		
Emergency Spill Response	0800 7838020		
Emergency Services Direct Dial	(9)999		

INSTRUCTION

In the event of a fire:

Calling out and continuously sounding the air horn located at the nearest emergency station.

- Note that two short blasts of the air horn indicate a crane lift taking place

Call the fire brigade immediately 999 ask the operator for the fire service, provide details of the fire and the address (see page 1 of this document) if required (not controllable)

Call to the fire brigade to be made by phone, if you have no phone call on the radio or shout until a person confirms the call has been raised.

Tackle the fire using the appropriate fire fighting equipment if trained to do so (do not place yourself in any danger), keep in communication, to ensure other persons know your location and you are safe.

See the section “Fighting fire” for additional information regarding fire fighting.

On hearing the alarm:

1. Stop task and make the work area safe
2. If driving or operating a vehicle, park in a safe place, turn off the engine and leave keys in the ignition.
3. Walk to the fire muster point by the shortest safe route, if indoors by using the nearest available exit, must point located outside the site gates.
4. Check that personnel wearing hearing protection have heard the alarm.
5. Close all doors behind you as necessary.
6. Do not re-enter the platform/building/site until informed by the emergency coordinator that it is safe to do so.

Do not re-enter the platform/building/site until informed by the emergency co-ordinator that it is safe to do so.

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Asbestos workers muster point

If asbestos workers are on site working in an asbestos controlled working area, asbestos workers muster point to be created and located away from the main muster point and main access route, to prevent any possible contamination, from their PPE in the event of an emergency evacuation from the workplace.

The location for the "Asbestos Workers Muster Point" sign will be agreed with the asbestos contractor and Project manager.

After any evacuation there PPE will be bagged (Approved asbestos bag) and disposed of in the asbestos container.

Fire Fighting

Fixed locations for fire extinguishers are at the emergency stations and in the store, also at the offices and welfare cabins.

Also, additional fire fighting equipment located in the workplace, including IBC's of water on platform structures.

The fire hoses are to be positioned in the work locations as determined by the risk assessment.

Sand is sometimes available on site, which can also be used.

Water supplied by fire hoses from a water bowser, additional water gain from interceptor, if required.

Site emergency co-ordinator will confirm what action is required by the site emergency team to prevent the fire from spreading and also to control/put out the fire after assessing the situation for safety and deeming safe.
The following actions:

- Prevent fire spreading by moving cylinders, fuel bowers, mobile plant and vehicles.
- Removing item on fire, if possible to the Fire quarantine area, if not move other waste/items out off the path of the fire.
- Direct staff to put the fire out using the site fire fighting equipment.
- Direct staff to ensure water supply is available to the bowers if required.

On the arrival of the fire brigade if applicable the fire brigade will take control.

Roll call to be conducted using:			
Staff:	Individual Contract Register	Location:	Site Office

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Visitor:	Supervisor or Security Team	Location:	Site Office
All other incidents should be reported immediately to the Emergency Co-ordinator			

Appendices (in addition to company form)

SITE INFORMATION (Annotate on Plan)	
Hazardous Materials: Type, Quantity and Location	**Small containers of hazardous material example grease, oil & marker paint (stored in flammable cabinet)**
Explosive Substances/Fuel Nature and Location	• **Petrol (stored in Flammable cabinet)** • **Gas cylinders (stored in Cylinder cage)** • **Gas oil stored in fuel bowser (located near in the decommissioning area opposite the office)**
Maximum Quantity and Nature of Waste	• **Main type of hazardous waste expected on site will be oily waste** • **Oil waste (stored in UN approved drums / IBC in the bunded area, possible 10 tonnes at any one time (amount of waste reviewed for each project).** • **Scrap metal processed for recycling will be segregated from other waste.** • **General waste to be stored in skips/containers** • **Separated recyclates to be stored in skips/containers** **A log of the waste on site will be available**
Machinery/Vehicles on Site	**Fork Lift Truck, Excavator and Mobile Elevated Working Platform when required** **Mobile plant will be park in the decommissioning area, this location may change due to site activites.**
Power/Gas/Water Isolation Point	**No Gas.** **Water isolation point (TBC)**

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	Electric isolation point (TBC) **Both are controlled by Peterson (01493 334730)**
On-Site Fire Fighting: **Fire Hydrant/Water Access**	**Fire extinguishers available at the Emergency stations** **Water tap available (TBC)** **Water Bowser (2,000 litres) available** **Additional assessment will be complete when a platform is on site to confirm extra water resources and fire fighting equipment.** **Sand may be available**
First Aid Station	**The Emergency stations provide eye wash bottles and first aid kits.** **First aid boxes are also available at the Mess Room and Site Office if available on site.** **Defibrillator located in the site office.**
Muster Point Location	**Muster Point: Outside the site gates.**
Full Emergency Plan Location (If Applicable)	

Environmental Receptors	
Foul Sewer System/ Sewerage undertaker	**N/A – Cess pit**
Surface Water Drainage System: Watercourse Name and Distance	**Surface Water Management system. Drainage to Sewer (TBA) but only if effluent complaint with the Trade Effluent Consent (TBA)** **The nearest watercourses is the River Yare, classified as a Primary River it is located 163 m west of site and flows north to south into the North Sea.**

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Aquifer Status	**Not in a Surface water or Groundwater Safeguard Zone**
Sensitive boundaries and receptors e.g. Schools, nature reserve	**The site is located next to the harbour quay, which leads on to the North Sea.** **The site is located in an industrial setting.**
Potential cumulative emergency effects	**Emissions to Air – Particulates: Abatement measures in place.** **Emissions to Water – All water to be discharged to sewer. Non-compliant (with the Trade Effluent Consent) water to be tankered off site.**

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4.2 Management System

Veolia ES (UK) Limited has a detailed management system which is audited to the three main standards, ISO 9001, ISO 14001 and OHSAS 18001. The following documentation should be considered during any planning, reviewing or auctioning of the above plan.

Document Name	Description	Reference Number
Environmental Aspects/Impacts	A review of the site and its operations to	ENV/2/004/001
Document Name	Description	**Reference Number**
Veolia PPE Risk Assessment	A review of applicable PPE required dependant on type of work activity	BMS
General Health Risk Assessment	This document highlights health based risks and the control measures in place to minimise the risk rating.	L001
General Site Activities & Safety Risk Assessment	A Review of elements such as vehicles utilised, environmental risks, risks posed by weather, fire or arson risks applicable to the Leeds Paper Pulp site	HS/2/044/001
Handling Special Wastes Risk Assessments	A review of the risks posed by handling items such as WEEE or quarantined waste types	HS/2/044/001
Lone Worker Risk Assessments	This document reviews the risks and control measures in the event of lone working	HS/2/044/001
Operational Area – Recycling Risk Assessment	This documents looks at the risks associated with tipping, handling and loading within the Recycling area	HS/2/044/001
Cleansing Operations Risk Assessments	This document looks at the risks and control measures associated with site cleansing in both mechanical and manual forms	HS/2/044/001
Operational Area – Tipping Hall Risk Assessments	This document looks at specific risks and control measures for activities within the main tipping hall	HS/2/044/001
Operational Area – Weighbridge Risk Assessments	This document reviews the risks associated within the weighbridge area and the control measures in place. Activities such as vehicle movements and DSE amongst others are reviewed	HS/2/044/001
Fire Risk Assessments	A review of the risks associated with fire. An assessment is carried out for each populated area of the facility	HS/2/028/001
Workplace Transport Risk Assessments	This document looks at vehicle movements and activities within the facility and includes surface types, reversing, sheeting etc.	HS/2/041/001
Manual Handling Assessments	A review of the risks posed by manual handling on site and the control measures in place to minimise the risk	HS/2/020/002

COSHH Assessments	This document analyses the chemicals used on site, including but not limited to, Plant fluids, fuel and Hand cleansing products. SDS are attached	MUN/3/010/001
Assessment of **First Aid Needs**	A review the first aid requirements on site, based on factors such as time of day, number of staff , activity and location	HS/023/001
Document reference numbers are correct at the point this document was reviewed, some environmental documentation is cross fed into H&S documents		
Document name	Description	**Reference Number**
Corporate commitment statement / policy	These individual policies cover, Health & Safety, environmental sustainability, Quality, corruption, crisis management, major accident prevention policy amongst others	NA
Local working procedures	These are local instructions specific to the site based on both legal and company requirements	Various
Permit to Works	These documents are issued both authorised site personnel to control activities from General works through to working at heights, isolation, hot works etc.	HS2/010
Assessment & Control of Contractors	This procedure is used to ensure that whilst contractors are on site they are working in a safe manner to prevent damage to persons or the environment. Contractors are monitored on site after an induction has taken place.	HS/2/013
Provision and Use of PPE	The purpose of this document is to ensure that all the health and safety requirements as laid down in the Personal Protective Equipment at Work Regulations 1992) and which relate to the purchase, issue, use and storage of Personal Protective Equipment is being met in all parts of Veolia	HS/2/026
PUWER	The purpose of this procedure is to ensure that the Provision and Use of Work Equipment Regulations 1998 are complied with	HS/2/008
LOLER	The purpose of this procedure is to give direction on the responsibilities and requirements related to UK legislation covering the provision and use of lifting operations and lifting equipment and ensuring that the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER) are complied with.	HS/2/009
Learning and Development framework	This document and the documents it relates to assist in a continual development program for staff, from yearly reviews to utilising the in house Campus to provide the relevant training	NA
Document reference numbers are correct at the point this document was reviewed		

5 Site Plans

The location and indicative arrangement of the facility is shown on the site plan ref No. GYDF-S2-PLAN-01, as set out in Appendix A. However this requires alteration to bring it in compliance with FPP requirements.

DRAFT

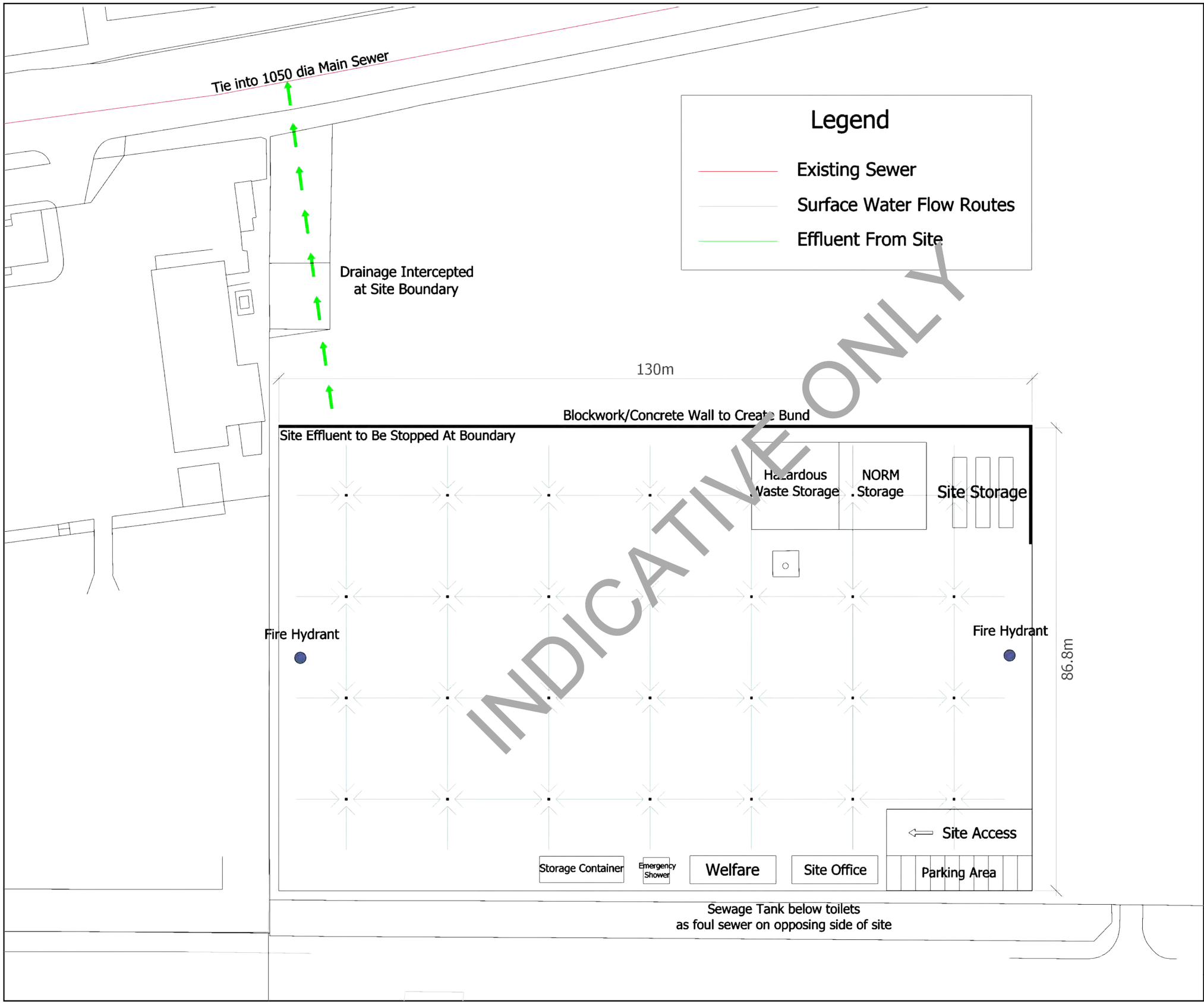
6 Key Receptors Plan

The Key Receptor Plan has yet to be finalised. However the receptor plan for Veolia's Existing site at Great Yarmouth located 100m south of the Inner site is included for reference only.

DRAFT

Appendix A

DRAFT



INDICATIVE ONLY

GENERAL NOTES

Details

Drawing is for comment and information.

Precise location of routes of services are still to be determined, so not shown on this layout for clarity.

Number of parking spaces is approximate at this stage.

Size of office and welfare facilities are approximate at this stage. Office and welfare may be double stacked to save site space.

Positions of fire hydrants is indicative, and not confirmed until routs of water mains are confirmed.

PETERSON

PROJECT

Tent Site Expansion - Great Yarmouth Outer Harbour

CLIENT

Veolia Peterson Joint Venture

TITLE / DESCRIPTION

Proposed Site Layout for Comment

	DD/MM/YY	Drawn	REMARKS	Apprvd
A1	27/09/19	KB	Issued for Comment	JJ

Drawing No. **GYDF-S2-PLAN-01**

Rev. **A1**

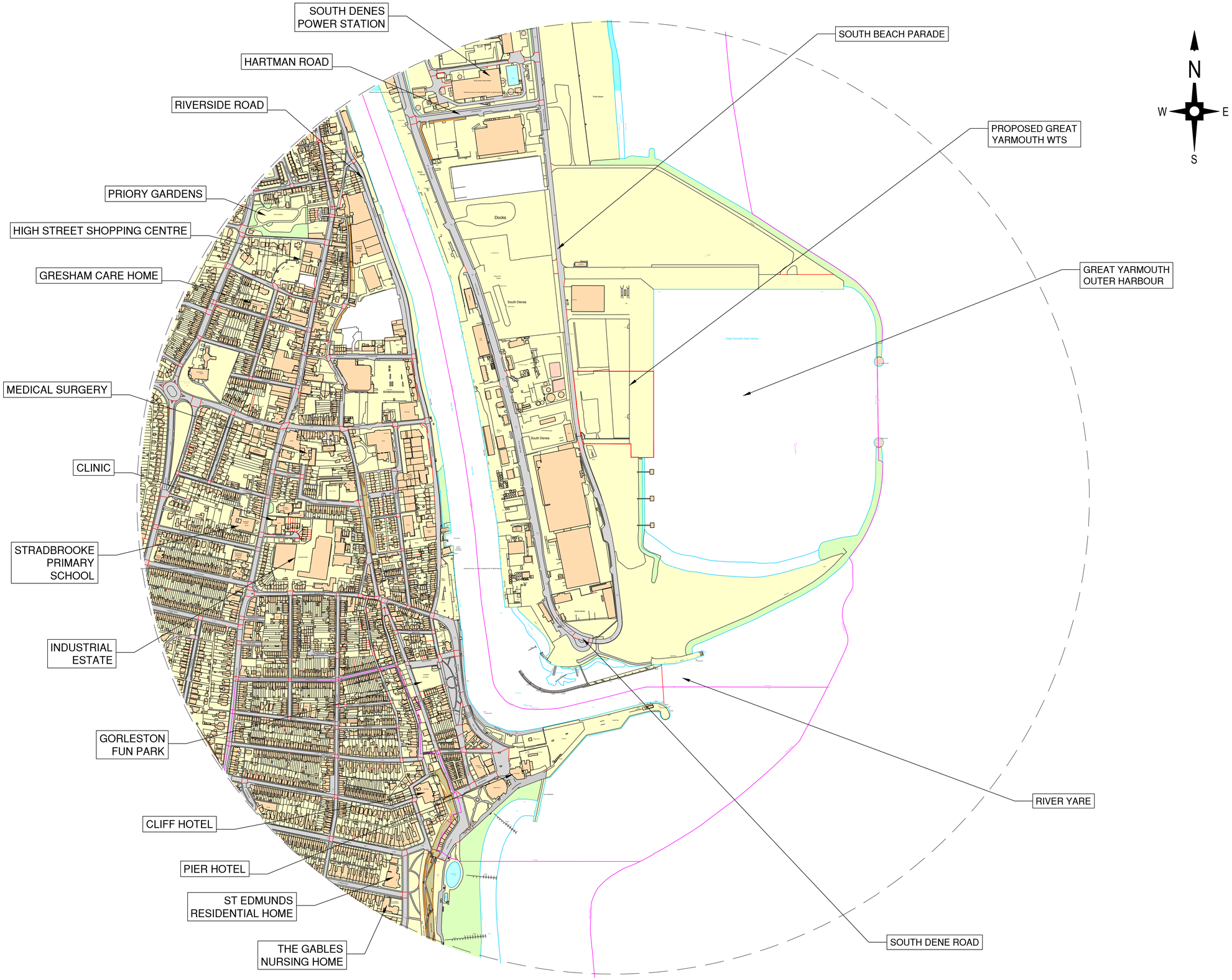
Plan 01: Site Location and Boundary

Appendix B

DRAFT

Revision -

Drawing No. VES_DT_YARM_200_002



GENERAL NOTES:

1. THIS DRAWING IS COPYRIGHT AND THE PROPERTY OF VEOLIA AND IS NOT TO BE COPIED IN WHOLE OR IN PART EXCEPT UNDER A WRITTEN AGREEMENT.

2. DETAILS SHOWN ON DRAWINGS ARE FOR REFERENCE PURPOSES ONLY.

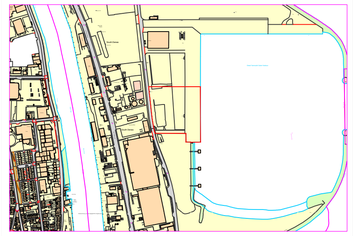
3. THIS IS A CONCEPTUAL DRAWING SUBJECT TO DETAILED DESIGN BY A DESIGN & BUILD CONTRACTOR.

4. IN CASE OF ANY DISCREPANCY BETWEEN THE DRAWING AND THE WORKS INFORMATION, THE WORKS INFORMATION WILL TAKE PRECEDENCE AND THE CONTRACTOR WILL BE DEEMED TO HAVE INTENDED TO COMPLY WITH THE WORKS INFORMATION AND SHALL DO SO.

5. ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE BY THE CONTRACTOR PRIOR TO PREPARING ANY WORKING DRAWINGS OR COMMENCING ON SITE.

6.PLEASE ENSURE DRAWING LICENCE DATE IS STILL VALID. ALL LICENCES ARE 12 MONTH UNLESS OTHERWISE STATED.

SITE BOUNDARY



LOCATION PLAN

Rev	Description of revision	Drawn	Chkd	App	Date

VEOLIA

Technical Direction,
8th Floor, 210 Pentonville Road, London. N1 9JY
Tel: 0207 812 5189

Project

GREAT YARMOUTH DECOMMISSIONING FACILITY

Title

KEY RECEPTOR PLAN

	Initials	Date	Scale	Sheet size
Drawn	DR	29.05.18	1:5000	A1
Checked	DR	29.05.18		
Approved	JB	30.05.18	© Copyright Reserved	

Job No. YARM

Drawing No. VES_DT_YARM_200_002

Revision -

APPENDIX G

ENVIRONMENTAL RISK ASSESSMENT and H1 ASSESSMENT (to be finalised)

Source	Pathway	Receptor	Harm	Likelihood	Consequence	Magnitude of Risk	Justification of Magnitude	Risk Management	Residual Risk
Release of particulate matter (dusts) and micro-organisms (bio aerosols)	Atmosphere and then inhalation	Local human population & Site staff	Harm to human health (respiratory irritation and illness)	Low	High	Medium	Permitted waste types do not include dusts, powders or loose fibres so only a medium magnitude risk is estimated.	Dismantling operations are not expected to be dusty, and given the size of the site it is unlikely that bioaerosols will transmit across the site boundary. Dust generating operations limited to burning operations only Permitted wastes unlikely to give rise to dust Regular maintenance of facility to minimise dust build up. All loads of waste leaving the site will be sheeted or otherwise contained, if there is a risk of loss of dust. Visual inspection of dusty levels on a daily basis Asbestos will be handled by approved Asbestos contractors and stored in seal containers.	Low
	Atmosphere and then deposition	Local human population	Nuisance – dust on cars, clothing etc.	Low	Medium	Low	Local residents often sensitive to dust.	As above	Very Low
Release of litter	Atmosphere and then deposition	Local human population and livestock	Nuisances, loss of amenity and harm to animal health	Low	Medium	Medium	Local residents are often sensitive to litter	As above. Due to the nature of the operation it is unlikely that litter will be produced by the facility. Regular maintenance of perimeter fencing All loose waste and waste which could escape upon leaving the site will be sheeted or otherwise contained. Visual inspection of litter levels on a daily basis Implement litter picking duties as necessary	Very Low
Mud on Roads	Vehicles leaving site	Local human population and livestock	Nuisances, loss of amenity and	Low	Medium	Medium	Local residents are often sensitive to mud on roads	Regular maintenance of all hardstanding Speed restrictions on site	Low

Source	Pathway	Receptor	Harm	Likelihood	Consequence	Magnitude of Risk	Justification of Magnitude	Risk Management	Residual Risk
			road traffic accidents				Road Safety	The the site will be covered in hardstanding, so there should be no issues with mud.	
Odour	Atmosphere and then inhalation	Local human population	Nuisances, loss of amenity	Low	Low	Low	Local residents are often sensitive to odour	Permitted wastes unlikely to be odourous Process of wastes at site as soon as practicable to prevent accumulation An odour management plan has been written with a view to the marine growth which may be present on some of the structures.	Very Low
Noise and vibrations	Atmosphere and ground for vibrations	Local human population	Nuisances, loss of amenity	Medium	Medium	Medium	Local residents are often sensitive to noise	Speed limits for vehicles Regular maintenance to prevent uneven surfaces All plant and machinery to be maintained in accordance with manufacturers specifications No idling engines and equipment turned off when not in use. A noise and vibration management plan has been produced in view of the operation.	Low
Animals, Pests and insects	Atmosphere and land	Local human population	Nuisances, loss of amenity, harm to heath	Low	Medium	Medium	Permitted wastes unlikely to attract scavenging animals and birds but may become nesting / breeding sites. Permitted wastes unlikely to attract pests.	Permitted wastes unlikely to attract scavenging animals or insects Waste to be processed on a high turnaround Food waste from welfare facility stored in sealed containers.	Very Low

Source	Pathway	Receptor	Harm	Likelihood	Consequence	Magnitude of Risk	Justification of Magnitude	Risk Management	Residual Risk
Spillage of leachate from waste, contaminated rainwater run-off	Direct runoff from site and via surface water drains	Surface water	Environmental Harm	Low	Medium	Medium	Site is not located in a flood risk area	Waste to be stored and processed on an area of the site with its own drainage linked to the surface water management system. Permitted wastes unlikely to generate significant quantities of leachate. Drainage system to be designed to accommodate all eventualities Site will develop an emergency plan which will include fire-fighting precautions and spillage containment measures. Regular inspection of drainage system Regular maintenance of drainage system All liquids stored on site will be suitably bunded.	Low
Spillage of leachate from waste, contaminated rainwater run-off	Direct runoff from site and via surface water drains	Groundwater Refer to Amec GW risk Assessment (Report ref: N010i2, Sept 2016) in Appendix G of the Supporting Statement for more detail)	Environmental Harm	Low	Medium	Medium	Site is not located within a groundwater source protection zone	Waste to be stored and processed on an area of the site with its own drainage linked to the surface water management system. No discharge to sewer unless compliant with Trade Effluent Consent limits Drainage system to be designed to accommodate all eventualities Regular inspection of drainage system. Regular maintenance of drainage system	Low

APPENDIX H BAT ASSESSMENTS

The techniques for waste acceptance and storage that will be applied at the site have been compared, where appropriate with the Best Available Techniques, presented in the sector guidance document, titled: *Guidance for the Recovery and Disposal of Hazardous and Non-hazardous Waste IPPC S5.06.*

Indicative BAT requirements for pre-acceptance procedures

Ref	Indicative BAT requirements for pre-acceptance	Management technique	Activity meets BAT
1	From the waste disposal enquiry the Operator should obtain information in writing relating to: • the type of process producing the waste • the specific process from which the waste derives • the quantity of waste; • chemical analysis of the waste (individual constituents and as a minimum their percentage compositions) • the form the waste takes (solid, liquid, sludge etc.) • hazards associated with the waste • sample storage and preservation techniques	A pre-acceptance assessment of waste types and estimated quantities are developed at contract bid stage. On contract award this is reviewed with an offshore assessment undertaken to catalogue and quantify waste volumes as well as identifying all hazardous wastes. This is referred to as the *Hazardous Materials Inventory Report*. This information is provided to the facility Site Project Manager so that plans can be established for appropriate receipt and processing in accordance with procedure *T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan.*	Meets BAT

Ref	Indicative BAT requirements for pre-acceptance	Management technique	Activity meets BAT
2	Unless a sample and analysis has already been completed by a third party and the Operator has sufficient written information from them, then the Operator should in every case obtain representative sample(s) of the waste from the production process/current holder.	The *Hazardous waste inventory Report* documents each hazardous waste fraction and any analysis undertaken to identify unknown waste. Examples of such reports will be made available at the facility, monitoring of waste will continue during the decommissioning operation. Sampling will only be carried out when the waste is unable to be identified	Not consistent with BAT
3	Other than for pure product chemicals or laboratory smalls, the chemical analysis should relate to an actual analysis and not simply be based on product data sheets or an extrapolation of information on product data sheets. For example, taking the concentrations as specified and applying a dilution factor is not acceptable.	See point 2 above; no laboratory smalls handled. Lab smalls may be delivered to site as part of a platform, if so a chemist will pack these wastes ready for transportation.	N/A
4	Wastes should not be accepted at the installation without a clear method or defined treatment and disposal route being determined and costed before the waste is accepted at the installation.	The *Hazardous Materials Inventory Report* allows the Project manager to plan for the processing of waste. The majority of which involves physical segregation. Costing is agreed in advance of the contract commencing. Examples of such reports will be made available at the facility when operational upon request. Waste map will be created to confirm disposal and recovery route options.	Meets BAT
5	The Operator should ensure that the sample is representative of the waste and obtained by a person who is technically competent to undertake the sampling process.	Staff responsible for collecting relevant samples are fully trained and experienced. For asbestos assessments a competent licensed contractor will be used. Veolia have trained chemists and Radiation Protection Supervisor (RPS).	Meets BAT.

Ref	Indicative BAT requirements for pre-acceptance	Management technique	Activity Review
6	The type of information that would demonstrate the reliability of the sample includes: • location of sampling point, for example, effluent tank • capacity of vessel sampled (for samples from drums an additional parameter would be the total number of drums) • method of sampling, e.g. sampling tap (mid flow), "top" sample • number of samples and degree of consolidation • operating conditions at time, e.g. normal operation, shut-down, maintenance and/or cleaning • preservation techniques	This information is included in the *Hazardous Materials Inventory Reports* where applicable to the samples taken offshore. Examples of such reports will be made available at the facility	Meets BAT.
7	Samples should be clearly labelled and any hazard identified.	All samples are clearly labelled to ensure effective testing and in compliance with Health and Safety (H&S) requirement.	Meets BAT.
8	Sample tracking systems within the installation should be established and be auditable.	Any sample taken will be referenced , with a sample map. However, number of waste samples likely to be minimal.	Meets BAT.
9	Analysis should be carried out by a laboratory with robust quality assurance and quality control methods and record keeping.	Laboratories with appropriate UKCAS and ISO accreditation are used.	Meets BAT.
10	Analysis required will vary depending upon the nature of the waste, the process to be used and what is known about the waste already. Results of analysis should be kept within the tracking system. These details should include: • check on constituents declared by waste producer/holder to ensure Permit compliance, treatment plant specification and final disposal • all hazardous characteristics	Waste information is provided to the facility Site Project Manager so that plans can be established for appropriate receipt and processing in accordance with procedure *T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan.*	Meets BAT

Ref	Indicative BAT requirements for pre-acceptance	Management technique	Activity meets BAT
	• physical appearance • colour • pH • presence, strength and description of odour assessment		
11	Further analysis may include other parameters relevant to the treatment method or waste stream e.g.: • presence of oxidants • acidity and alkalinity • COD • ammonia • flashpoint • presence of sulphide • presence of cyanide • List I and List II substances • other substances of environmental significance	This is only applicable to Veolia where a waste type is encountered which is new and not characterized, then analysis is required to determine treatment approach. This is rare given the predominance of physical separation techniques on the site. Waste is reviewed in accordance with procedure *T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan* and site waste map.	Meets BAT
12	Also, for example in the case of oil recovery: • chlorine • sulphur • metals • PCBs	As above	Meets BAT
13	Installations accepting waste oil should have the facility to hold and test loads for PCBs or a surrogate test for chlorine at a level of detection to assess compliance with the requirements of the Waste Oils Directive.	Analysis of hydrocarbon wastes is undertaken offshore prior to acceptance, to identify hazardous waste. This would be documented in the *Hazardous Materials inventory Report.* Before waste arrives the site project manager will ensure storage arrangements are in place.	Meets BAT
14	Following characterisation of the waste, a technical assessment should be made of its suitability for treatment	This is a key aim of the *Hazardous Materials Inventory Report*. Is to allow Veolia to asses	Meets BAT

Ref	Indicative BAT requirements for pre-acceptance	Management technique	Activity meets BAT
	and to ensure Permit conditions are being met.	identified the mechanism for processing the waste prior to site acceptance.	
15	There must be a clear distinction between sales and technical staff roles and responsibilities. If non-technical sales staff are involved in waste disposal enquiries, then a final technical assessment prior to approval should be made. It is this final technical checking that should be used to avoid build-up of accumulations of wastes.	Veolia have trained staff for managing hazardous waste including chemist and waste technical assessors. Sales staff are supported by waste team.	Meets BAT
16	All records relating to pre-acceptance should be maintained at the installation for cross-reference for verification at the waste acceptance stage.	Records of *Hazardous Materials Inventory Reports* and client waste inventories are maintained in Veolia project shared drive.	Meets BAT
17	For laboratory smalls, whether or not the installation Operator packs them on behalf of the producer, a full list of laboratory smalls should be created and transported with the waste. Operators should have written procedures regarding the segregation, packaging and labelling of laboratory smalls. For those Operators who accept wastes packaged by their customers, this Guidance should be provided to the customer so as to prevent problems when the material is delivered to the installation. This guidance should include the following: • What information is required in order to meet the Licence Holders pre-acceptance checks • What chemicals are not licensed by the Licence Holders site licence (e.g. radioactive chemicals, Clinical wastes,	Laboratory smalls are unlikely to be processed by Veolia on this site.	N/A

Ref	Indicative BAT requirements for pre-acceptance	Management technique	Activity meets BAT
	explosives,) • How to identify the waste laboratory chemical • How to establish and record the hazards posed by the chemical • Supporting documentation required (e.g. manufacturers data, material safety data sheets) • Segregation policy for waste laboratory chemicals to avoid mixing of incompatible wastes in the same drum • How to pack the chemicals • What information is to accompany the waste		

Indicative BAT requirements for acceptance procedures when waste arrives at the installation

Ref	Indicative BAT requirements for acceptance procedures when waste arrives at the installation	Management technique	Activity meets BAT
	Load arrival		
1	On arrival loads should: • be weighed, unless alternative reliable volumetric systems linked to specific gravity data are available • not be accepted into site unless sufficient storage capacity exists • have all documents checked and approved, and any discrepancies resolved before the waste is accepted • have any labelling that does not relate to the contents of the drum removed before acceptance on site.	The *Hazardous Materials Inventory Reports* provides details on waste type and estimated volume. Waste handling on arrival including recording weights at Dales Voe is covered in procedure *T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan.*	Meets BAT
2	Hazardous wastes should only be received by a suitably qualified person (HNC qualified chemist or higher)	COTC holder supported by suitably trained chemists and technical assessors from within the business.	Meets BAT
	Load inspection		
3	Visual inspection. Where possible, inspection checks should be undertaken before offloading. Inspection must in any event be carried out immediately upon the arrival of the load at the installation.	Inspection / checks are carried in accordance with procedure *T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan.*	Meets BAT
4	Check every container to confirm quantities against accompanying paperwork. All containers should be clearly labelled and should be equipped with well-fitting lids, caps and valves secure and in place. Any damaged, corroded or unlabelled drums should be put into a quarantine area and dealt with appropriately. Following inspection, the waste should then be unloaded into a dedicated sampling / reception area.	Inspection / checks are carried in accordance with procedure *T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan.* Daily checks undertaken in accordance with *Procedure T4-GYDFI-001 Great Yarmouth Decommissioning Facility Permit Working Plan*	Meets BAT

Ref	Indicative BAT requirements for acceptance procedures when waste arrives at the installation	Management technique	Activity meets BAT
5	At this stage the waste tracking system unique identifier should be applied to each container. Each container should also be labelled with the date of arrival on-site and primary hazard code.	Waste is identified and containers labelled in accordance *T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan*	Meets BAT
6	Where containers are bulked, the earliest date of arrival of the bulked wastes should be transposed from the original container onto the bulk container.	No bulking takes place in this form at the facility. Repackaging shall be limited to decanting liquids from tanks/large structures.	Meets BAT
7	The inspection, unloading and sampling areas should be marked on a plan and have suitably sealed drainage systems (see Section 2.8 on page 97).	The inspection would take place on the vessel or on site depending how the waste was offloaded and the size of the waste. Please note the facility will take delivery of a platform.	Meets BAT
	Sampling - checking - testing of wastes - storage		
8	Other than pure product chemicals and laboratory smalls, no wastes should be accepted at the installation without sampling, checking and testing being carried out. Reliance solely on the written information supplied is not acceptable, and physical verification and analytical confirmation are required. All wastes, whether for on-site treatment or simply storage, must be sampled and undergo verification and compliance testing.	All wastes are identified and analysed where necessary prior to site acceptance. Any waste not previous identified or encountered during the dismantling process is analysed if required to identify the waste.	Meets BAT
9	The Operator should ensure that waste delivered to the installation is accompanied by a written description of the waste describing:	Documented in the *Hazardous Materials inventory Report* if required (large structures with hazardous waste) and appropriate waste transfer paperwork providing details of the waste.	Meets BAT

Ref	Indicative BAT requirements for acceptance procedures when waste arrives at the installation	Management technique	Activity meets BAT
	• the physical and chemical composition • hazard characteristics • incompatible substances and handling precautions • information specifying the original waste producer and process		
10	On-site verification and compliance testing should take place to confirm: • the identity of the waste • the description of the waste • consistency with pre-acceptance information and proposed treatment method • compliance with permit	*Hazardous Materials Inventory Reports* cross checked on arrival at the site to confirm acceptance, where possible. Waste checked in accordance with procedure *T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan*	Meets BAT
11	The Operator should have clear and unambiguous criteria for the rejection of wastes, together with a written procedure for tracking and reporting such non-conformance. This should include notification to the customer/waste producer and the Regulator. Written/computerised records should form part of the waste tracking system information.	Waste checked in accordance with procedure *T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan* Non-conformance concluded; reported to client as part of contract variation.	Meets BAT
12	Documentation provided by the driver, written results of acceptance analysis, details of offloading point or off-site transfer location should be added to the tracking system documentation.	Each structure (i.e. making up the project) is catalogued in the Hazardous Material Report. Each waste is then given a European Waste Catalogue Code which remains with the waste from arrival to final destination. This information would be provided prior to delivery.	Meets BAT

13	A record of the sampling regime for each load and justification for the selection of this option should be maintained at the installation	Procedure *T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan.* Not all waste requires sampling, only un identified waste.	Meets BAT
14	Wastes in containers should be unloaded into a dedicated reception area pending acceptance sampling. Such storage should be for a maximum period of 5 days. During this period there should be no bulking up or mixing of drums or decanting the contents into bulk storage. Wastes should be segregated within this reception area according to compatibility in line with HSE Guidance Note HSG71. Segregation must be achieved immediately upon offloading.	All wastes will remain within the structure(s) or arrive in piece small. This is driven by the method of dismantling. Large structure may take many months to dismantle. Only a small % of waste is hazardous waste, which will be assessed before storage.	Not consistent with BAT
15	Wastes must not be deposited within a reception area without space and precautions for adequate incompatibility segregation must be assessed without delay and in any event within the same working day.	All wastes remain within the structure(s) or arrive in piece small. This is driven by the method of dismantling. Waste will be segregated appropriately. Only a small % of waste is hazardous waste, which will be assessed before storage. The reception area will be transitionary, due to different type of waste and sizes.	Meets BAT
16	Dedicated quarantine area and dealt with appropriately. Such storage should be for a maximum of five working days. Written procedures should be in place for dealing with wastes held in quarantine, together with a maximum storage volume.	Waste checked in accordance with procedure *T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan* Non-conformance concluded; reported to client as part of contract variation. Non-conformance waste will be store in a segregated area and reported to the client and the QHSE team.	Meets BAT
17	If the cause of failure to meet acceptance criteria is due to incompatibility, then the wastes should be segregated immediately to remove the hazard.	Waste checked in accordance with procedure *T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan,* Non-conformance waste will be store in a segregated area and reported to the client, record on Veolia reporting system and to the QHSE team.	Meets BAT

18	Tankered wastes should be sampled prior to acceptance. There should be no storage pending sampling.	Not applicable	N/A
19	The driver of the vehicle carrying the waste may arrive at the installation with a sample that has been taken at some stage beforehand. This should be the exception and only be relied on if: • there are health and safety and environmental control considerations, for example, water reactive substances which would make sampling difficult • the following written information has been supplied - the physical and chemical composition, hazard characteristics, incompatible substances and handling precautions, information specifying the original waste producer and process, and • the waste has been taken directly from the production site to the waste treatment installation	Not applicable	N/A
20	The installation should have a designated sampling point or reception area. These should be in close proximity to the laboratory/checking facility and the sampling point should be visible (or covered by CCTV), if sampling is not directly supervised by, for example, laboratory staff.	Sampling is completed on the structure offshore as part of the Hazardous Material Inventory Reporting. Where sampling is required for an unidentified waste then this is held in the quarantine area until the analysis	Meets BAT
21	The offloading, sampling point/reception and quarantine areas should have an impervious surface with self-contained drainage, to prevent any spillage entering the storage systems or escaping off-site. Most spills and leaks during sampling are on a small scale, resulting from releases from the back valve of a tanker if the sample is being obtained in this way. Attention should be given to ensuring that incompatible substances do not come into contact resulting from spills from sampling, for example, within a sump serving the sampling point. Absorbents should be made available.	The entire operational area of the base for handling hazardous waste contains a impervious layer, which will drain to a collection sump for pumping to the surface water management system.	Meets BAT

	Sampling of bulk liquid wastes		
22	Deliveries in bulk road tanker should be accompanied by a "wash-out" certificate or a declaration of the previous load so that contamination by this route can be checked.	All deliveries of waste will come by sea.	N/A
23	Samples are usually taken by the tanker driver from one of three points on the tanker: • top hatch • back valve • sight glass	Not applicable	N/A
24	The key requirement is to obtain a sample that is representative of the load, that is, the sample takes account of the full variation and any partitioning within a bulk load such that "worst-case" scenarios are accounted for. Taking a sample through a top hatch of the surface of the liquid may not be representative, but may be useful in establishing whether there may be a layer of, for example, solvent or some other immiscible substance, which may be unsuitable for treatment. Top samples should be obtained from the cross-section of the load, that is, a core sample.	Bulk liquids are not typically encountered on offshore structures or are removed prior to the start of the decommissioning phase. Any liquids not clearly identifiable would be sampled and analysed at the pre-acceptance stage. The approach would be specific to the liquid and whether it appears to be well mixed, etc.	Meets BAT
25	A gantry should be constructed to avoid the need to take samples from the back valve of tankers, which is likely to result in a small spillage.	Not applicable	N/A
	Sampling drummed waste		
26	The contents can only be identified with certainty if every container is sampled. Acceptance should involve sampling every container. However, analysis of composite samples is acceptable with such a sampling regime. A representative sample must be obtained by taking a core sample to the base of the container. Operators should ensure that lids, bungs and valves are replaced immediately after sampling.	Waste contained within drums is not a regular occurrence on the site. Any drums received would be clearly labelled and information presented in the Hazardous Material Inventory Report. All identification completed offshore.	Meets BAT

	Drum Labelling		
27	• For drummed waste controls should utilise the individual labelling of each drum to record: • the location of each drum • the duration of storage • the chemical identity of the drums contents and • the hazard classification for each drum • Drums should be handled and stored so that the label can be seen at all times.	As noted above all waste accepted in drums would be clearly labelled or treated as a non-conformance. In accordance with Procedure *T4-GYDFI-001 Great Yarmouth Decommissioning Facility Permit Working Plan*	Meets BAT
	Acceptance of laboratory smalls		
29	The procedure for accepting laboratory smalls on-site should be essentially identical to that for drummed waste. They differ from the "normal" waste inputs to site in that they are in a pure concentrated form.	Lab small waste is not a regular occurrence on the site. Any lab small received would be clearly labelled and information presented in the Hazardous Material Inventory Report. All identification completed offshore.	Meets BAT
30	In situations where the Operator has undertaken the identification and packaging on behalf of the customer, then the on-site verification can be restricted to opening the drums to check that the containers remain undamaged. In such cases the load must be accompanied by documentation confirming the checking and packing. In situations where the drum has been packed by the customer, then full checking and verification should be undertaken. Checking packaging and segregation adequately should include emptying of the drum as soon as possible and in any event not before the end of the working day, repackaging the waste once the necessary checks have been made.	N/A	N/A
	Waste Rejection procedures		
31	Lab smalls must not be accepted at a facility where there is insufficient suitably qualified personnel to process wastes within the above timescales.	Lab smalls may be delivered to site as part of a platform, if so a chemist will pack these wastes ready for transportation.	Meets BAT

32	If on opening a drum it is found that it contains incompatible substances, or that the substances have not been packaged adequately, then the drum should be sorted and repacked immediately and the non-conformance procedure followed.	Drummed waste is not commonly received at the facility. No drum would be opened if it was not labeled correctly. The non-conformance procedure would be followed in the event that a drum was received which was not correctly labeled.	Meets BAT
33	Sorting and repackaging of laboratory smalls should take place in a dedicated area/store. Once the wastes have been sorted according to hazard classification, with due consideration for any potential incompatibility problems, and repacked, then these drums should not be stored within the dedicated laboratory smalls area but should be removed to the appropriate storage area.	Lab smalls may be delivered to site as part of a platform, if so a chemist will pack these waste ready for transportation. This will be carried out on the platform.	Meets BAT
34	The Licence holder should have clear and unambiguous criteria for the rejection of wastes, together with a written procedure for tracking and reporting such non-conformance. This should include notification to the customer/waste producer and the Environment Agency. Written/computerised records should form part of the waste tracking system information. The Licence holder should also have a clear and unambiguous policy for the subsequent storage and disposal of such rejected wastes. This policy should achieve the following: • identifies the hazards posed by the rejected wastes • labels rejected wastes with all information necessary to allow proper storage and segregation arrangements to be put in place • segregates and stores rejected wastes safely pending final disposal	Non-conformance waste will be store in a segregated area and reported to the client, record on Veolia reporting system and to the QHSE team. In accordance with Procedure *T4-GYDFI-001 Great Yarmouth Decommissioning Facility Permit Working Plan*	Meets BAT

	Records		
35	The waste tracking system should hold all the information generated during pre-acceptance, acceptance, storage, treatment and/or removal off-site. Records should be made and kept up to date on an ongoing basis to reflect deliveries, on-site treatment and despatches. The tracking system should operate as a waste inventory/stock control system and include as a minimum: • date of arrival on-site • producers details • all previous holders • a unique identifier • pre acceptance and acceptance analysis results • package type and size • intended treatment/disposal route • record accurately the nature and quantity of wastes held on site, including all hazards and identification of primary hazards	All waste streams are tracked / record on the project Environmental tracker. In accordance with procedures *T4-GYDFI-005 Great Yarmouth Decommissioning Facility - Completing Environmental monitoring reports procedure.* Waste amounts are reviewed before waste is accepted on site to ensure no limits are breached with waste amounts already on site, in accordance with procedure *T4-GYDFI-007 Great Yarmouth Decommissioning Facility – Waste. management plan*	Meets BAT
36	All records relating to pre-acceptance should be maintained and kept readily available at the installation for cross-reference and verification at the waste acceptance stage. Records should be held for a minimum of two years after the waste has been treated or removed off-site. Records should be held in an area well removed from hazardous activities to ensure their accessibility during any emergency.	See point 35.	Meets BAT

37	The system adopted should be capable of reporting on all of the following: • total quantity of waste present on-site at any one time, in appropriate units, for example, 205 litre drum equivalents • breakdown of waste quantities being stored pending on-site treatment, classified by treatment route • breakdown of waste quantities on-site for storage only, that is, awaiting onward transfer • breakdown of waste quantities by hazard classification • indication of where the waste is located on site relative to a site plan • comparison of the quantity on site against total permitted • comparison of time the waste has been on-site against permitted limit	See point 35.	Meets BAT
38	Back-up copies of computer records should be maintained off-site.	See point 35.	Meets BAT
	General		
39	Wastes should not be accepted at the installation without a clear method or defined treatment and disposal route being determined and costed and sufficient capacity being available. These checks should be performed before the waste acceptance stage is reached.	*T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan* covers the requirements for the acceptance for all waste. Waste map confirms disposal and recovery routes. The requirements are covered above with this document.	Meets BAT
40	The Operator should ensure that the installation personnel who may be involved in the sampling, checking and analysis procedures are suitably qualified (HNC qualified chemist or higher) and adequately trained, and that the training is updated on a regular basis.	COTC holder supported by suitably trained chemists and technical assessors from within the business.	Meets BAT.
41	Analysis should be carried out by a laboratory with suitably accredited test methods.	See point 39	Meets BAT
42	Samples should be retained on-site for a minimum of two days after the waste has been treated or removed off-site including all residues from its treatment.	See point 39	Meets BAT

43	Once analysis has confirmed that the waste is acceptable, the Operator should only then create a batch for treatment or a load for off-site removal. Once a batch has been assembled for treatment, the operator should create a composite sample for analysis prior to treatment. Scope of analysis depends upon intended treatment but should be specified	No batch treatments, dismantling depends on size and nature of the structure	Not consistent with BAT
44	There must be a clear distinction between sales and technical staff roles and responsibilities. If non-technical sales staff are involved in waste enquiries then a final technical assessment prior to approval should be made. It is this final technical checking that should be used to avoid build-up of accumulations of wastes and to ensure that sufficient capacity exists.	Veolia have trained staff for managing hazardous waste including chemist and waste technical assessors. Sales staff are supported by waste team.	Meets BAT

Indicative BAT requirements for waste storage

Ref	Indicative BAT requirements for waste storage	Management technique	Activity meets BAT
	Offloading/discharge of waste		
1	The operator should have in place a system to ensure that the correct discharge point or storage area is used. The options for this include: • ticket systems • supervision by site staff and if relevant CCTV • colour-coded points/hoses or fittings of a specific size	Waste handling on arrival including recording weights at Dales Voe is covered in procedure *T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan.* Storage and waste activates are In accordance with Procedure *T4-GYDFI-001 Great Yarmouth Decommissioning Facility Permit Working Plan.*	Meets BAT
2	Offloading and quarantine points should have an impervious surface with self-contained drainage, to prevent any spillage entering the storage systems or escaping off-site	Storage and waste activates are In accordance *with* Procedure *T4-GYDFI-001 Great Yarmouth Decommissioning Facility Permit Working Plan,* the procedure cover ground conditions for each waste activities.	Meets BAT
3	Damaged hoses and connections must not be used.	Risk assessments and Method Statement are in place to ensure that all connecting hoses, etc. are checked prior to use. Any damaged connections are labelled to show they must not be used and repaired as soon as practicable.	Meets BAT
4	Only couplings of the correct size for the connection should be used and the coupling should be able to withstand the maximum shut valve pressure of the transfer pump.	Risk assessments & Method Statement are in place to ensure that all couplings of the correct size are made available at the relevant transfer	Meets BAT
	Record keeping		
5	The operator should have an internal tracking system which should satisfy the objectives and minimum standards given at Section 2.1.2 on page 28 for all wastes.	The waste Project environment tracking reports used at the facility meets the objectives and minimum standards given.	Meets BAT

Ref	Indicative BAT requirements for waste storage	Management technique	Activity meets BAT
	General storage requirements		
6	Storage areas are often the most visible aspects of the installation. Storage areas should be located away from watercourses and sensitive perimeters, for example, those which may be adjacent to public rights of way, housing or schools, and within the security-protected area of the installation to prevent vandalism.	All storage areas are within the secure fenced boundary of the site. Storage bays are demarcated and used for the disassembly of individual structures. The site is to be managed by CCTV.	Meets BAT
7	Storage areas should be located to eliminate or minimise the double handling of wastes within the installation.	Storage areas are set out based on the ability to locate a structure which can be disassembled in-situ.	Meets BAT
8	Storage areas should be clearly marked and signed with regard to the quantity and hazardous characteristics of the wastes stored therein.	As waste is removed from the structure and sorted it is transferred to appropriate storage areas or containers.	Meets BAT
9	The total maximum storage capacity of the site should be clearly and unambiguously stated in writing, accompanied with details of the method used to calculate the volumes held against this maximum. The stated maximum capacity of storage areas should not be exceeded.	Storage and calculation of tonnages are In accordance *with* Procedure *T4-GYDFI-001 Great Yarmouth Decommissioning Facility Permit Working Plan,*	Meets BAT
10	All containers should be clearly labelled with the date of arrival, relevant hazard code(s), chemical identity and composition of the waste and a reference number or code enabling identification through stock control and cross-reference to pre-acceptance and acceptance records. All labeling should be resilient enough to stay attached and legible throughout the whole time of storage at the installation.	The majority of waste is still attached to the structure to be disassembled. Once removed and sorted each waste type is stored either in clearly labelled bays (i.e. scrap steel) or within containers within the dedicated hazardous waste storage area.	Meets BAT
11	Storage area drainage infrastructure should ensure that all contaminated run-off is contained and that drainage from incompatible wastes cannot come into contact with each	All run-off will be collected and diverted through the surface water management system prior to discharge off site. Incompatible waste unlikely.	Meets BAT

Ref	Indicative BAT requirements for waste storage	Management technique	Activity meets BAT
12	Procedures must be in place for the regular inspection and maintenance of storage areas, including drums, vessels, pavements and bunds. Inspections should pay particular attention to signs of damage, deterioration and leakage. Records should be kept detailing action taken. Faults must be repaired as soon as practicable. If containment capacity or capability of bund, sump or pavement is compromised, then waste must be immediately removed until the repair is completed.	Procedures are in place to ensure that storage areas are inspected at least daily. A non-conformance procedure is in place to ensure that any defects or near misses are recorded and appropriate corrective or preventive actions are carried out in a timely manner. There is some overlap with site security, health and safety. *T4-GYDFI-001 Great Yarmouth Decommissioning Facility Permit Working Plan* and S*YS/2/037 Reporting Accidents Incidents Near Misses and Enforcement Authority Communications*	Meets BAT
13	There should be daily inspection of the condition of containers and pallets and written records should be kept of these inspections. If a container is found to be damaged, leaking or in a state of deterioration, it should immediately be over-drummed or the contents to transferred to another container.	Daily inspections checklist are undertaken on all waste and raw material storage areas. This ensures that any leaks are detected promptly. *T4-GYDFI-001 Great Yarmouth Decommissioning Facility Permit Working Plan*	Meets BAT
14	Over-drumming should be seen as an emergency measure and take place, if appropriate, in a designated location equipped with Local Exhaust Ventilation (LEV) as necessary. All appropriate information should be transferred onto the label of the new container. Large quantities of wastes in over-drums should be avoided by re-drumming once the incident leading to overdrumming has been dealt with. Pallets damaged to the extent that the stability of the containers is or may become compromised should be replaced. “Plastic shrink wrap” should only be used to provide secondary stability to drum/container storage in addition to the use of sound pallets.	Where a storage container has failed (i.e. leaking) the container and contents will be assessed to confirm the safety method to prevent a leak and to contain.	Meets BAT

Ref	Indicative BAT requirements for waste storage	Management technique	Activity meets BAT
15	There should be vehicular, for example, forklift, and pedestrian access at all times to the whole of the storage area such that the transfer of containers is not reliant on the removal of others that may be blocking access, other than drums in the same row. Drums should not be stored more than two high and allow access for inspection on all sides. That is, four x 205 litre drums on a pallet, stacked no more than two x 205 litre drums high in rows.	Veolia waste storage rules confirm access is required to allow container inspections and also maximum height for 205ltr drums is 2 high.	Meets BAT
16	All spillages of hazardous wastes should be logged, where spillages >200 litre then additionally the Regulator should be informed.	Emergency Management Plan in place which cover handling and reporting spillages, in accordance with *SYS/2/027 Emergency Management Plan*	Meets BAT
17	Activities that create a clear fire risk should not be carried out within the storage area, even if it is not formally classified as hazardous. Examples include grinding, welding or brazing of metalworks, smoking, parking of normal road vehicles except when unloading, charging of the batteries of fork lift trucks.	Emergency Management Plan in place in accordance with *SYS/2/027 Emergency Management Plan.* Fire risk assessments will be completed, in accordance with *HS/2/028 Fire safety* Permit to work will be completed for hot work in accordance with *HS/2/010 Permit To Work.*	Meets BAT
	Turnover		
18	Storage within the reception area should be for a maximum of five working days. Following receipt, wastes should be treated or removed off-site as soon as possible. The total	Storage will be appropriate to the operation of the facility. All hazardous waste will be stored in the dedicated waste storage area and removed	Meets BAT

Ref	Indicative BAT requirements for waste storage	Management technique	Activity meets BAT
	storage time will depend upon the characteristics of a particular site and the waste types being stored. For example, on a site in a sensitive location handling hazardous wastes, it may be appropriate to limit storage times to one month. Other non-hazardous wastes, however, may be held on-site for longer periods. However, all waste should be treated or removed off site within a maximum of six months from the date of receipt	from site when suitable volumes accumulate to make it economical / environmental to do so. Please note large structures may take 12 months to dismantle.	
	Storage of drummed waste and other containerised wastes such as IBCs		
19	Storage under cover for drummed waste has the advantage of reducing the amount of potentially contaminated water that may be produced in the event of any spillage and extending the useful life of the container. It is preferable that wastes are stored under cover. This should also apply to any container that is held in storage pending sampling and emptied containers. Covered areas must have adequate provision for ventilation by means of wall or roof vents or construction of the area, for example, open barn. Any such warehousing should meet the requirements of HSG71.	Hazardous waste will be stored in a dedicated storage area. Asbestos will be stored in a sealed containers after removing from any structure. Small items of hazardous waste will be stored in a bunded cabinet.	Meets BAT
20	Containers should be stored in such a manner that leaks and spillages could not escape over bunds/edge of the sealed drainage area.	Hazardous waste will be stored in a dedicated storage area. Asbestos will be stored in a sealed containers after removing from any structure. Small items of hazardous waste will be stored in a bunded cabinet.	Meets BAT
21	Containers should be stored with well-fitting lids, caps and valves, secure and in place.	All containers containing hazardous waste would be secured according the specific requirements of the waste.	Meets BAT

Ref	Indicative BAT requirements for waste storage	Management technique	Activity meets BAT
22	Storage areas for containers holding substances that are known to be sensitive to heat and light or reactive with water or moisture should be under cover and protected from water, heat and direct sunlight	This type of waste is not anticipated to be common on the facility; all waste will be assessed and stored in suitable containers.	Meets BAT
23	Storage areas for containers holding flammable or highly flammable wastes should meet the requirements of HSG 51, HSG71 and HSG176.	Storage and segregation will meet HSG 51, HSG71 and HSG176.	Meets BAT
	Aged stock		
24	It is important to avoid accumulations of waste, which may in turn lead to a deterioration in the container resulting in spillage or, in extreme cases, the deformation of the container to such an extent that it cannot be moved.	Storage will be appropriate to the operation of the facility. All hazardous waste will be stored in the dedicated waste storage area and removed from site when suitable volumes accumulate to make it economical / environmental to do so.	Meets BAT
	Segregation		
25	In addition to the requirements of this document, the segregation of wastes should meet the requirements of HSG71 and be justified by risk assessment.	The site will not process significant quantities of incompatible wastes. Segregation is a key activity of the site and will be undertaken based on the output of the *Hazardous Material Inventory Reports.*	Meets BAT
26	HSG 71…	Not applicable	
27	Storage of aerosols should take place under cover in closed containers or cages. Aerosols should not be stored in open containers.	Small volumes of aerosols will be stored in an appropriate chemical cabinet, with appropriate ventilation.	Meets BAT

Ref	Indicative BAT requirements for waste storage	Management technique	Activity meets BAT
	Storage of laboratory smalls		
28	Written procedures for the segregation and packing of laboratory smalls should be produced identifying; • How the hazards associated with each package are identified. • How the risks of adverse reactions occurring between individual packages are assessed, and by whom. • The level of competence, qualification and training required by those undertaking this assessment • How incompatible substances (i.e. those that could react to generate heat, fire or hazardous reaction products) are prevented from being stored within the same drum • How the wastes are to be stored • How the wastes are to be disposed of	Lab smalls may be delivered to site as part of a platform, if so a chemist will pack these wastes ready for transportation in line with appropriate ADR regulations. Managed under *T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan.* It should be noted that lab smalls will be stored in situ (without being repackaged) temporarily pending repackaging.	Not consistent with BAT
29	Incompatible substances should not be stored within the same drum.	Not applicable as noted above	N/A
30	Sorting and repackaging of laboratory smalls should take place in a dedicated area/store. Once the wastes have been sorted according to hazard classification, with due consideration for any potential incompatibility problems, and repacked, then these drums should be removed to the appropriate storage area.	Not applicable as noted above	N/A

Ref	Indicative BAT requirements for waste storage	Management technique	Activity meets BAT
	Compatibility testing		
31	In order to prevent any adverse or unexpected reactions and releases before transfer involving the following activities, testing should take place prior to the transfer: • tanker discharge to bulk storage • tank-to-tank transfer • transfer from container to bulk tank • bulking into drums/IBCs • bulking of solid waste into drums or skip	Only the same waste material will be bulked up and stored in bulk Managed under *T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan.*	Meets BAT
32	Any evolved gases and cause of odour should be identified. If any adverse reaction is observed, an alternative discharge or disposal route should be found.	Not applicable in this context.	N/A
33	Due consideration should be taken of the implications of scale-up from laboratory compatibility testing to bulk transfer and the Guidance is given in HSG143.	Not applicable	N/A
	Transfer from tanker, drums and other containers in bulk storage		
34	Due consideration should be taken of the implications of scale-up from laboratory compatibility testing to bulk transfer and the guidance given in HSG143.	Only the same waste material will be bulked up and stored in bulk. Managed under *T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan.*	Meets BAT
35	Wastes in containers should be transferred into storage	Not applicable in this context	N/A

Ref	Indicative BAT requirements for waste storage	Management technique	Activity meets BAT
	vessels by dip pipe to minimise splash, fume and odour.		
36	Transfer/discharge should only take place after compatibility testing has been completed and then only with the sanction of an appropriate manager. Approval should specify which batch/ load of material is to be transferred, the receiving storage vessel, equipment required, including spillage control and recovery equipment, and any special provisions relevant to that batch/load.	Not applicable in this context	N/A
37	During bulking to tankers, vapour balance lines connected to appropriate abatement equipment should be used.	Not applicable in this context	N/A
38	Tankers must not be used as reaction vessels. Blending by bulking into tankers should only take place following a risk assessment and once suitable verification and compatibility testing has been carried out.	Not applicable in this context	N/A
39	If flammable chemicals are being transferred, particular caution has to be taken to avoid the generation of static electricity, with the subsequent risk of ignition. Guidance on the safe use and handling of flammable liquids is provided by the Health and Safety Executive and is contained within HSG140, including Guidance on the issue of static electricity build-up.	Not applicable in this context	N/A
40	A representative sample of the receiving tank/vessel/container should be mixed in a proportional ratio with a sample of incoming waste stream that it is proposed to add to the tank/ vessel/container. The two	Not applicable in this context	N/A

Ref	Indicative BAT requirements for waste storage	Management technique	Activity meets BAT
	samples should take account of the "worst-case" scenario of likely constituents. The particular test parameters will be driven by the wastes being bulked. As a minimum, records of testing should be kept including any reaction giving rise to: • increase in temperature • viscosity change • separation or precipitation of solids • evolution of gases • evolution of odours Bulking up into drums (includes drum, tank, tanker or small container transfers into drums)		
41	Bulking/mixing should only take place under instruction from and under direct supervision of a suitable manager/chemist and should be under Local Exhaust Ventilation (LEV) in appropriate cases. Odorous materials should not be bulked up. If bulking different batches, then a composite sample must be compatibility tested prior to bulking.	Not applicable in this context	N/A
	Containers should be kept lidded/sealed as much as possible. If transfer involves tanker to drum, a minimum of two people should be checking pipes and valves at all times.	Not applicable in this context	N/A
	Bulking of solid waste		
42	Bulking of different batches must not take place without compatibility testing. In appropriate cases, LEV should be	Only the same waste material will be stored in bulk	Meets BAT

Ref	Indicative BAT requirements for waste storage	Management technique	Activity meets BAT
	used to control odour and dust. Drums should be manipulated using mechanical means, for example, forklift with rotating drum handling fitting. Liquid waste must not be added to solid wastes other than in purpose-designed and -built reaction vessel, that is, decanting of liquids into a skip containing bulked solids must not take place.	containers.	
	Bulk storage vessels BAT points 43 to 57	The only vessels on the site will be those relating to the waste water storage and for raw material containment. All of which will be stored within a bunded area to ensure effective containment and subject to routine checks. BAT points 44 to 57 are therefore not considered relevant to the site operations and have been omitted.	N/A
	Tank and process pipework labelling	Tank storage of liquids will be confined to waste water or small volume raw materials. And will be appropriately labelled.	N/A
58	All vessels should be clearly signed as to their contents and capacity and should have a unique identifier. Tanks should be appropriately labelled.	See comment above.	
59	Labelling should differentiate between wastewater and process water, combustible liquid and combustible vapour and direction of flow.	See comment above.	
60	Written records of all tanks should be kept detailing: • unique identifier • capacity	See comment above.	

Ref	Indicative BAT requirements for waste storage	Management technique	Activity meets BAT
	• construction including materials • maintenance schedules and inspection results • fittings • waste types that may be stored/treated in the vessel including flashpoint limit		
61	A suitable pipework coding system should be used, for example, RAL European standard colour coding.	See comment above.	
62	All valves should be tagged with a unique identifier shown on the process and instrumentation diagram. All connections should be correctly sized and maintained in an undamaged state. Other storage requirements	See comment above.	
63	Waste or raw materials in non-waterproof packaging should be kept under cover.	Waste is stored in suitable containers and raw materials likewise although most raw materials come in sealed weather proof -containers.	Meets BAT
64	Drums and other mobile containers should only be moved between different locations (or loaded for removal off-site) in accordance with written procedures. The waste tracking system should then be amended to record these changes.	Only a small number drums will be present on site and other mobile containers (i.e. 40 cubic yard container for marine growth waste) will remain in allocated bays.	Meets BAT

Relevant Waste Treatment BREF BAT reference:	Description from BREF document	Adherence to BAT	Comments
Section 6.1 – General BAT Conclusions			
BAT 1	In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS)	Yes	EMS adopted as part of ISO:14001 accreditation
BAT 2	In order to improve the overall environmental performance of the plant, BAT is to use waste pre-acceptance, acceptance, tracking, segregation and compatibility procedures	Yes	Set out in T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan
BAT 3	In order to facilitate the reduction of emissions to water and air, BAT is to establish and to maintain an inventory of waste water and waste gas streams, as part of the environmental management system (see BAT 1)	Yes	Set out in T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan
BAT 4	In order to reduce the environmental risk associated with the storage of waste, BAT is to use all of the techniques set out in the guidance such as storage optimisation, capacity and safety.	Yes	Hazardous waste to be segregated and stored in designated area
BAT 5	In order to reduce the environmental risk associated with the handling and transfer of waste, BAT is to set up and implement handling and transfer procedures.	Yes	No shredding of metal waste will take place. Mechanical treatment via cutting, hot cutting, shearing etc
BAT 10	BAT is to periodically monitor odour emissions.	Yes	OMP in place. Types of waste received will be of low odour generating potential
BAT 11	BAT is to monitor the annual consumption of water, energy and raw materials as well as the annual generation of residues and waste water, with a frequency of at least once per year.	Yes	Will be required by the Permit when issued

Relevant Waste Treatment BREF BAT reference:	Description from BREF document	Adherence to BAT	Comments
BAT 12	In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to set up, implement and regularly review an odour management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:	Yes	OMP in place
BAT 14	In order to prevent or, where that is not practicable, to reduce diffuse emissions to air, in particular of dust, organic compounds and odour, BAT is to use an appropriate combination of the techniques given in the guidance	Yes	Limited potential due to nature of waste processed at this facility. No shredding of metal waste will take place
BAT 17	In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to set up, implement and regularly review an noise and vibration management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:	Yes	Noise and Vibration Plan in place
BAT 18	In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to use one or a combination of techniques given in the guidance	Yes	Noise and Vibration Plan in place
BAT 19	In order to optimise water consumption, to reduce the volume of waste water generated or, where that is not practicable, to reduce emissions to soil and water, BAT is to use an appropriate combination of the techniques given in the guidance	Yes	Surface water management system yet to be finalised, however the site is impermeable and has a sealed drainage system
BAT 20	In order to reduce emissions to water, BAT is to treat waste water using a combination of techniques given in the guidance	Yes	The surface water management system will include treatment via an interceptor to remove solids and oils.
BAT 21	In order to prevent or limit the environmental consequences of accidents and Incidents, BAT is to use all of the techniques given in the	Yes	Set out in Emergency Plan

Relevant Waste Treatment BREF BAT reference:	Description from BREF document	Adherence to BAT	Comments
	guidance, as part of the accident management plan (see BAT 1).		
BAT 23	In order to use energy efficiently, BAT is to use both of the techniques given In the guidance	Yes	Energy usage is monitored and reported on an annual basis in accordance with generic permit conditions.
BAT 24	In order to reduce the quantity of waste sent for disposal, BAT is to maximise the reuse of packaging, as part of the residues management plan (see BAT 1).	Yes	Set out in T4-GYDFI-007 Great Yarmouth Decommissioning Facility - Waste management plan

APPENDIX I

ODOUR MANAGEMENT PLAN

Great Yarmouth Decommissioning Facility (Inner) Odour Management Plan

T4-GYDFI-002

Issue 1 (DRAFT)

GREAT YARMOUTH DECOMMISSIONING FACILITY (INNER) ODOUR MANAGAMENT PLAN

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1.0 INTRODUCTION

This document specifies how Veolia will comply with the permit conditions of Great Yarmouth Decommissioning facility in respect of monitoring and managing odour.

2.0 SCOPE

This procedure applies to work undertaken at Veolia at Great Yarmouth Decommissioning Facility .Permit No: EPR/HP3806PG

3.0 REFERENCES

3.1 Great Yarmouth – Permit No: EPR/HP3806PG
3.2 T4-GYDFI-001 Great Yarmouth Decommissioning Facility Permit working plan
3.3 T4-GYDFI-007 Great Yarmouth Decommissioning Facility Waste management plan
3.4 T4-GYDFI-008 Great Yarmouth Decommissioning Facility Marine Growth management plan
3.5 SYS/2/015 Monitoring and Review of Location Office Health, Safety, Environment and Insurance Risk
3.6 SYS/2/037 Reporting Accidents Incidents Near Misses and Enforcement Authority Communications
3.7 ENV/2/004 Identification and Evaluation of Environmental Aspects and Impacts
3.8 H4 Guidance 2011 for an Odour Management Plan

4.0 DEFINITIONS

Permitted Facility	Great Yarmouth Decommissioning Facility (Inner)
Redundant offshore module / structure	Redundant off-shore oil and gas production platform, structure / module received on site for decontamination & deconstruction
RIVO	Electronic system for recording, tracking and monitoring environment and health and safety incidents and near misses.
OMP	Odour Management Plan
NORM	Natural Occurring Radioactive Material

5.0 ODOUR MANAGEMENT PLAN (OMP)

5.1. STRUCTURE OF ODOUR MANAGEMENT PLAN (OMP)

The OMP structure is in accordance with H4 Guidance 2011 for an Odour Management Plan (Environment Agency in England).

The OMP considers:

- Activities that have the potential to produce odour and sources of release;
- Process/control failures or abnormal events that could lead to an increased level of emission or exposure;
- Potential outcomes of each failure scenario in respect to odour impact; and
- Actions to mitigate the effect of odour release (during normal and abnormal operations) and details of person responsible at the installation.
- The prevailing wind direction and hot weather.

6.0 SITE BACKGROUND

6.1. SITE PERMITTING

Company / permit holder	Veolia ES (UK) Limited
Permit Reference	EPR/HP3806PG
Site name	Great Yarmouth Decommissioning Facility (Inner)
Location/visiting address	Veolia South Beach Parade, Great Yarmouth, Norfolk, NR30 3QGY
Grid Ref	5315 0457

Table 1: Site Information

Figure 1: Site Location

6.2. FACILITY OVERVIEW

The facility is permitted to receive hazardous, non-hazardous waste.

Veolia will use Great Yarmouth Decommissioning Facility to receive oil and gas platforms, structures and subsea equipment for decommissioning and decontamination, aiming to reuse and recycle. The facility is permitted by Environment Agency.

The principal methodology for the recycling of the structures is as follows:

- Each structure / item will be accepted in Great Yarmouth after reviewing the types of waste, including hazardous waste.
- Each structure / item will then be subject to a survey to confirm the quantities and locations of all waste arising for subsequent decontamination operations.
- Each structure/item will be decontaminated and resulting wastes shall be contained on site, sorted, bulked and transported off site for recycling, treatment or disposal.
- On completion of decontamination, large metal structures / items will be reduced in size using mechanical metal cutting and/or manual flame cutting techniques. The resultant metal will be stored for subsequent shipment in bulk by sea for recycling.

The facility comprises the following built elements:

- Access road, office, mess facilities and welfare facilities
- Area comprising bunded locations for storing waste.
- Car parking
- Specific waste storage areas
- Fuel and oil storage facilities (fuel only when required)
- Additional storage tanks will be provided on the site, if required. Each project requirements will be assessed to ensure suitable storage for waste is provided.

6.2.1. Surrounding area

Great Yarmouth Decommissioning facility is surrounded by:

- North – Vacant land
- East – Siemens facility
- South – Industrial facility
- West - South Denes Road opposite industrial storage area and office.

6.3. POTENTIAL ODOUR SENSITIVE RECEPTORS

Potential odour sensitive receptors within 500 meters are listed in Table 2 and shown in Figure 2. Distances measured are from the storage area.

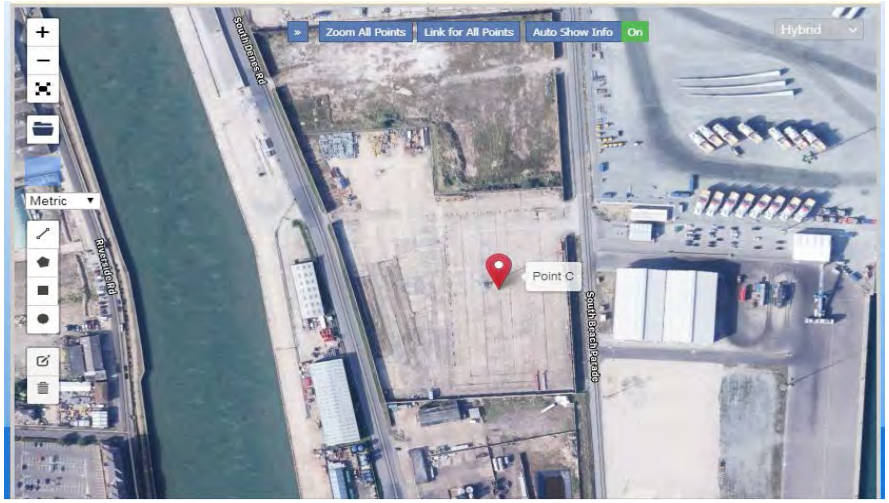

Figure 2: Location of sensitive receptors

Reference	Address	Building type/comments	Distance to works
1	ASCO UK Ltd	Fuels and lubricants	66m
2	Gleadell Agriculture Ltd	NIHHS site	23m
3	International Tubular Services Ltd	Industrial fabrication	<100m
4	Oilfield Containers Ltd	Industrial packaging	<100m

Table 2: Potential Odour Sensitive Receptors

6.4. POTENTIAL ODOUR SOURCES AND ACTIVITIES

Measures to control odour have been considered in the context of the installation setting and the operations that are undertaken.

Identified operations with the potential to produce and release odour at the facility are described below. This OMP has been developed to ensure that potential odour, from each part of the process, is minimised through effective management to an acceptable level.

Table 3 below presents a summary of main odour sources and estimated intensity:

Process step	Operation	Type of odour	Reason
Structure reception	Removal and storage of structures pending demolition	Moderate to strong	Degradation of incoming marine growth attached to offshore jackets.
Marine growth stripping	Removal of Marine growth form dismantled jackets	Moderate to strong	Degradation of incoming marine growth attached to offshore jackets
Storage of marine growth pending disposal	Storage of marine growth pending disposal	Moderate to strong	Degradation of incoming marine growth removed from offshore jackets
Waste from topside structures	Intermediate storage of hydro-carbons	Hydro-carbon – low odour, unlikely to be detected beyond 5 metres from storage vessel.	vapours from storage vessels with open vents to atmosphere
Storage of surface water	Surface water storage	Low odour	The water within the tanks can go anaerobic and produce sulphur-based odorous compounds.
Exhaust emissions	Diesel engine plant on site	Low odour, unlikely to be detected beyond 5 metres from plant.	Exhaust emissions from plant when operating venting to atmosphere

Table 3: Summary of main odour sources and estimated intensity

6.4.1. Receipt of structures with marine growth attached

The potential for odour generation, following the receipt of jackets with marine growth attached, is directly influenced by the type of growth, hard or soft, and the extent of degradation. The extent of degradation of the growth will effectively be determined by the age of the waste and ambient temperatures, i.e. during warm periods of extended retention, materials with higher odour potential may be delivered to site. In the event that a malodorous load is delivered, the removal of the marine growth will be a priority action and if necessary an odour suppressant will be applied if deemed necessary by the project manager.

Procedure “T4-GYDFI-008 Great Yarmouth Decommissioning Facility Marine growth management plan” provides information for dealing with marine growth.

6.4.2. Treatment of Storage Pad Run-Off

Any liquid draining from the marine growth waste is contained within the storage area by means of bunding. Runoff will be pumped and discharged into a surface water collection system located adjacent to the storage area.

7.0 CONTROL MEASURES

Veolia operating procedures for the dismantling of marine structure ensures that effective operational practices are employed. Whilst not specifically aimed at odour control; effective management and control of the demolition process minimises odour generation.

The primary control measure for the Great Yarmouth Decommissioning site is to limit, as much as practicable, the amount of time the jackets remain in place before being dismantled. This dismantling allows the marine growth to be stripped from the jackets in a timely manner and, due to the height of some of the jackets, removes some of the potential airborne risk and carriage of the odour by the wind.

We also acknowledge that the stripping and the storage of the marine growth, prior to disposal, will cause some odour issues. However, we intend to perform these operations as far as possible from any potential receptors, and will be covered over using tarpaulins, and sprayed with odour suppressant, if deemed appropriate.

Procedure “T4-GYDFI-008 Decommissioning Facility Great Yarmouth Marine growth management plan” provides information for dealing with marine growth.

Additionally, the following sections detail management techniques, procedures, and odour control measures to minimise the potential for odour generation for each aspect of the operations.

7.1. ENVIRONMENTAL ASPECTS AND IMPACT ASSESSMENTS

Environmental Aspects and Impacts (actual or potential) will be identified and recorded in accordance with procedure "ENV/2/004 Identification and Evaluation of Environmental Aspects and Impacts"

This process will identify the process/task/activity (aspect) with the associated hazard risk rating, control measure/s and post risk rating score. Environmental Impacts are then identified with the associated Aspect.

7.2. PLANT AND EQUIPMENT

Plant and equipment will be serviced as per recommendation from the manufacturers and suppliers. Operatives will report any damages to their line manager to arrange repairs, to prevent any additional emission to air.

Requirements for servicing, inspection, testing and calibration for equipment and mobile plant are covered in Veolia procedures as per Business Management System.

Key procedures for plant and equipment:

- SYS/2/011 Calibration and Maintenance of Testing and Measuring Equipment
- HS/2/008 Provision and use of Work Equipment Regulations (PUWER)
- HS/2/009 Lifting Operations and Lifting Equipment (LOLER)
- HS/2/045 Mobile Plant Operations

7.3. WASTE

Waste will be stored in suitable containers or in designated areas, which will be monitored each working day checking for spillages and odour.

Waste will be removed from site as soon as practically possible, if any odour concerns are foreseen or occur.

Procedure "T4-GYDFI-007 Great Yarmouth Decommissioning Facility Waste management plan" provides more details regarding waste and controls.

7.4. FUEL

Fuel will be stored in sealed approved containers.

Procedure "T4-GYDFI-001 Great Yarmouth Decommissioning Facility Permit working plan" provides more details regarding storage of fuel.

7.5. LIAISON WITH NEIGHBOURS

If an action is being considered that may cause temporary odour, outside of the normal operational procedures, then before such action is taken the area or operations manager will be informed. Neighbours who may be affected will be contacted to advise them of the operation being undertaken, and that any increase in odour will be of a temporary nature. When this type of work is expected to take place the Environment Agency and the local authorities must be informed and more regular olfactory checks made to identify any potential odour complaints or issues.

8.0 FAILURE OR ABNORMAL EVENT SCENARIOS

Types of failure or abnormal events considered to have the potential to result in an odour impact have been considered.

These have been identified as abnormal meteorological conditions and failure of aspects of them. Failure and abnormal event scenarios are presented in Appendix A and summarised below.

8.1. ABNORMAL METEOROLOGICAL CONDITIONS

Extreme meteorological conditions that promote the generation of odour and inhibit its effective dispersion (i.e. high temperatures and stable conditions) may result in increased risk of impact at any receptor locations.

Applying control measures, such as use of meteorological forecasts, containment any marine growth and treatment with odour suppressants, arrangements for the waste to be removed from site, reduces the potential for impact. However, should extreme circumstances occur potential odour impact is more likely, which will need further consideration.

9.0 MONITORING MEASURES

The aim of the site monitoring is to regularly check the site to ensure its performance and confirm that our operations do not have a detrimental effect to the local environment or harm to human health. The site is inspected daily. The responsibility for this lies with the Project Manager or nominated deputy.

The basic principle is that during the course of the working week, measures will be implemented to carry out odour monitoring as per Procedure "SYS/2/015 Monitoring and Review of Location Office Health, Safety, Environment and Insurance Risk"

9.1. ODOUR ASSESSMENT SCORE

Odour assessment score will be calculated when monitored.

The odour assessment score is the calculation as per following:

Odour Intensity X Odour Extent = Odour assessment score

Odour Intensity	Description
1	No detectable odour
2	Faint odour (barely detectable, need to stand still and inhale facing into wind.
3	Moderate odour (odour easily detectable while walking and breathing normally, possibly offensive)
4	Strong odour (bearable, but offensive odour – will my clothes hair/smell?)
5	Very strong odour (this is when you really wish you were somewhere else)

Odour Extent	Description
1	Local and transient (only detected during brief periods when wind drops or blows)
2	Transient as above, but detected away from site boundary
3	Persistent but fairly localised
4	Persistent and pervasive up to 50m from site boundary
5	Persistent and widespread (odour detected >50m) from site boundary

9.2. MONITORING AND RECORDING

Document T4-GYDFI-001-01 – Great Yarmouth Decommissioning Facility Daily site inspection checklist- will be completed to monitor the site and boundaries. Areas identified in table 3 “odour sources” will be monitored from a downwind location, in line with Procedure “SYS/2/015 Monitoring and Review of Location Office Health, Safety, Environment and Insurance Risk”.

Odour assessment score to be recorded, if a score of **8** or more is recorded, details to be provided to the project manager for review and action.

9.3. ODOUR SURVEY ASSESSMENT FORM

If odour is detected with an odour assessment score of 8 then the Project Manager (or Deputy) is notified immediately and the Document “T4-GYDFI-002-01 Great Yarmouth Decommissioning Facility Odour survey assessment report” will be completed.

Actions to prevent and resolve the odour concern or complaint will also be recorded on the on the “T4-GYDFI-002-01 Great Yarmouth Decommissioning Facility Odour survey assessment report” .The process will be repeated until the Odour assessment score is 6 or below.

9.4. METEOROLOGICAL CONDITIONS

Meteorological forecasts and conditions shall be monitored to enable potential odour problems to be predicted and, if necessary, remedial actions, such as modifications to the method of working.

The meteorological conditions to be recorded on the T4-GYDFI-001-01 – Great Yarmouth Decommissioning Facility Daily site inspection checklist

9.5. COMPLAINT MONITORING

Complaints shall be recorded and reported on Rivo Safeguard, including the following information: date and time, nature of complaint, name of complainant (if given), a summary of investigation and actions taken and their results, in line with Veolia tier 2 procedure SYS/2/007 Complaints and Non Conformance Reporting

If the Environment Agency has not been informed of the complaint, then they must be notified at the earliest opportunity.

In the event of a complaint, further odour monitoring will be undertaken as per section 10.4 “Odour survey assessment report”

The odour assessor shall undertake odour observation at the location of the complaint and at potentially sensitive receptor locations downwind from the site. For each location observations shall be made concerning odour intensity, persistence and character. Details are record on the Document “T4-GYDFI-002-01 Great Yarmouth Decommissioning Facility Odour survey assessment report”

10.0 APPENDIX

Appendix A Failure and abnormal event summary table

11.0 DOCUMENTS

T4-GYDFI-002-01 Great Yarmouth Decommissioning Facility Odour survey assessment report

T4-GYDFI-002 GREAT YARMOUTH
ODOUR MANAGAMENT PLAN
APPENDIX A – FAILURE & ABNORMAL EVENT SUMMARY TABLE

APPENDIX A – FAILURE AND ABNORMAL EVENT SUMMARY TABLE

Odour generating process [material]	**Release points**	**Abnormal situation / failure**	**Potential outcome**	**Control measure**	**Action (Responsible person)**
Reception, storage stripping and storage pending disposal, etc process. [Marine growth]	Jacket Storage area, Non-hazardous Waste Containment Area.	Extended duration of stable meteorological conditions	Elevated odour concentrations at receptors.	Weather forecast, manage Marine growth storage and stripping in response to wind/weather conditions. Olfactory survey and complaint monitoring.	Progressive initiation of control measures as necessary and complaint investigation in accordance with Section **Error! Reference source not found.**(Project Manager)
Decomposition of waste in reception area. [Marine Growth]	Reception area	Breakdown of dismantling equipment.	Elevated odour concentrations at receptors.	Hire replacement equipment if repairs to cannot be made in a timely manner.	Rapid repair of the dismantling equipment. If necessary arrange to hire replacements. (Project Manager)
Run off water [surface water run off]	Tank exhaust	Failure of containment system	Elevated odour concentrations at receptors.	Monitor odour level. Consider hire of pump/ removal of water by tanker.	Consider hire of pump/ removal of water by tanker (Project Manager)

APPENDIX J

NOISE MANAGEMENT PLAN

Great Yarmouth Decommissioning Facility (Inner) Noise & Vibration Management Plan

T4-GYDFI-004

Issue 1 (DRAFT)

GREAT YARMOUTH DECOMMISSIONING FACILITY (INNER)
NOISE MANAGAMENT PLAN

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1. INTRODUCTION

The purpose of the Noise Management Plan is to monitor, reduce and prevent noise & vibration and comply with the site Permit

This procedure is for dealing with environmental noise and vibration.

Procedure “HS/2/003 Noise at work” is for dealing with occupational noise in relation to Health and Safety.

2. SCOPE

This procedure applies to the work been carried out under Veolia control at Great Yarmouth Decommissioning Facility Permit

3. REFERENCES

3.1 Permit EPR/HP3806PG
3.2 T4-GYDFI-001 Great Yarmouth Decommissioning Facility Permit working plan
3.3 T4-GYDFI-005 Great Yarmouth Decommissioning Facility Completing Environmental monitoring reports procedure
3.4 T4-GYDFI-006 Great Yarmouth Decommissioning Facility Traffic management plan
3.5 SYS/2/015 Monitoring and Review of Location Office Health, Safety, Environment and Insurance Risk
3.6 SYS/2/037 Reporting Accidents Incidents Near Misses and Enforcement Authority Communications
3.7 HS/2/003 Noise at Work
3.8 ENV/2/004 Identification and Evaluation of Environmental Aspects and Impacts
3.9 HS/2/013 Assessment and Control of Contractors

4. DEFINITIONS

RIVO	The Company's electronic system for recording, tracking and monitoring environment and health and safety incidents and near misses.

5. NOISE MANAGEMENT PLAN

5.1 STATUS OF THE NOISE MANAGEMENT PLAN

This Noise Management Plan is a "live" document. The monitoring procedures, responsibilities and compliance actions will be updated as appropriate.

6. SITE BACKGROUND

6.1 SITE PERMITTING

Company / permit holder	Veolia ES (UK) Limited
Permit Reference	EPR/HP3806PG
Site name	Great Yarmouth Decommissioning Facility (Inner)
Location/visiting address	Veolia South Beach Parade, Great Yarmouth, Norfolk, NR30 3GY
Grid Ref	5315 0457

Table 1 Site Information

Figure 1: Site Location

6.2 FACILITY OVERVIEW

Veolia will use the Great Yarmouth Decommissioning Facility to depollute and dismantle marine vessels and floating structures utilised in the offshore oil and gas industry. The facility is permitted by the Environment Agency.

6.3 SURROUNDING AREA

Great Yarmouth Decommissioning facility is surrounded by:

- North – Vacant land
- East – Siemens facility
- South – Industrial facility
- West - South Denes Road opposite industrial storage area and office.

No houses, residential homes or hospitals are within a mile of the operational site.

6.4 POTENTIAL NOISE SENSITIVE RECEPTORS

Potential noise sensitive receptors within 500 meters are listed in Table 2 and shown in Figure 2. Distances measured are from the storage area.

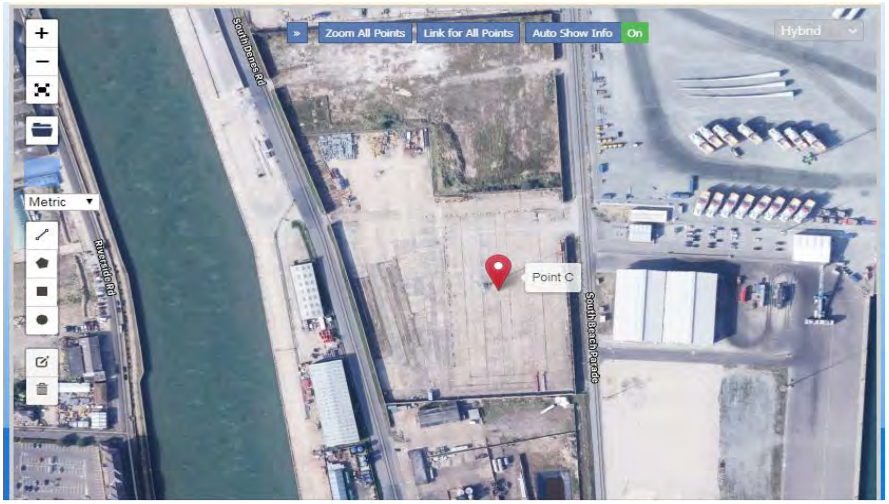


Figure 2: Location of sensitive receptors

Reference	Address	Building type/comments	Distance to works
1	ASCO UK Ltd	Fuels and lubricants	66m
2	Gleadell Agriculture Ltd	NIHHS site	23m
3	International Tubular Services Ltd	Industrial fabrication	<100m
4	Oilfield Containers Ltd	Industrial packaging	<100m

Table 2: Potential Noise Sensitive Receptors

6.5 RECOGNISED VULNERABLE AREA AND VULNERABLE TIME PERIOD FOR WILDLIFE

Potential vulnerable area and time period for wildlife within 500 meters are listed in Table 3 and shown in Figure 3. Distances measured are from the Decommissioning facility.

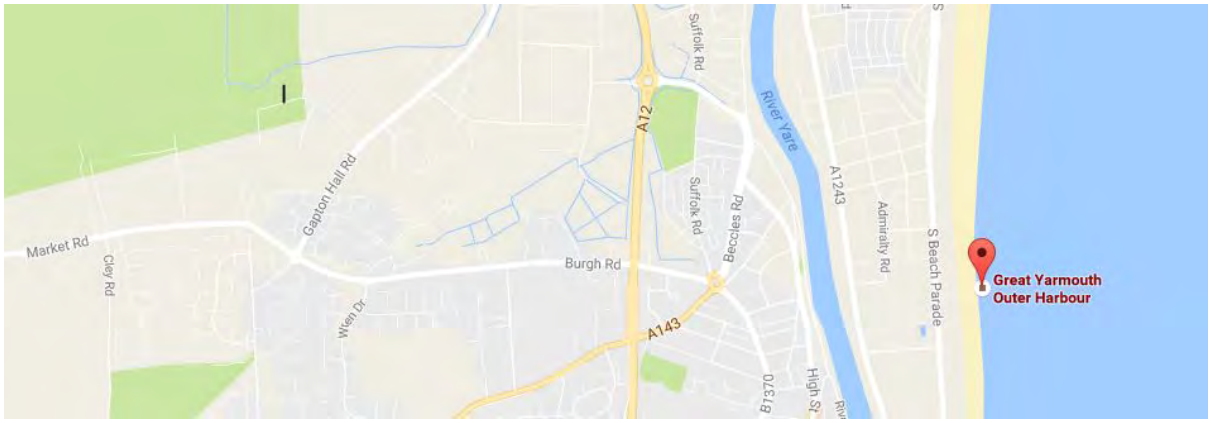


Figure 3: Potential vulnerable area for wildlife within 500 meters

Reference	Address / location	Period	Building type/comments	Distance to works
			Currently none	

Table 3: Potential vulnerable area and period for wildlife within 500 meters

Details of the nearest conservational area are recorded on the T4-GYDFI-001 Great Yarmouth Decommissioning Facility Permit working plan.

6.6 CRITERIA AND ANTICIPATED DE-CONSTRUCTION NOISE

Veolia has completed a similar de-construction & recycling project at Veolia's Existing site at South Beach Parade and at it's Lerwick Decommissioning Facility, on the TCP 02 module, of 8.700 tonnes, which was loaded in, on SPMT trailers.

Veolia commissioned a noise assessment specialist to prepare a report relating to the noise generated by these facilities.

The assessment determined the levels of noise at the facility. It is considered that the levels of noise generated at the Great Yarmouth Decommissioning Facility will not significantly vary from that experienced in both sites, due to similarity of the project and the equipment to be used.

Appendix A demonstrates Lerwick Decommissioning facility noise assessment levels, which are likely to be similar to the level of noise generated at the Great Yarmouth Facility.

NOISE SOURCES

The following table lists significant equipment proposed to be used on the site.

Equipment specific noise measurements were taken at a distance of 1 metre with a wind-shielded microphone standing 1.2 metres above the ground.

The measurements were taken whilst the equipment was engaged in de-construction activities. It should be borne in mind that noise levels will fluctuate depending on the size of the metal being processed.

During initial site noise monitoring, the validity of this data will be confirmed and adjusted where necessary for the major items of equipment.

Equipment	Model	Type	L_{eq} dB(A) @ 1 Metre	Data reference
Excavator with shears	Komatsu PC340 LC	34 tonne	96.0	Vehicle Technical Documents
Excavator with shears	Hitachi CX600	62 tonnes	99.0	Vehicle Technical Documents
Excavator with grab	Komatsu PC210 LC	21 tonnes	94.0	Vehicle Technical Documents
Excavator with shears - tracking	Leibherr 107	35 tonnes	83.5	AOHS Report Measurement
Excavator with shears - operating	Leibherr 107	35 tonnes	90.3	AOHS Report Measurement
Telescopic Handler -Idling	JCB – 535	3.6 tonnes	76.4	AOHS Report Measurement
Telescopic Handler –Operating	JCB -535	3.6 tonnes	83.5	AOHS Report Measurement
Telescopic Handler –Reverse alarm	JCB -535	3.6 tonnes	85.0	AOHS Report Measurement
Oxy-propane Burning	Standard Equipment – various suppliers	N/A	87.1	AOHS Report Measurement
Fork-lift Truck	Clark – GPX40	4 tonne	84.2	AOHS Report Measurement
Mobile Crane – Idle	Leibherr	90 tonnes lift	77.0	AOHS Report Measurement
Mobile Crane – Operating	Leibherr	90 tonnes lift	88.7	AOHS Report Measurement
Dock Crane – Operating	NCK Rapier C54B	54 tonnes lift	87.1	AOHS Report Measurement

Table 4 Noise Source table

The following table (Table 5) shows the key activities likely to generate significant noise, and shows the approximate duration of the activity and the equipment that is likely to be used.

Task	Activities	Duration of task	Equipment
Load-in operations from sea-barge at quayside	Barge to load-in using self-propelled Modular transport trailers.	1 to 3 days for a large platform. 1 day small structure.	SPMT trailer lines with power-packs
Individual preparation of barges for load-in operations	Structure sea-fastenings removed on the barge.	1 days per barge	Crane and oxy-acetylene burning equipment
De-construction of structures	De-construction of structures using excavators with shears and oxy-acetylene equipment.	Depend on the site of structure	Excavators, oxy-actylene burning equipment, cranes
Felling of structures	Felling of structures	Maximum felling period of 1 -5 minutes.	Excavator with pull line. Potential for use of controlled charges.

Table 5 Noise generating activities

MITIGATION

Indicative calculations have been conducted for the main items of equipment based on the outline de-construction methodology.

The calculations are considered ‘worst case’ scenario, based on 3 items of plant being used simultaneously, at the closest location to the nearest sensitive receptor, assuming open field conditions above solid hard ground.

1. Excavator with shears generating 99.0eq dB(A) at 1 metre
2. Oxy-propane burning at quayside generating 87.1eq dB(A) at 1 metre
3. Telescopic handler generating 83.5eq dB(A) at 1 metre

The calculation predicts a noise level of 54eq dB(A) at the location of 150meters which falls within the acceptable parameters as advised by the World Health Organisation.

- 55 dB(A) Leq is regarded by the World Health Organisation as the maximum day time level before community annoyance sets in. This is the base level for residential areas
- 35 dB(A) is viewed by WHO as the maximum desirable noise level for sleep.

CALCULATION

Prior to de-construction operations commencing the actual noise levels of the plant will be measured and the combined source calculations re-assessed.

PERMIT CONDITIONS

The generic Permit condition states the following: “The activities shall be free from noise and vibration at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved noise and vibration management plan to prevent or where that is not practicable to minimise and noise and vibration”.

7. CONTROL MEASURES

7.1 ENVIRONMENTAL ASPECTS AND IMPACTS ASSESSMENT

Environmental Aspects and Impacts (actual or potential) will be identified and recorded in accordance with procedure “ENV/2/004 Identification and Evaluation of Environmental Aspects and Impacts”

This process will identify the process/task/activity (aspect) with the associated hazard risk rating, control measure/s and post risk rating score. Environmental Impacts are then identified with the associated Aspect.

7.2 CONTROL MEASURES ASSESSMENT LIST

On the basis of the predicted calculated noise levels, the following general noise control measures have been identified as likely to be required to avoid noise emissions from the site causing a nuisance.

Equipment/process	Mitigation options
De-construction equipment	• No working outside of the hours 0700 to 2000 is anticipated to be undertaken.
Manual handling/tools	• Place tools and equipment on the ground – do not drop • Cover surfaces where tools/equipment is placed with resilient material • Do not drag equipment on the ground
Cars, vans and trucks	• Avoid slamming doors • Minimise speed and engine revs • Stereos / radio's off • Minimise use of horns • Switch off engines off when stationary
Reversing alarms	• Alarm level to be variable relative to the background noise level
Excavators, bulldozers, loaders, bobcats	• Grease tracks /equipment regularly • Avoid unnecessary movements • Exhaust silencers • Engines off when not in use
Cranes and Hiabs	• Use straps rather than chains where practical
Generators, Compressors and pumps	• Equipment enclosure • Keep enclosure panels/doors closed • Fit with attenuators and silencers • Locate away from neighbours • Use centralised generators

Table 6 Mitigation options per equipment

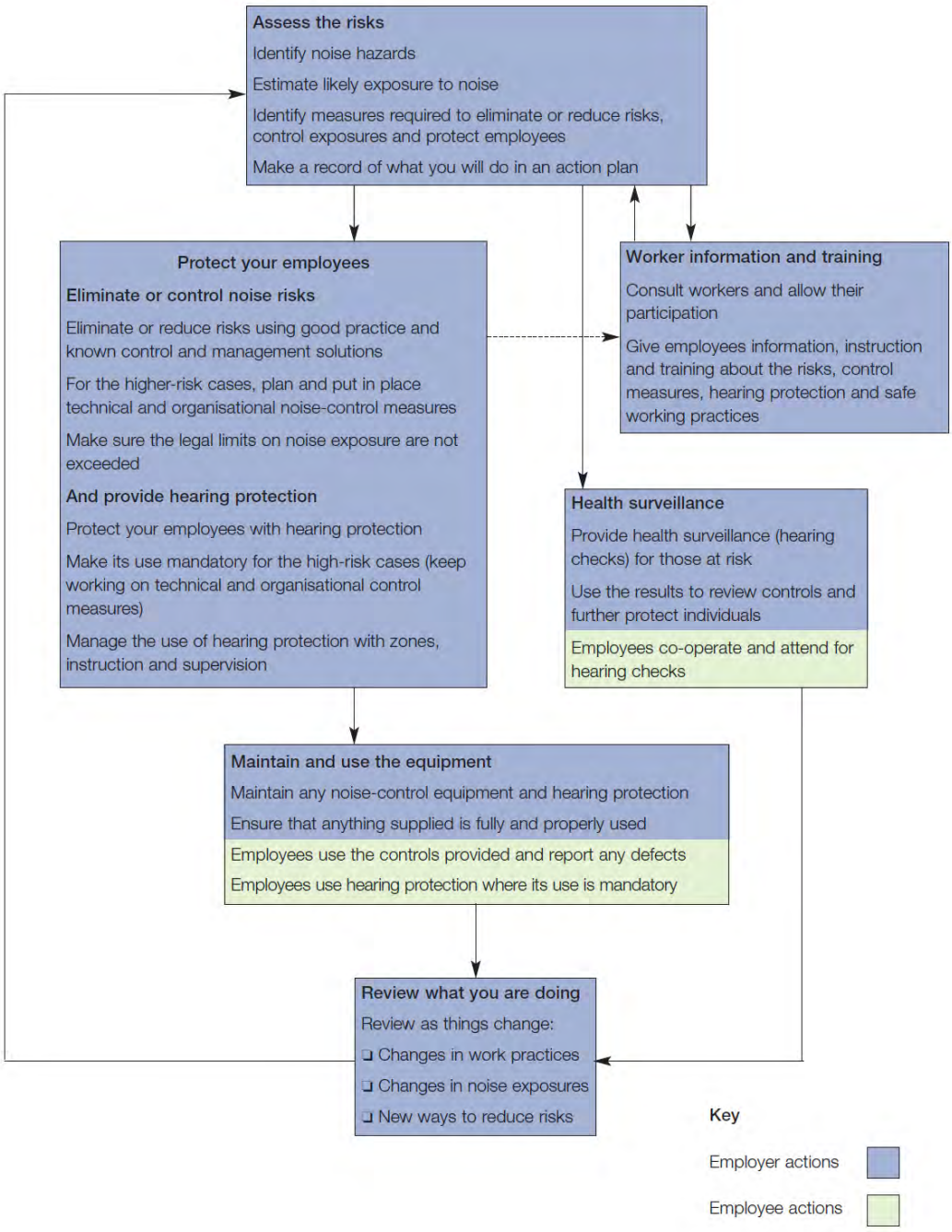
7.3 EQUIPMENT, MOBILE PLANT AND VEHICLES

To prevent and avoid any additional noise from equipment, mobile plant and vehicles, the required servicing, inspection and repairs will be carried out in line with the following procedure:

- SYS/2/011 Calibration and Maintenance of Testing and Measuring Equipment
- HS/2/008 Provision and use of Work Equipment Regulations (PUWER)
- HS/2/009 Lifting Operations and Lifting Equipment (LOLER)
- HS/2/045 Mobile Plant Operations

7.4 FLOW DIAGRAM MANAGING NOISE

The following flow diagram will be followed to reduce the risk of noise.



7.5 LIAISON WITH NEIGHBOURS

If an action has the potential to cause temporary noise, outside of the normal operational procedures, then before such action is taken the area or operations manager will be informed. Neighbours who may be affected will be contacted to advise them of the operation being undertaken, and that any increase in noise will be of a temporary nature. When this type of work is expected to take place the Environment Agency and the Port Authority must be informed and more regular checks made to identify any potential complaints or issues.

8. MONITORING & SURVEYS

8.1 THIRD PARTY ENVIROMENTAL NOISE MONITORING

Noise monitoring & surveys shall be conducted by authorised competent company, if required.

The monitoring may be required if a project is deemed to have high amount of noise, which has been classed as high risk, a project may be deemed high risk after a control evaluation using the site Environmental Aspects and Impacts assessment.

A third party environmental noise monitoring may be required as part of an investigation into a noise complaint.

8.2 EQUIPMENT CALIBATION

Noise monitoring equipment will be checked to ensure the equipment has been calibrated before work starts.

8.3 NOISE SURVEY MONITORING

Noise survey monitoring will take place as per procedure HS/2/003 Noise at Work

Following each noise survey, the results will be recorded and maintained in the Noise survey report HS/2/003/003, which will be made available for inspection by Environment Agency and any issues discovered will be investigated.

8.4 DAILY INSPECTION CHECKLIST

Document T4-GYDFI-001-01 – Great Yarmouth Decommissioning Facility Daily site inspection checklist- Great Yarmouth will be completed to ensure the site and boundary comply with the permit requirements in line with Procedure “SYS/2/015 Monitoring and Review of Location Office Health, Safety, Environment and Insurance Risk”. Actions and concerns will be recorded and reported to the project manager and also on Rivo as per procedure.

9. COMPLAINTS

Complaints shall be recorded and reported on Rivo Safeguard, including the following information: date and time, nature of complaint, name of complainant (if given), a summary of investigation and actions taken and their results. If the Environment Agency has not been informed of the complaint, then they must be at the earliest opportunity.

Complaints in accordance with procedure SYS/2/007 Complaints and Non Conformance Reporting

n the event of a complaint further noise monitoring will be undertaken and an investigation carried, the noise will be assessed using the Flow diagram – managing noise, the findings of

the investigation and the actions taken will be record on Rivo, also the finding will be communicated to complainants.

10. DOCUMENTS

None

11. APPENDIX A

Site Perimeter Measurements (see Table 2)

Perimeter measurements were taken whilst pipework unloading operations were being carried out at the south east corner of the site, the NCK Rapier Crane was being used constantly.

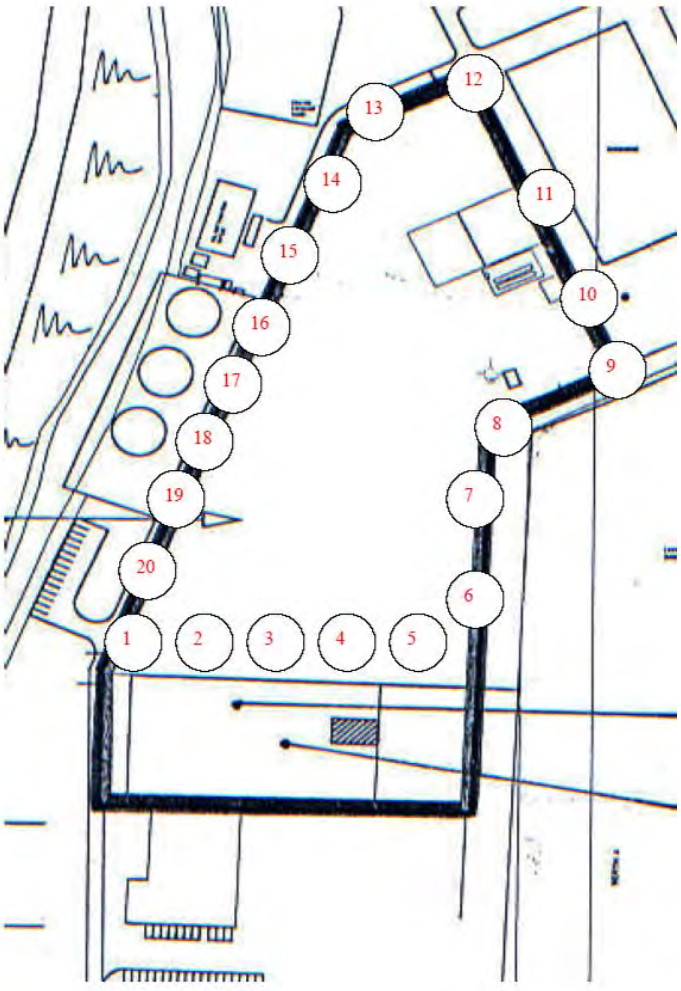
The measurements varied between L_{eq} 50 dB(A) and L_{eq} 70 dB(A) with L_{eq} 67 dB(A) at the south east corner beside the crane operations. The most significant factors were the Lmax readings which varied up to 88 dB(A), this was caused by vehicular traffic related to the other commercial operations on the Greenhead Base.

Table 2 Measurements at facility perimeter and 3.5 metres from any building

Ref. No	Time Start Finish	L_{eq} dB(A)	L_{10} dB(A)	L_{90} dB(A)	L_{max} dB(A)	L_{min} dB(A)	Surface / Location / Comments
1	11:17:43 11:23:54	65.0	66.2	51.4	83.5	48.1	Compact earth – Vehicle Traffic (4) Fork Lift Traffic (1)
2	11:25:38 11:31:48	56.5	60.2	50.4	65.8	49.0	Compact earth – Crane Operations Vehicle Traffic (3)
3	11:32:32 11:38:15	54.1	57.6	50.0	65.3	49.0	Compact earth – Crane Operations Vehicle Traffic (1)
4	11:39:17 11:45:13	57.6	59.0	54.2	73.9	52.8	Compact earth – Crane Operations Vehicle Traffic (2)
5	11:45:55 11:51:29	60.6	64.6	55.8	72.1	54.9	Compact earth – Crane Operations Vehicle Traffic (1)
6	11:53:16 11:59:47	67.3	67.6	62.0	79.0	61.1	Concrete – Crane Operations
7	13:22:21 13:27:34	65.9	69.8	56.8	79.8	55.3	Concrete – Quayside – Havila Favour unloading pipes
8	13:28:27 13:32:58	58.7	62.2	52.6	70.4	51.4	Concrete – Quayside – Havila Favour unloading pipes
9	13:37:31 13:42:59	54.9	56.6	52.0	61.1	49.5	Concrete – North East Corner
10	13:44:05 13:50:01	49.6	52.4	44.2	71.6	42.6	Tarmac – North Boundary Road
11	13:50:52 13:57:04	52.0	51.2	42.6	70.3	40.7	Tarmac – North Boundary Road – adjacent net washing area
12	13:58:43 14:05:00	62.0	65.2	47.2	83.1	45.1	Compact Earth – North Corner – Vehicle Traffic
13	14:05:44 14:11:31	62.0	60.0	49.4	84.0	46.3	Compact Earth – North West Corner Vehicle Traffic (4)
14	14:12:15 14:18:38	58.8	59.4	50.8	78.5	49.1	Compact Earth – North West Boundary Vehicle Traffic (3)
15	14:19:35 14:25:13	58.1	58.4	53.8	73.6	52.5	Compact Earth – North West Boundary Vehicle Traffic (3)

Ref. No	Time Start Finish	L_{eq} dB(A)	L_{10} dB(A)	L_{90} dB(A)	L_{max} dB(A)	L_{min} dB(A)	Surface / Location / Comments
16	14:25:58 14:31:46	58.5	61.4	52.2	74.0	50.2	Compact Earth – North West Boundary Vehicle Traffic (1) + Plane low overhead
17	14:32:27 14:39:00	70.0	67.0	50.2	89.7	49.1	Compact Earth –West Boundary Fork Lift Trucks (2)
18	14:40:03 14:45:58	69.4	70.2	52.0	88.0	50.4	Compact Earth –West Boundary Vehicle Traffic (3)
19	14:46:52 14:59:38	61.9	65.0	49.0	82.3	47.1	Compact Earth –West Boundary Vehicle Traffic (1)
20	15:00:28 15:08:03	56.7	56.6	49.0	75.4	47.6	Compact Earth –West Boundary Vehicle Traffic (1)
21	15:08:33 15:15:17	51.5	52.8	48.4	63.8	47.5	Compact Earth – Middle of Site – No Operations

Table 7 Measurements at facility perimeter and 3.5 metres from any building



APPENDIX K

TECHNICAL COMPETENCE

Continuing Competence Certificate

This certificate confirms that

Ian Porter

Has met the relevant requirements of the Continuing Competence scheme for the following award(s) which will remain current for two years from 23/05/2019

TSH	Transfer - Hazardous Waste

Expiry Date: 23/05/2021

Verification date: 22/05/2019

Authorised:

WAMITAB Chief Executive Officer

Learner ID: 10702

Certificate No.: 5144140

Date of Issue: 23/05/2019

CIWM Chief Executive Officer

The Chartered Institution of Wastes Management

00141798

WAMITAB

WASTE MANAGEMENT INDUSTRY TRAINING AND ADVISORY BOARD

CERTIFICATE No: 3121

CERTIFICATE OF TECHNICAL COMPETENCE

This Certificate confirms that

Ian Porter

has demonstrated the standard of technical competence required for the management of a facility of the type set out below

Facility Type:

Managing Transfer Operations :

Clinical or Special Waste (Level 4) - TSS4

Authorising Signatures:

Director General

Director

Date of issue: 04 October 2000

City & Guilds

CONTINUATION

This Certificate of Unit Credit towards

NATIONAL VOCATIONAL QUALIFICATION
MANAGING TRANSFER OPERATIONS CLINICAL OR SPECIAL WASTE LEVEL 4

is awarded to IAN PORTER

MAINTAIN SAFE AND PRODUCTIVE WORKING CONDITIONS ON SITES TRANSFERRING CLINICAL, SPECIAL AND OTHER WASTES	U1026758
CONTROL SITE OPERATIONS FOR CLINICAL, SPECIAL AND OTHER WASTE TRANSFER	U1026759
CONTROL THE DISPOSAL OF OUTPUTS AND RESIDUES FROM CLINICAL, SPECIAL AND OTHER WASTE TRANSFER AND RECOVERY OPERATIONS	U1026760
CONTROL TECHNICAL IMPROVEMENTS IN CLINICAL,SPECIAL AND OTHER WASTE TRANSFER OPERATIONS	U1026761

Awarded AUGUST 2000 0008/027263 /073407/OBM0182/1/25/08/71

Chairman
The City and Guilds of London Institute

Director General
The City and Guilds of London Institute

City & Guilds
National
Vocational
Qualification

WAMITAB INCORPORATED 1989

MANAGING TRANSFER OPERATIONS CLINICAL OR SPECIAL WASTE LEVEL 4
(Q1026781)

This Certificate
is awarded to IAN PORTER

The holder has one or more formal Certificates of Unit Credit by which this award was earned

Awarded AUGUST 2000 0008/027263 /073407/OBM0182/1/25/08/71/

Director-General
The City and Guilds of London Institute

Qualifications and Curriculum Authority

Chief Executive
Waste Management Industry Training & Advisory Board

The City and Guilds of London Institute *Incorporated* by Royal Charter *Founded* 1878

N593

City & Guilds

This Certificate of Unit Credit towards

NATIONAL VOCATIONAL QUALIFICATION
MANAGING TRANSFER OPERATIONS CLINICAL OR SPECIAL WASTE LEVEL 4

is awarded to IAN PORTER

WHO ATTENDED MOULTON COLLEGE, NORTHAMPTON

AND WAS SUCCESSFUL IN THE FOLLOWING TWELVE UNITS

CONTROL MAINTENANCE AND OTHER ENGINEERING OPERATIONS	U1026713
ENSURE PROTECTION OF THE ENVIRONMENT ON WASTE MANAGEMENT SITES	U1026714
RECOMMEND,MONITOR AND CONTROL THE USE OF RESOURCES ON WASTE MANAGEMENT SITES	U1026711
PROVIDE PERSONNEL FOR WASTE MANAGEMENT SITES	U1026715
CREATE AND MAINTAIN EFFECTIVE WORKING RELATIONSHIPS ON WASTE MANAGEMENT SITES	U1026716
SEEK, EVALUATE AND ORGANISE INFORMATION TO SUPPORT DECISION MAKING ON WASTE MANAGEMENT SITES	U1026712
CONTROL THE RECEPTION OF CLINICAL,SPECIAL AND OTHER WASTES	U1026717
CONTROL THE MOVEMENT SORTING AND STORAGE OF CLINICAL,SPECIAL AND OTHER WASTES	U1026718

Awarded AUGUST 2000 0008/027263 /073407/OBM0182/1/25/08/71

CONTINUED

Chairman
The City and Guilds of London Institute

Director General
The City and Guilds of London Institute

City & Guilds

National Vocational Qualification

WAMITAB INCORPORATED 1989

MANAGING TRANSFER OPERATIONS CLINICAL OR SPECIAL WASTE LEVEL 4
(Q1026781)

This Certificate is awarded to IAN PORTER

The holder has one or more formal Certificates of Unit Credit by which this award was earned

Awarded AUGUST 2000 0008/027263 /073407/OBM0182/1/25/08/71/

Director General
The City and Guilds of London Institute

Qualifications and Curriculum Authority

Director General
Waste Management Industry Training & Advisory Board

City & Guilds

CONTINUATION

This Certificate of Unit Credit towards

NATIONAL VOCATIONAL QUALIFICATION
MANAGING TRANSFER OPERATIONS CLINICAL OR SPECIAL WASTE LEVEL 4

is awarded to IAN PORTER

MAINTAIN SAFE AND PRODUCTIVE WORKING CONDITIONS ON SITES TRANSFERRING CLINICAL, SPECIAL AND OTHER WASTES	U1026758
CONTROL SITE OPERATIONS FOR CLINICAL, SPECIAL AND OTHER WASTE TRANSFER	U1026759
CONTROL THE DISPOSAL OF OUTPUTS AND RESIDUES FROM CLINICAL, SPECIAL AND OTHER WASTE TRANSFER AND RECOVERY OPERATIONS	U1026760
CONTROL TECHNICAL IMPROVEMENTS IN CLINICAL,SPECIAL AND OTHER WASTE TRANSFER OPERATIONS	U1026761

Awarded AUGUST 2000 0008/027263 /073407/OBM0182/1/25/08/71

Chairman
The City and Guilds of London Institute

Director-General
The City and Guilds of London Institute

City & Guilds

This Certificate of Unit Credit towards

NATIONAL VOCATIONAL QUALIFICATION
MANAGING TRANSFER OPERATIONS CLINICAL OR SPECIAL WASTE LEVEL 4

is awarded to IAN PORTER

WHO ATTENDED MOULTON COLLEGE, NORTHAMPTON

AND WAS SUCCESSFUL IN THE
FOLLOWING TWELVE UNITS

CONTROL MAINTENANCE AND OTHER ENGINEERING OPERATIONS	U1026713
ENSURE PROTECTION OF THE ENVIRONMENT ON WASTE MANAGEMENT SITES	U1026714
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Awarded AUGUST 2000 0008/027263 /073407/OBM0182/1/25/08/71

CONTINUED

Chairman
The City and Guilds of London Institute

Director General
The City and Guilds of London Institute

APPENDIX L

BASELINE REPORTS

TerraConsult

07/08/2019
Report No 10444/R01 Issue 01

Great Yarmouth

Phase 1 Desk Study and Preliminary Risk Assessment Report

Prepared for

Veolia ES (UK) Ltd

Great Yarmouth

Phase 1 Desk Study and Preliminary Risk Assessment Report

7th August 2019

Carried Out For:

Veolia ES (UK) Ltd
PO BOX 7838
Corby
NN17 5ZZ

Prepared By:

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DOCUMENT INFORMATION AND CONTROL SHEET

Document Status and Approval Schedule

Report No 10444/R01 Issue 01	Title Great Yarmouth Phase 1 Desk Study and Preliminary Risk Assessment Report

Issue History

Issue	Status	Date		Signature	Date
01	FINAL	August 2019	**Prepared By:** Adam Steele BSc (Hons) MSc MIEnvSc		02/08/2019
			Checked By: Jason Tilley BEng (Hons) MSc DIC FGS		07/08/2019
			Authorised By: Jason Tilley BEng (Hons) MSc DIC FGS		07/08/2019
DISCLAIMER This report should be read with the Service Constraints Report Limitations & Planning Requirements set out in Appendix A.					

EXECUTIVE SUMMARY

The client, Veolia ES (UK) Ltd, commissioned TerraConsult Ltd to undertake a Phase 1 desk study for a site at Great Yarmouth, which is being considered for development.

DEVELOPMENT PROPOSALS

Development proposals are understood to comprise construction of a decommissioning site.

CONCLUSIONS

Based on the findings of the Conceptual Side Model (CSM) a plausible pollutant linkage has been identified. Additional investigation is therefore considered necessary.

RECOMMENDATIONS

We recommend that a Phase 2 geoenvironmental investigation is undertaken to allow an assessment of the underlying ground conditions.

HAWTHORN FARM, BLYTHBURGH

Phase 1 Desk Study and Preliminary Risk Assessment Report

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Appendix B Environmental Risk Assessment Methodology and Terminology
Appendix C Historical Maps
Appendix D Groundsure Report

1. INTRODUCTION

1.1 Background Information

TerraConsult Limited (TerraConsult) was commissioned by Veolia ES (UK) Ltd to undertake a Phase 1 Desk Study and Preliminary Risk Assessment for the site known as Great Yarmouth.

1.2 Development Proposals

It is understood that the development proposals comprise the construction of a decommissioning site.

1.3 Purpose of Investigation

The purpose of the report is to provide a preliminary assessment of the site using published information and a site walkover survey in relation to the proposed development of the site.

This report has been devised to comply with the relevant principles and requirements of a range of guidance with regards to potentially contaminated land, including (but not limited to):

- Part IIA of the Environment Protection Act, 1990;
- Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, April 2012);
- National Planning Policy Framework (HCA, March 2012);
- BS5930:2015: “Code of practice for site investigations”;
- BS10175: 2011 +A2:2017 “Investigation of Potentially Contaminated Sites - Code of Practice”;
- The Building Regulations 2010. Part C (HM Government 2013)
- DEFRA/Environment Agency (2004) Report CLR11 “Model Procedures for the Management of Land Contamination”;
- Environment Agency (2011) Report GPLC1 “Guiding Principles for Land Contamination”;
- Environment Agency (2017) “The Environment Agency’s Approach to Groundwater Protection” November 2017 Version 1.1

1.4 Previous Investigations

It is understood that the site has not been subject to any previous investigations.

1.5 Limitations

TerraConsult's service constraints and report limitations are presented in Appendix A and a description of environmental risk assessment methodology and terminology is presented in Appendix B.

In preparation of this report, it is assumed that any information provided to TerraConsult by the client in connection with the commission is accurate, complete and not misleading. TerraConsult cannot guarantee the accuracy or validity of this information.

2. SITE LOCATION AND DESCRIPTION

2.1 Site Location

The location of the site is indicated in **Figure 1** below and a summary and a brief description is presented in **Table 2.1**.

Table 2.1 Summary of Description of the Site and its Environs

Location	The site is located off South Beach Parade, approximately 610m north of Great Yarmouth Outer Harbour.
Grid Reference	653146 304562
Site Area	1.24ha (approximately)
Topography	The site is relatively flat.

2.2 Site Description

The site is accessed off South Beach Parade, approximately 50m north of Brineflow Properties and Handling. The site is bounded by depots to the north and south, South Beach Parade to the east and South Denes Road to the west. The site boundaries are demarcated by a brick wall to the east and south and open land to the north and west.

The site comprises concrete hard standing with what appears to be shipping containers along the eastern boundary. A post of mast is present in the north-west and concrete posts are present along the western and northern boundaries.

3. GEOLOGICAL INFORMATION

A summary of the environmental background information (geology, hydrology, hydrogeology, database information *etc.*) and regulator consultation information has been presented in the following chapters. Unless otherwise stated, the following information has been obtained from the GroundSure report which is included in **Appendix E**.

3.1 Anticipated Ground Conditions and Permeability

The anticipated superficial deposits, underlying solid geology and recorded Made Ground within 250m of the site are detailed in **Table 3.1**.

Table 3.1 Ground Conditions and Permeability

Item	Anticipated Ground Conditions	Recorded Permeability
Made/Artificial Ground	Made Ground is located 14-212m east and west of the site.	Very high to low with a mixed flow type.
Superficial Deposits	The site is underlain by Blown Sand.	High with an intergranular flow type.
	The North Denes Formation, Marine Beach Deposits, Tidal River or Creek Deposits and Breydon Formation are 66-212m west, east and south-west.	-
Solid Geology	The superficial deposits on site are underlain by the Crag Group.	Very high to high with an intergranular flow type.
Faults	None recorded.	-

3.2 Radon Potential

Information regarding radon is presented in **Table 3.2** below.

Table 3.2 Radon

Item	Details
Radon Affected Area	The site is not within a radon affected area, as less than 1% of properties are above the action level.
Radon Protected Measure	No radon protective measures are considered necessary for new properties or extensions as described in Building Research Establishment (BRE) publication BR211.

3.3 Geological Hazards

Information regarding the risk of geological hazards affecting the site is presented in **Table 3.3** below.

Table 3.3 Geological Hazards

Hazard	Distance/Direction	Hazard Rating
Shrink-swell clays	On site	Negligible
Landslides	On site	Very low
Ground dissolution of soluble rocks	On site	Negligible
Compressible deposits	On site	Negligible

Hazard	Distance/Direction	Hazard Rating
	14m east	Very low
Collapsible deposits	On site	Negligible
Running sands	On site	Low
	14m east	Very low

4. HYDROGEOLOGY AND HYDROLOGY INFORMATION

4.1 Aquifers

Information regarding aquifers beneath the site is presented in **Table 4.1** below.

Table 4.1 Aquifers

Item	Distance/Direction	Designation
Superficial Deposits	On site	Secondary A Aquifer.
	131m west	Unproductive.
Solid Geology	On site	Principal Aquifer.

4.2 Abstraction Licences

Information regarding abstraction licences within 250m of the site is presented in **Table 4.2** below.

Table 4.2 Abstraction Licences

Item	Distance/Direction	Details
Groundwater Abstraction	-	None recorded.
Surface Water Abstraction	-	None recorded.
Potable Water Abstraction	-	None recorded.

4.3 Source Protection Zones and Groundwater Vulnerability

Information regarding source protection zones (SPZs) and groundwater vulnerability within 250m of the site are presented in **Table 4.3** below.

Table 4.3 SPZs and Groundwater Vulnerability

Item	Distance/Direction	Classification / Soil Vulnerability Category
SPZs	-	None recorded.
SPZs within Confined Aquifers	-	None recorded.
Groundwater Vulnerability and Leaching Potential	On site	Major aquifer / high leaching potential (HU).
	244m west	Major aquifer / high leaching potential (HU).

4.5 Detailed River Network and Surface Water Features

Information regarding river networks and surface water features within 250m of the site are presented in **Table 4.4** below.

Table 4.4 Detailed River Network and Surface Water Features

Item	Distance/Direction	Details
Ordnance Survey MasterMap Water Network	163m west	Name: River Yare (2 records). Type: tidal river or stream. Catchment area: Wensum and Yare.
Surface Water Features (not represented on mapping).	116m west	1 record; no further details given.

4.6 Flooding

Information regarding flooding within 250m of the site is presented in **Table 4.5** below.

Table 4.5 Flooding

Item	Details
Environment Agency Zone 2 and Zone 3 Floodplains	An Environment Agency Zone 2 floodplain is 63m west and a Zone 3 floodplain is 64m west.
Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating	The highest risk of flooding on site is recorded as very low.
Flood Defences	There are no recorded flood defences within 250m of the site.
Areas benefitting from Flood Defences	There are areas benefitting from flood defences within 250m of the site.
Areas benefitting from Flood Storage	There are no areas used for flood storage within 250m of the site.
Groundwater Flooding Susceptibility Areas and Flooding Confidence Areas	There are groundwater flooding susceptible areas within 50m of the site. This relates to clearwater flooding. The highest susceptibility to groundwater flooding is recorded as limited potential; the BGS confidence in this result is 'low'.

5. HISTORICAL INFORMATION

5.1 Historical Industrial Sites and Landfills

Information regarding historical industrial sites and landfills within 250m of the site is provided in **Table 5.1** below.

Table 5.1 Historical Potentially Contaminative Uses

Item	Distance/Direction	Use
Potentially Contaminative Uses	On site	Unspecified depot and unspecified commercial/ industrial (3 records).
	11-47m south, north and west	Unspecified depot, unspecified tank, unspecified tanks and quay (10 records).
	47-99m west and south	Unspecified tanks, unspecified commercial/ industrial, quay, unspecified pit, tramway sidings, railway sidings, railway buildings and unspecified store (12 records).
	106-241m north, west, south-west, south and north-west	Unspecified tank, quay, unspecified heap, unspecified tanks, sand pit, oil tanks, unspecified works, unspecified shed, smithy, railway sidings, unspecified wharf, graving dock, cold store, unspecified commercial/ industrial (48 records).
Historical Tank Database	10-50m south, west and north	Tanks and unspecified tank (19 records).
	58-91m south	Tanks and unspecified tank (15 records).
	101-249m south, north, south-west and north-west	Tanks, unspecified tanks and oil tanks (45 records).
Historical Energy Features Database	158-249m south and west	Electricity substation (5 records).
Historical Petrol and Fuel Database	99-123m south	Petrol storage depot (4 records).
Historical Garage and Motor Vehicle Repair Database	-	None recorded.
Historical Military Sites	-	None recorded.
Potentially Infilled Land	47-99m west	Quay and unspecified pit (6 records).
	110-239m south-west, west, north and south	Unspecified heap, quay, sand pit, unspecified wharf and graving dock (27 records).
Environment Agency Landfills	-	None recorded.
Environment Agency Historical Landfills	-	None recorded.
BGS/DoE Non-operational Landfill Sites	-	None recorded.
Landfills from Local Authority and Historical Mapping Records	-	None recorded.

Item	Distance/Direction	Use
Waste treatment, transfer or disposal sites.	-	None recorded.
Environment Agency Licensed Waste Sites	105m south-west	Technical Waste; special waste transfer station (3 records). Size: <25,000 tonnes. Issue date: 24/01/2001. Status: transferred and issued.
	106m south-west	Great Yarmouth Technical Waste Management Centre; physical treatment facility and transfer station (3 records). Size: <25,0000 and <75,000 tonnes. Issued date: 24/01/2001. Status: modified and transferred.
	188m south	Great Yarmouth Decommissioning Facility; metal recycling site. Size: >= 75,000 tonnes. Issued date: 08/12/2014. Status: modified.

5.2 Site History

The site history is summarised below in **Table 5.2** and determined from the GroundSure historical mapping.

Table 5.2 Site History

Map Date	Map Scale	On Site	Off Site
1882-1883 1883-1886 1884-1885 1885* 1889*	1:2,500 1:10,560 1:10,560 1:500 1:10,560	The site is an open plot of land.	A track adjacent the beach is 10m east and another track is 90m west. A store is 100m west. The North Sea is 200m east and the River Yare is 120m west. A smithy and floating bridge are 240m west.
1901-1904 1904-1906 1905* 1905-1906	1:10,560 1:10,560 1:10,560 1:2,500	No significant change has occurred since the previous mapping editions.	Mooring posts are 110m and 240m west. A ballast quay with tram crane is 100-250m west and north-west. A pond and a magazine are 90m south-west.
1926* 1926-1928 1927	1:10,560 1:10,560 1:2,500	No significant change has occurred since the previous mapping editions.	The crane to the north-west is no longer present. The smithy and floating bridge to the west are no longer present. Buildings have been constructed 150m north-west and north-east, 20m east, 90m east and 200m south-east. Oil tanks are 130m south-west. The western bank of the River Yare is labelled as Hewett's Wharf. The track to the west is South Denes Road.
1938 1938*	1:10,560 1:10,560	No significant change has occurred since the previous mapping editions.	
1946 1949 1949-1950 1949-1951	1:10,560 1:1,250 1:2,500 1:2,500	No significant change has occurred since the previous mapping editions.	Ruins are 20m west and along Hewetts Wharf suggesting bomb damage. South Beach parade is 5m east. Net drying racks are 20m east and 100-250m south-east. Groynes are present along

Map Date	Map Scale	On Site	Off Site
			the beach. Tanks and a petrol storage depot are 100-120m south and south-west.
1950-1955* 1952* 1953-1957* 1954-1958* 1958*	1:1,250 1:10,560 1:1,250 1:1,250 1:10,560	No significant change has occurred since the previous mapping editions.	An electricity substation is 200m south. The ruins are no longer present.
1965-1966 1966 1967* 1967*	1:1,250 1:2,500 1:2,500 1:2,500	The site is a seasonal camping site.	Tanks forming an oil storage depot are 30-130m north and 20-120m south. Stores are 90m east and 100m west. Works are 130m north-west and 250m west. The net drying racks are no longer present.
1970* 1970-1974* 1978-1981	1:10,000 1:1,250 1:10,000	The site is an open plot of land with fencing or walls in the northern section.	Buildings or warehouses are 100m north-west, west and south-west.
1986-1990* 1988* 1988*	1:1,250 1:10,000 1:10,000	The site is a depot.	No significant change has occurred since the previous mapping editions.
1994	1:1,250	No significant change has occurred since the previous mapping editions.	No significant change has occurred since the previous mapping editions.
2002	1:10,000	The site is Viking Yard depot.	No significant change has occurred since the previous mapping editions.
2010 2014	1:10,000 1:10,000	No significant change has occurred since the previous mapping editions.	No significant change has occurred since the previous mapping editions.

* Partial map

5.3 Railways and Tunnels

Information regarding railways and tunnels on or within 250m of the site are presented in **Table 5.3** below.

Table 5.3 Railways and Tunnels

Feature	Distance/Direction	Use / Detail
Tunnels	-	None recorded.
Historical Railway and Tunnel Features	-	None recorded.
Historical Railways	55-207m west and north-west	Railway, tramway sidings and railway sidings (16 records).
Active Railways	-	None recorded.
Railway Projects	-	None recorded.

6. ENVIRONMENTAL INFORMATION

6.1 Environmental Permits, Incidents, Registers and Sensitive Sites

Information regarding environmental permits, incidents, registers and designated sensitive sites are provided in **Table 6.1** below.

Table 6.1 Environmental Permits, Incidents, Registers and Sensitive Sites

Item		Distance/Direction	Detail
Industrial Sites Holding Licences and/or Authorisations	Historic IPC Authorisations	-	None recorded.
	Part A(1) and IPPC Authorised Activities	99m south-west	Asco UK Ltd (6 records). Process: waste landfilling. Status: effective.
		99m south-west	Enviroco Ltd (22 records). Process: other waste disposal, temporary storage of hazardous waste, disposal or recovery of hazardous waste. Status: superseded and transfer effective.
		187m south-east	Veolia ES (UK) Ltd (2 records). Process: disposal or recovery of hazardous waste and temporary storage of hazardous waste. Status: determination.
		238m north	Omni-Pac UK Ltd (2 records). Paper, pulp and board. Status: superseded and superseded by PAS.
	Red List Discharge Consents	194m south-east	Veolia ES (UK) Ltd. Trade discharges – site drainage.
	List 1 Dangerous Substances Inventory Sites	-	None recorded.
	List 2 Dangerous Substances Inventory Sites	-	None recorded.
	Part A(2) and Part B Activities and Enforcements	134m west	East Port UK. Process: coal and coke. Historical permit; Type B.
		249m west	Yarecrete Concrete Products Ltd. Process: use of bulk cement. Historical permit; Type B.
	Category 3 or 4 Radioactive Substances Authorisations	194m south	Veolia ES (UK) Ltd. Permit number: EB3595DZ.
	Licensed Discharge Consents	175m south-west	Sea-Mar Diesel Ltd (2 records). Trade discharges – process effluent – not water company. Status: pre NRA legislation where issue date > 31/08/1989.

Item		Distance/Direction	Detail
		177m north-west	Ballast Quay Outfall. Sewage discharges – unspecified – water company. Status: post NRA legislation where issue date > 31/09/1989 (historic only).
		194m south-east	Great Yarmouth Decommissioning Facility. Trade discharges – site drainage. Status: new issued under EPR 2010.
		200m west	Dock Tavern Lane Outfall. Sewage discharges – unspecified – water company. Status: pre NRA legislation where issue date > 31/09/1989 (historic only).
		240m south-west	Baker Street Outfall. Sewage discharges – unspecified – water company. Status: revoked.
		247m south-west	Baker Street Pumping Station (2 records). Sewage discharges – unspecified – water company. Status: new consent.
	Water Industry Referrals	-	None recorded.
	Hazardous Substance Consents and Enforcements	74-97m east and south	ASCO UK Ltd; no details and marine gas oil (4 records).
		74-229m east and north	Great Yarmouth Port Company; no details (2 records).
		97m south	ASCO Fuels and Lubricants; marine gas oil, derv and kerosene.
Dangerous or Hazardous Sites		23m east	Gleadell Agriculture Ltd; historical NIHHS Site.
		66m west	Asco Group Ltd (asco Oils Division); historical NIHHS Site.
		230m south	Bunn Fertiliser Ltd; historical NIHHS Site.
		230m south	Origin UK Operations Ltd; current COMAH Site.
Environment Agency Recorded Pollution Incidents	National Incidents Recording System, List 2	220m north-west	Date: 23/07/2002. Contaminated water; firefighting runoff. Category 3 minor air impact.
		224m south	Date: 18/03/2002. Contaminated water; firefighting runoff. Category 3 minor air and water impact.

Item		Distance/Direction	Detail
	National Incidents Recording System, List 1	-	None recorded.
Recorded Part 2A Sites		-	None recorded.
Current Industrial Data		12-33m west and east	Tank; tanks (generic), Viking Yard (Depot); container and storage, and electricity substation; electrical features (3 records).
		60-94m east, south and west	Electricity substation; electrical features, tank; tanks (generic), oil storage depot; container and storage, Asco; marine engineers and services, and warehouse; container and storage (8 records).
		104-183m south and north	Tank; tanks (generic), depot; container and storage, electricity substation; electrical features, International Tubular Services Ltd; special purpose machinery and equipment, depot; container and storage, Oilfield Containers Ltd; packaging, and Beckett Logistics Management Ltd; container and storage (14 records).
		208-248m south, north-west, south-west, north and south	Depot; container and storage, OCS; general construction supplies; MI Drilling Fluids UK ltd; tools including machine shops; works; unspecified works or factories, East Quay; moorings and unloading facilities, West Quay; moorings and unloading facilities, Ceras Energy; fuel distributors and suppliers, Sub Sea Technology and Rental; marine equipment including boats and ships, and Autotune Service and Repair Ltd; vehicle repair, testing and servicing (13 records).
Petrol and Fuel Sites		-	None recorded.
Underground Electricity Transmission Cables		-	None recorded.
High Pressure Gas Transmission Pipelines		-	None recorded.
Designated Environmentally Sensitive Sites		On site	Nitrate Vulnerable Zone.
		116m west	Outer Thames Estuary Special Protection Area.

7. GROUND WORKINGS, MINING, EXTRACTIONS AND CAVITIES

Information regarding historical and current ground workings, mining activities, extractions and cavities on or within 250m of the site are presented in **Table 7.1** below.

Table 7.1 Ground Workings, Mining, Extractions and Cavities

Feature	Distance/Direction	Use/Detail
Historical Surface Ground Working Features	47-99m west	Quay and unspecified pit (7 records).
	109-198m west, south-west, north and south	Quay, unspecified pit and sand pit (16 records).
	213-239m west, south-west and north-west	Unspecified wharf, quay and graving dock (14 records).
Historical Underground Ground Working Features	-	None recorded.
Current Ground Workings	-	None recorded.
Historical Mining	-	None recorded.
Coal Mining	-	None recorded.
Records Held by Johnson Poole and Bloomer	-	The study site is not located within 1000m of an area when Johnson Poole and Bloomer hold information.
Non-coal Mining	-	None recorded.
Non-coal Mining Cavities	-	None recorded.
Natural Cavities	-	None recorded.
Brine Extraction	-	None recorded.
Gypsum Extraction	-	None recorded.
Tin Mining	-	None recorded.
Clay Mining	-	None recorded.

8. HAZARD ASSESSMENT & PRELIMINARY CONCEPTUAL SITE MODEL

8.1 Hazards Identified with the Proposed Development

The hazard identification is based on the assumption that the site is to be developed to a commercial end-use, comprising a decommissioning site. It is assumed that drinking water will be supplied by underground pipes.

8.2 Potential Sources of Contamination

8.2.1 On Site Sources

Based on the data previously discussed, the following potential sources of contamination on site have been identified:

- Unspecified depot;
- Unspecified commercial/ industrial; and
- Made Ground present on site.

8.2.2 Off Site Sources

Based on the data previously discussed, the following potential sources of contamination off site have been identified:

- Unspecified depot;
- Unspecified tanks;
- Quay;
- Unspecified commercial/ industrial;
- Unspecified pit;
- Tramway sidings;
- Railway sidings;
- Railway buildings;
- Unspecified store;
- Unspecified heap;
- Sand pit;
- Oil tanks
- Smithy;
- Unspecified shed;
- Cold store;
- Unspecified wharf;
- Graving dock;
- Electricity substations;
- Petrol storage depot;

- Environment Agency Licensed Waste Sites;
- Part A(1) and IPPC Authorised Activities;
- Red List Discharge Consents;
- Part A(2) and Part B Activities and Enforcements;
- Category 3 or 4 Radioactive Substances Authorisations;
- Licensed Discharge Consents;
- Hazardous Substance Consents and Enforcements;
- Dangerous or Hazardous Sites;
- Environment Agency Recorded Pollution Incidents; and
- Current Industrial Data.

8.3 Conceptual Site Model

In accordance with BS 10175, a general schematic section has been developed for the site based on the previously presented data and contaminant linkage assessment. This is shown in **Figure 1**.

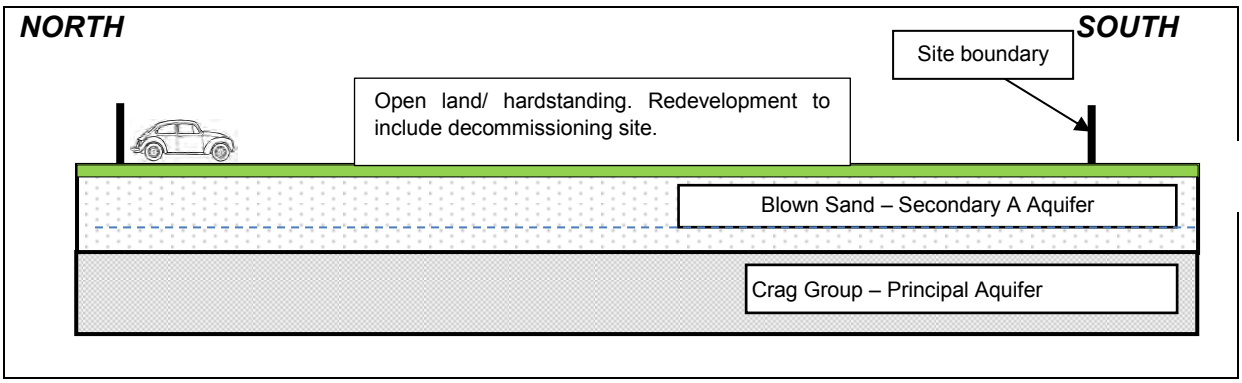

Figure 1 Preliminary Conceptual Site Model based on the proposed development (not to scale).

The model for the site shows the anticipated geology, former site usage and vulnerable receptors. The information presented above represents the preliminary conceptual ground model that may need to be revised based on data obtained during any future investigation, either desk-based or intrusive. The conceptual site model and proposed end use described above should be considered very broadly representative of a residential land use, as a worst case scenario, as defined in SR3 "Updated Technical Model to the CLEA Model" (SC050021/SR3, 2011) for the purpose of this report.

8.4 Preliminary Contamination Hazard Assessment

The preliminary hazard assessment is based on current available guidance published by a number of sources and is summarised in Appendix B. A preliminary conceptual site model for this site has been established using the desk study information and has been used as a basis for the preliminary hazard assessment. Potential sources of contamination have been identified, principally the historic depot, unspecified commercial/ industrial and Made Ground present on site. Therefore, there is a low to moderate possibility that harm could arise to a receptor.

9. CONCLUSIONS

9.1 Environmental Risk Assessment

A preliminary risk assessment has been made based on the contaminant - pathway - receptor model, as defined in Part IIA of the Environmental Protection Act 1990 and in accordance with *BS10175: 2011 +A2:2017 "Investigation of Potentially Contaminated Sites - Code of Practice".* A preliminary conceptual site model has been produced to set out the characteristic ground conditions and elements of the surrounding environment and has assisted with identifying potential sources of contamination, potential receptors of the contamination and potential pathways between them.

From the site history, walkover survey and information obtained during the desk study, potential sources of contamination have been identified.

9.2 Recommendations

We recommend that a Phase 2 geoenvironmental investigation is undertaken to allow an assessment of the underlying ground conditions. The investigation should include boreholes to allow the retrieval of representative soil samples to be analysed for a suite of contaminants including metals, hydrocarbons and asbestos. The results of the Phase 2 investigation would be used to update the CSM and revise the risk assessment.

9.3 Health & Safety

As outlined within the HSE publication "Successful Health and Safety Management – HSG65" this report should inform your development of safe systems of work and the information used as an input to the safety management system. The contents of this report may be used to supplement the contents of the Health and Safety File as required under the Construction Design and Management (CDM) Regulations 2015.

In accordance with the Construction Design and Management (CDM) Regulations 2015, TerraConsult has acted in the role of Principal Contractor and as Principal Designer for the works as described in this report. With issue of this report, TerraConsult has discharged and completed all contractual and legal requirements for these positions and has no further involvement with the project. It is the developer's duty, as required by the CDM Regulations, to appoint others to fill these roles for the further development of the site.

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APPENDICES

Appendix A	Service Constraints, Report Limitations and Planning Requirements
Appendix B	Environmental Risk Assessment Methodology and Terminology
Appendix C	Historical Maps
Appendix D	Groundsure Report

Appendix A

Service Constraints, Report Limitations

and Planning Requirements

Service Constraints, Report Limitations and Planning Requirements

This report (the "Services") was compiled and carried out by TerraConsult (South) Limited (TCSL) for the client named on the front of the report (the "client") in accordance with the terms of a contract between TCSL and the "client". The Services were performed by TCSL with the skill and care ordinarily exercised by a reasonable environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by TCSL taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between TCSL and the client.

Other than that expressly contained in the above paragraph, TCSL provides no other representation or warranty whether express or implied, is made in relation to the Services. Unless otherwise agreed, this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of TCSL. If a third party relies on this report, it does so wholly at its own and sole risk and TCSL disclaims any liability to such parties.

It is TCSL's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of, or reliance upon, the report in those circumstances by the client without TCSL 's review and advice shall be at the client's sole and own risk.

The information contained in this report is protected by disclosure under Part 3 of the Environmental Information Regulations 2004 pursuant to the provisions of Regulation 12(5) without the consent in writing of a Director of TerraConsult (South) Limited.

The report has been prepared at the date shown on the front page and should be read in light of any subsequent changes in legislation, statutory requirements and industry practices. Ground conditions can also change over time and further investigations or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of TCSL. In the absence of such written advice of TCSL, reliance on the report in the future shall be at the client's own and sole risk. Should TCSL be requested to review the report in the future, TCSL shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between TCSL and the client.

The observations and conclusions described in this report are based solely upon the Services that were provided pursuant to the agreement between the client and TCSL. TCSL has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report. TCSL is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, TCSL did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, radon gas or other radioactive or hazardous materials.

The Services are based upon TCSL's observations of existing physical conditions at the site gained from existing documents, together with TCSL's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst TerraConsult (South) Limited has no reason to doubt the accuracy and that it has been provided in full from those it was requested from, the items relied on have not been verified. No responsibility can be accepted for errors within third party items presented in this report. Further, TCSL was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. TCSL is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to TCSL and

including the doing of any independent investigation of the information provided to TCSL save as otherwise provided in the terms of the contract between the client and TCSL.

Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and TCSL] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.

Throughout the report the term 'geotechnical' is used to describe aspects relating to the physical nature of the site (such as foundation requirements) and the term 'geoenvironmental' is used to describe aspects relating to ground-related environmental issues (such as potential contamination). However, it should be appreciated that this is an integrated investigation and these two main aspects are inter-related. The geoenvironmental sections are written in broad agreement with BS 10175:2011+A1 2013. For the geotechnical aspects of the report, the general requirements of Eurocode 7 (BS EN 1997-2:2007) providing a desk study assessment. This report shall not be considered as being a Ground Investigation Report (GIR).

Planning Requirements

The National Planning Policy Framework (NPPF, 2012) has twelve core land-use planning principles, two of which directly relate to the potential for pollution and contaminated land:

- Requirement to *"contribute to conserving and enhancing the natural environment and reducing pollution"* and setting out of a preference for developments to be on land of "*lesser environmental value*"; and
- *"encourage the effective use of land by re-using land that has been previously developed (brownfield land), providing that it is not of high environmental value.".*

In accordance with the core principles of NPPF, Paragraph 109 clarifies that enhancing the natural environment includes:

- *"preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and*
- *remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.".*

Paragraph 121 of NPPF states that planning policies and decisions for developments should also ensure that:

- *"the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;*
- *after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and*
- *adequate site investigation information, prepared by a competent person, is*

presented.".

This report has been prepared and authorised by staff that are competent as defined in the NPPF.

Unexploded Ordnance

Clients have a legal duty under the CDM 2015 Regulations to provide designers and contractors with project-specific health and safety information needed to identify hazards and risks. This includes the possibility of unexploded ordnance (UXO) being encountered on the site. Further details are given in CIRIA Report C681 (Stone et al 2009). A non-UXO specialist screening exercise has been carried out for the site by considering any evidence of UK defence activities on or near the site evident from the gathered desk study information and the unexploded aerial delivered bomb (UXB) regional risk maps produced by Zetica. Other data sources are available, but as a first stage screening exercise the freely available Zetica maps have been used. The level of risk stated is that determined by Zetica, a company experienced in the desk study, field investigation and clearance of UXO/UXB.

Appendix B

Environmental Risk Assessment

Methodology & Terminology

ENVIRONMENTAL RISK ASSESSMENT

METHODOLOGY & TERMINOLOGY

Legislation Overview

This report includes hazard identification and environmental risk assessment in line with the risk-based methods referred to in relevant UK legislation and guidance. Government environmental policy is based upon a "suitable for use approach," which is relevant to both the current use of land and also to any proposed future use. The contaminated land regime is the statutory regime for remediation of contaminated land that causes an unacceptable level of risk and is set out in Part 2A of the Environmental Protection Act 1990 ("EPA 1990"). The main objective of introducing the Part IIA regime is to provide an improved system for the identification and remediation of land where contamination is causing unacceptable risks to human health or the wider environment given the current use and circumstances of the land. Part IIA provides a statutory definition of contaminated land under Section 78A(2) as:

> *"any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on, or under the land, that:*
>
> *(a) Significant harm is being caused or there is a significant possibility of such harm being caused;*
>
> *or*
>
> *(b) Pollution of controlled waters is being, or is likely to be, caused."*

In order to assist in establishing if there is a "*significant possibility of significant harm*" there must be a "*contaminant linkage"* for potential harm to exist. That means there must be a source(s) of contamination, sensitive receptors present and a connection or pathway between the two. This combination of contaminant-pathway-receptor is termed a "contaminant linkage or CPR linkage."

Part IIA of The Environmental Protection Act 1990 is supported by a substantial quantity of guidance and other Regulations. Key implementing legislation of the Part 2A regime includes the Contaminated Land (England) Regulations 2006 (SI 2006/1380) as recently amended by the overarching legislation for the contaminated land regime, which implements the provisions of Part IIA of the Environmental Protection Act 1990 (as inserted by section 57 of the Environment Act 1995), came into force on 14th July 2000 together with recent amended regulations: Contaminated Land (England) (Amendment) Regulations 2012 (SI 2012/263). Revised and Contaminated Land Statutory Guidance was published by Defra in (Defra, April 2012). Part IIA defines the duties of Local Authorities in dealing with it. Part IIA places contaminated land responsibility as a part of planning and redevelopment process rather than Local Authority direct action except in situations of very high pollution risk.

In the planning process guidance is provided by National Planning Policy Framework (NPPF) of March 2012 which requires that a site which has been developed shall not be capable of being determined "contaminated land" under Part IIA. In practice, Planning Authorities require sites being developed to have a lower level of risk post development than the higher level of risk that is required in order to determine a site as being contaminated in accordance with Part IIA. This is to ensure that there is a suitable zone of safety below the level for Part IIA determination and prevent recently developed sites becoming reclassified as contaminated land if there are future legislative or technical changes (e.g. a substance is subsequently found to be more toxic than previously assessed this increases its hazard)..

The criteria for assessing levels of contaminants and hence determining whether a site represents a hazard are based on a range of techniques, models and guidance. Within this context it is relevant to note that Government objectives are:

(a) to identify and remove unacceptable risks to human health and the environment;

(b) to seek to bring damaged land back into beneficial use;

(c) to seek to ensure that the cost burdens faced by individuals, companies and society as a whole are proportionate, manageable and economically sustainable.

These three objectives underlie the "suitable for use" approach to remediation of contaminated land. The "suitable for use" approach focuses on the risks caused by land contamination. The approach recognises that the risks presented by any given level of contamination will vary greatly according to the use of the land and a wide range of other factors, such as the underlying geology of the site. Risks therefore should be assessed on a site-by-site basis.

The "suitable for use" approach then consists of three elements:

(a) *ensuring that land is suitable for its current use* - in other words, identifying any land where contamination is causing unacceptable risks to human health and the environment, assessed on the basis of the current use and circumstances of the land, and returning such land to a condition where such risks no longer arise ("remediating" the land); the contaminated land regime provides the regulatory mechanisms to achieve this;

(b) *ensuring that land is made suitable for any new use, as planning permission is given for that new use* - in other words, assessing the potential risks from contamination, on the basis of the proposed future use and circumstances, before official permission is given for the development and, where necessary to avoid unacceptable risks to human health and the environment, remediating the land before the new use commences; this is the role of the town and country planning and building control regimes; and

(c) *limiting requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to the current use or future use of the land for which planning permission is being sought* - in other words, recognising that the risks from contaminated land can be satisfactory assessed only in the context of specific uses of the land (whether current or proposed), and that any attempt to guess what might be needed at some time in the future for other uses is likely to result either in premature work (thereby running the risk of distorting social, economic and environmental priorities) or in unnecessary work (thereby wasting resources).

The mere presence of contaminants does not therefore necessarily warrant action, and consideration must be given to the scale of risk involved for the use that the site has, and will have in the future.

OVERALL METHODOLOGY

The work presented in this report has been carried out in general accordance with recognised best practice as detailed in guidance documents such as in the CLR 11 Model Procedures for the Management of Land Contamination (Environment Agency, 2004), and BS10175:2011+A2 20173. Important aspects of the risk assessment process are transparency and justification. The particular rationale behind the risk assessments presented is given in this appendix.

The first stage of a two-staged investigation and assessment of a site is the Preliminary Investigation (BS 10175:2011), often referred to as the Phase 1 Study, comprising desk study and walk-over survey, which culminates in the Preliminary Risk Assessment. A preliminary conceptual site model (CSM) is developed which identifies potential geotechnical and geo-environmental hazards and the qualitative degree of risk associated with them. From the geo-environmental perspective, the Hazard Identification process uses professional judgement to evaluate all the hazards in terms of potential contaminant linkages (of contaminant source-pathway-receptor). Potential contaminant linkages are potentially unacceptable risks in terms of the current contaminated land regime legal framework and require either remediation or further assessment. These are normally addressed via intrusive ground investigation and generic risk assessment.

The second stage is the Ground Investigation, Generic Risk Assessment and Geotechnical Interpretation. This represents the further assessment mentioned above. The scope of the Ground

Investigation is based on the findings of the Preliminary Risk Assessment and is designed to reduce uncertainty in the geotechnical and geoenvironmental hazard identification. The Ground Investigation comprises fieldwork, laboratory testing and usually also on-site monitoring. The Ground Investigation may include the Exploratory, Main and Supplementary Investigations described in BS 10175:2011+A1 2013. The result of the Ground Investigation reduces uncertainty in the geotechnical and geoenvironmental risks. Depending on the findings more detailed investigations or assessments may be required.

Preliminary Risk Assessment

Current practice recommends that the determination of potential liabilities that could arise from land contamination be carried out using the process of risk assessment, whereby "risk" is defined as:

"(a) The probability, or frequency, or occurrence of a defined hazard; and

(b) The magnitude (including the seriousness) of the consequences."

The UK's approach to the assessment of environmental risk is set out in by the Department of the Environment Transport and the Regions (2000) publication "A Guide to Risk Assessment and Risk Management for Environmental Protection" (also called Greenleaves II). This established an iterative, systematic staged process which comprises:

(a) Hazard identification;

(b) Hazard assessment;

(c) Risk estimation;

(d) Risk evaluation;

(e) Risk assessment;

At each stage during the development process the above steps are repeated as more detailed information becomes available for the site.

For an environmental risk to be present, all three of the following elements must be present:

- Source/Contaminant: hazardous substance that has the potential to cause adverse impacts;
- Receptor: target that may be affected by contamination: examples include human occupants/users of site, water resources (rivers or groundwater), or structures;
- Pathway: a viable route whereby a hazardous substance may come into contact with the receptor.

The absence of one or more of each component (contaminant, pathway, receptor) would prevent a contaminant linkage being established and there would be no significant environmental risk.

The identification of potential contaminant linkages is based on a Conceptual Model of the site, which is subject to continual refinement as additional data becomes available. As part of a Phase I Investigation (Desk Study and site walk over) a Preliminary Conceptual Site Model (PCSM) is formed. Based on the PCSM, potential contaminant linkages can be assessed. If the PCSM and hazard assessment indicate that a pollution linkage is not of significance then no further assessment or action is required due to this linkage. For each significant and possible linkage a risk assessment is carried out. The linkages which potentially pose significant risks may require a variety of responses ranging from immediate remedial action or risk management or, more commonly, further investigation and risk assessment. This next stage is termed a Phase II Main Site Investigation and should provide additional data to allow refinement of the Conceptual Site Model and assess the level of risk from each contaminant linkage.

Definition of Risk Assessment Terminology

The criteria used for risk assessment are broadly based on those presented in DETR's "A Guide to Risk Assessment and Risk Management for Environmental Protection" (2000). The Severity of the risk is classified according to the criteria in Table B.1 below:

Table B.1 Severity/Consequence of Risk	
Severe	Acute risks to human health. Catastrophic damage to buildings/property (e.g. by explosion). Direct pollution of sensitive water receptors or serious pollution of other controlled water (watercourses or groundwater) bodies.
Medium	Harm to human health from long-term exposure. Slight pollution of sensitive controlled waters (surface waters or aquifers) or pollution of other water bodies. Significant effects on sensitive ecosystems or species.
Mild	No significant harm to human health in either short or long term. No pollution of sensitive controlled waters, no more than slight pollution of non-sensitive waters. Significant damage to buildings or structures. Requirement for protective equipment during site works to mitigate health effects.
Negligible	Damage to non-sensitive ecosystems or species. Minor damage to buildings or structures. No harm or pollution of water.

The probability of the risk occurring is classified according to criteria given in Table B.2 below:

Table B.2: Probability of Risk Occurring	
High likelihood	Contaminant linkage may be present, and risk is almost certain to occur in the long term, or there is evidence of harm to the receptor.
Medium/Reasonably Foreseeable	Contaminant linkage may be present, and it is probable that the risk will occur over the long term.
Low/Unlikely	Contaminant linkage may be present and there is a possibility of the risk occurring, although there is no certainty that it will do so.
Negligible/ Not credible	Contaminant linkage may be present but the circumstances under which harm would occur are improbable.

An overall evaluation of the level of risk is gained from a comparison of the severity and probability, as shown in Table B.3 below:

Table B.3: Comparison of Severity and Probability					
		Severity			
		Severe	**Medium**	**Mild**	**Negligible**
Probability	**High likelihood**	Very High Risk	High Risk	Medium/Low Risk	Low Risk
	Medium/Reasonably Foreseeable	High Risk	Medium Risk	Low Risk	Near Zero
	Low/Unlikely	High/Medium Risk	Medium/Low Risk	Low Risk	Near Zero
	Negligible/	Medium/Low	Low Risk	Low Risk	Near Zero

	Not credible	Risk			

The various risk rankings provide guidance for recommended actions, whether this is:

AR - Action Required, Remediation or mitigation or site investigation works required

SIR - Site Investigation Required, further assessment is required.

NAR - No Action Required.

A description of the evaluated risk is as follows:

Table B.4 – Description of the Classified Risks and Likely Action Required

Evaluated Risk	Recommended Actions
Very High Risk	AR: There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High Risk	AR: Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the long term.
Moderate Risk	SIR: It is possible that harm could arise to a designated receptor from an identified hazard. However, it is relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Low Risk	NAR: It is possible that harm could arise to a designated receptor from an identified hazard, but there is a low likelihood of this hazard occurring and if realised, harm would at worst normally be mild.
Near Zero	NAR: There is a negligible possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

Definition of Controlled Waters

The term 'controlled waters' is defined in Section 104 of the Water Resources Act 1991 as:

> *"Territorial Waters…which extend seawards for three miles…, coastal waters…, inland freshwaters, waters in any relevant lake or pond or of so much of any relevant river or watercourse as is above the freshwater limit, and ground waters, that is to say, any waters contained in underground strata."*

Note that the definition of groundwater under the Water Resources Act 1991 includes all water within underground strata (including soil / pore water in the unsaturated zone). The definition of groundwater under the Groundwater Directive however is limited to water in the saturated zone. For the purposes of Part IIA of the Environmental Protection Act 1990, the Environment Agency recommends that the groundwater within the saturated zone only is considered as the receptor (rather than soil / pore water).

Environment Agency's Aquifer Designations

The Environment Agency have classified different types of aquifer from which groundwater can be extracted. The aquifer designations reflect the importance of aquifers in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetland ecosystems. The aquifer designation data is based on geological mapping provided by the British Geological Survey.

The maps are split into two different types of aquifer designation:

- **Superficial (Drift)** – permeable unconsolidated (loose) deposits.
- **Bedrock (Solid)**– solid permeable formations e.g. sandstone, chalk, limestone.

The aquifer designations displayed on the Environment Agency maps are as follows:

- **Principal Aquifers (formerly termed Major Aquifers) –** These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as a major aquifer.
- **Secondary Aquifers (formerly termed Minor Aquifers) –** These include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary aquifers are subdivided into two types:
    - **Secondary A** - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers;
    - **Secondary B** - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.
    - - **Secondary Undifferentiated** - has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.
- **Unproductive Strata (formerly termed Non-Aquifer) –** These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

MANAGEMENT OF CONTAMINATED LAND

When risk assessment of the site has been completed and this indicates that remedial works are required, the main guidance in managing this process is set out in the Defra/EA publication CLR11 (2004) “Model Procedures for the Management of Land Contamination.” The stages of managing remediation are as follows:

(a) Options Appraisal and develop Remediation Strategy;

(b) Develop Implementation Plan and Verification Plan;

(c) Remediation, Verification and Monitoring.

The Remediation Strategy sets out the remediation targets, identifies technically feasible remedial solutions and presents an evaluation of the options so that these can be assessed enabling that the most suitable solution is adopted. An outline of the proposed remedial method should be presented. Agreement should be sought of the appropriate statutory bodies for the Remediation Strategy before proceeding to the next stage.

The Implementation Plan is a detailed method statement setting out how the remediation is to be carried out including stating how the site will be managed, welfare procedures, health and safety considerations together with practical measures such as details of temporary works, programme of works, waste management licences and regulatory consents required. Agreement should again be sought of the appropriate statutory bodies for this Plan.

The Verification Plan sets out the requirements for gathering data to demonstrate that the remediation has met the required remediation objectives and criteria. The Verification Plan presents the requirements for a wide range of issues including the level of supervision, sampling and testing regimes for treated materials, waste and imported materials, required monitoring works during and

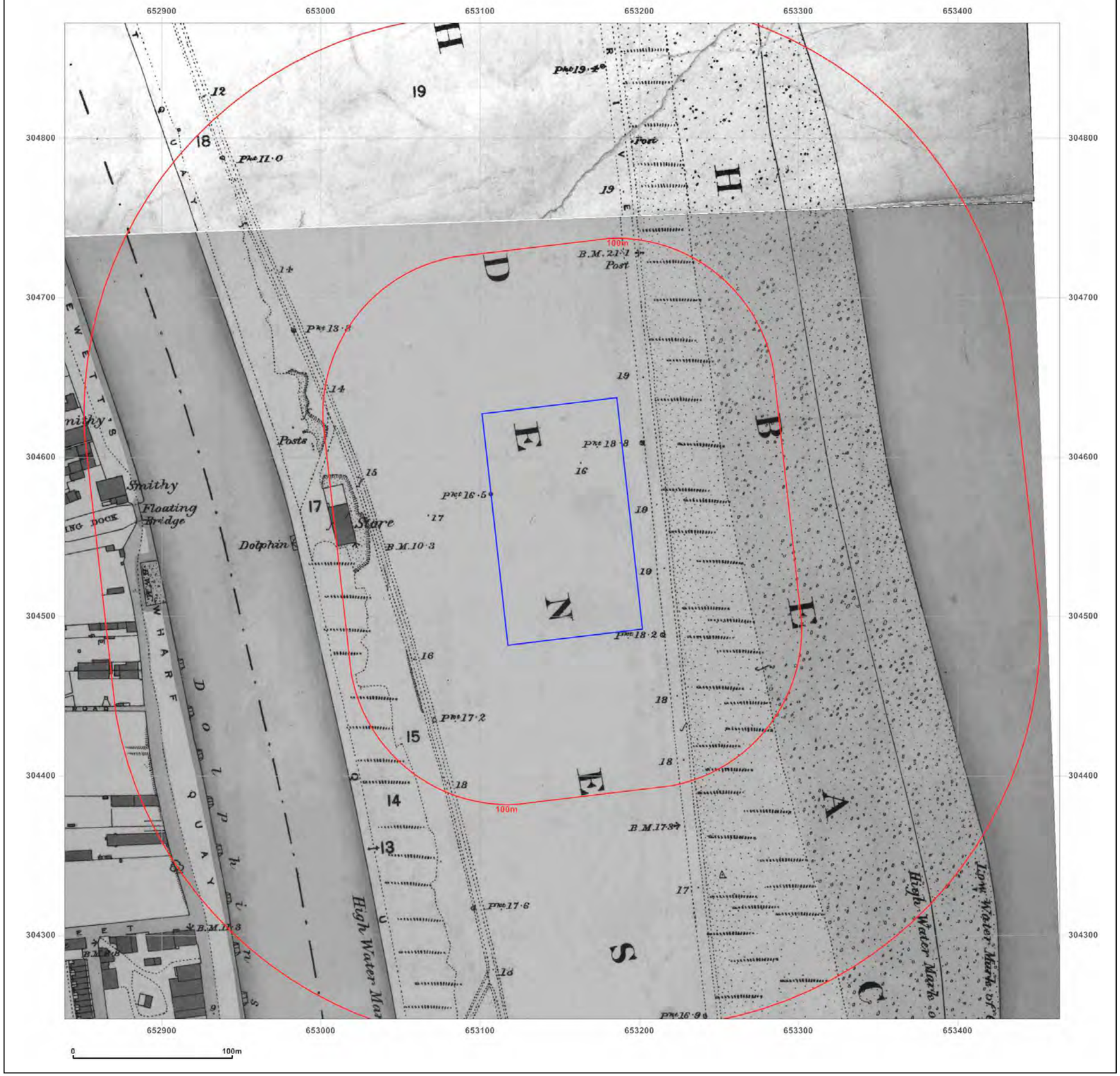
post remediation, how compliance with all licenses and consents will be checked etc. Agreement should again be sought of the appropriate statutory bodies for the Verification Plan. On completion of the remediation a Verification Report should be produced to provide a complete record of all remediation activities on site and the data collected as required in the Verification Plan. The Verification Report should demonstrate that the remediation has met the remedial targets to show that the site is suitable for the proposed use.

GLOSSARY

TERMS		UNITS	
AST	Above Ground Storage Tank	m	Metres
BGS	British Geological Survey	km	Kilometres
BSI	British Standards Institute	%	Percent
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes	%v/v	Percent volume in air
CIEH	Chartered Institute of Environmental Health	mb	Milli Bars (atmospheric pressure)
CIRIA	Construction Industry Research Association		
CLEA	Contaminated Land Exposure Assessment	l/hr	Litres per hour
CSM	Conceptual Site Model	ha	Hectare (10,000 m^2)
DNAPL	Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB)	µg/l	Micrograms per Litre (parts per billion)
DWS	Drinking Water Standard	ppb	Parts Per Billion
EA	Environment Agency	mg/kg	Milligrams per kilogram (parts per million)
EQS	Environmental Quality Standard		
GAC	General Assessment Criteria	ppm	Parts Per Million
GL	Ground Level	mg/m^3	Milligram per metre cubed
GSV	Gas Screening Value	Mg/m^3	Megagram per metre cubed
HCV	Health Criteria Value	$µg/m^3$	Microgram per metre cubed
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel)	m bgl	Metres Below Ground Level
ND	Not Detected	m bcl	Metre Below Cover Level
LMRL	Lower Method Reporting Limit	mOD	Metres Above Ordnance Datum (sea level)
NR	Not Recorded		
OD	Ordnance Datum	kN/m^2	Kilo Newtons per metre squared
PAH	Poly Aromatic Hydrocarbon		
PCB	Poly-Chlorinated Biphenyl	kPa	Kilo Pascal – same as kN/m^2
PID	Photo Ionisation Detector	µm	Micro metre
PCSM	Preliminary Conceptual Site Model		
SGV	Soil Guideline Value		
TPH (CWG)	Total Petroleum Hydrocarbon (Criteria Working Group)		
SPT	Standard Penetration Test		
SVOC	Semi Volatile Organic Compound		
UST	Underground Storage Tank		
VCCs	Vibro Concrete Columns		
VSCs	Vibro Stone Columns		
VOC	Volatile Organic Compound		

Appendix C

Historical Maps



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Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: County Series

Map date: **1882-1883**

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Printed at: 1:2,500

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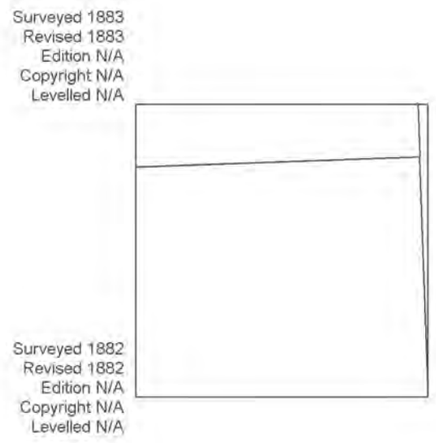

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GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: County Series Town Plan
Map date: **1885**
Scale: 1:500
Printed at: 1:1,000

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Surveyed 1885
Revised N/A
Edition N/A
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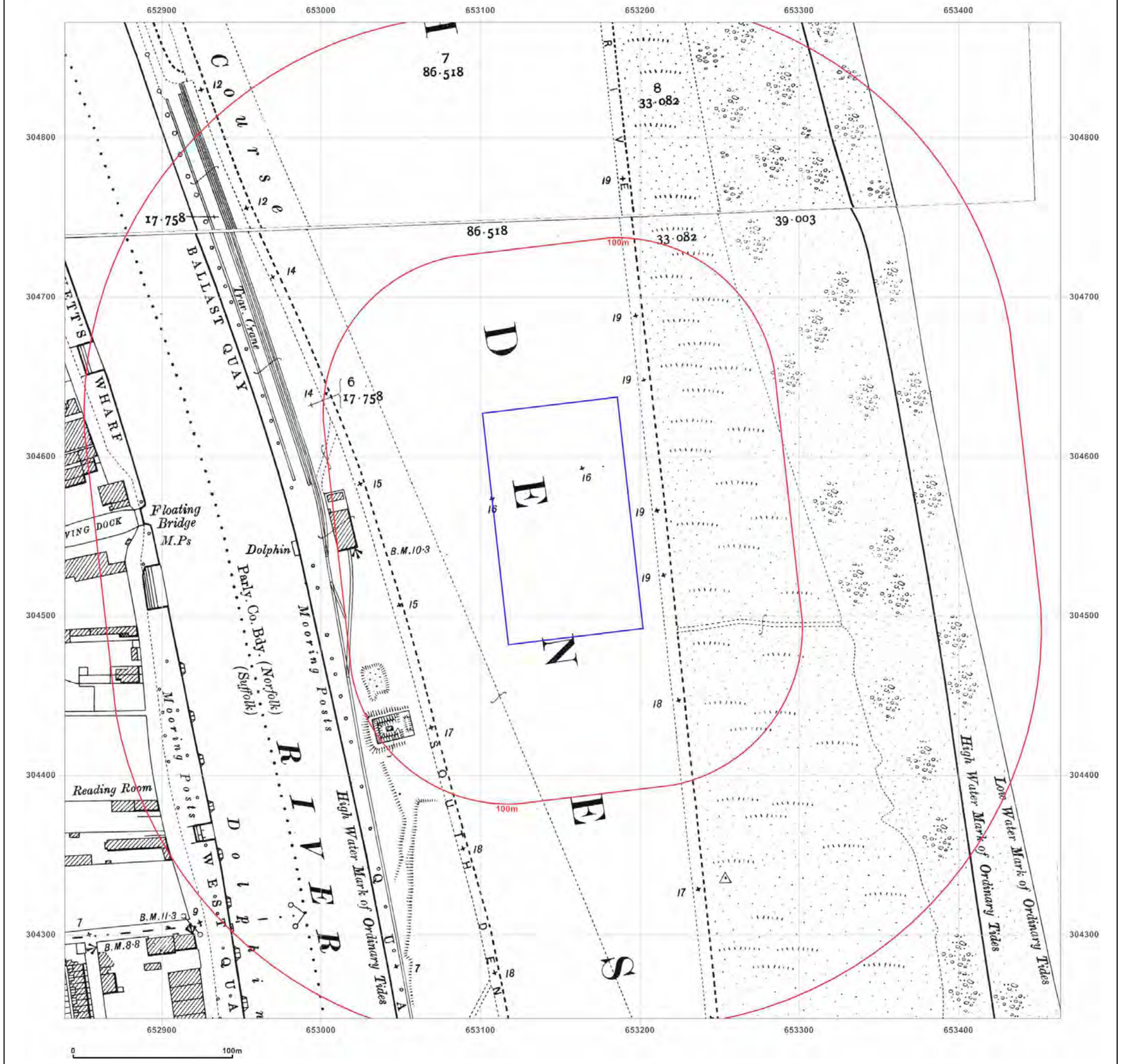

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Grid Ref: 653151, 304560

Map Name: County Series

Map date: **1905-1906**

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Printed at: 1:2,500

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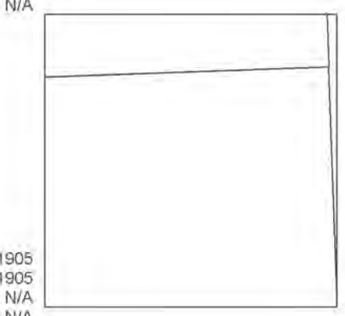
Surveyed 1883
Revised 1904
Edition 1906
Copyright N/A
Levelled N/A



Surveyed 1905
Revised 1905
Edition N/A
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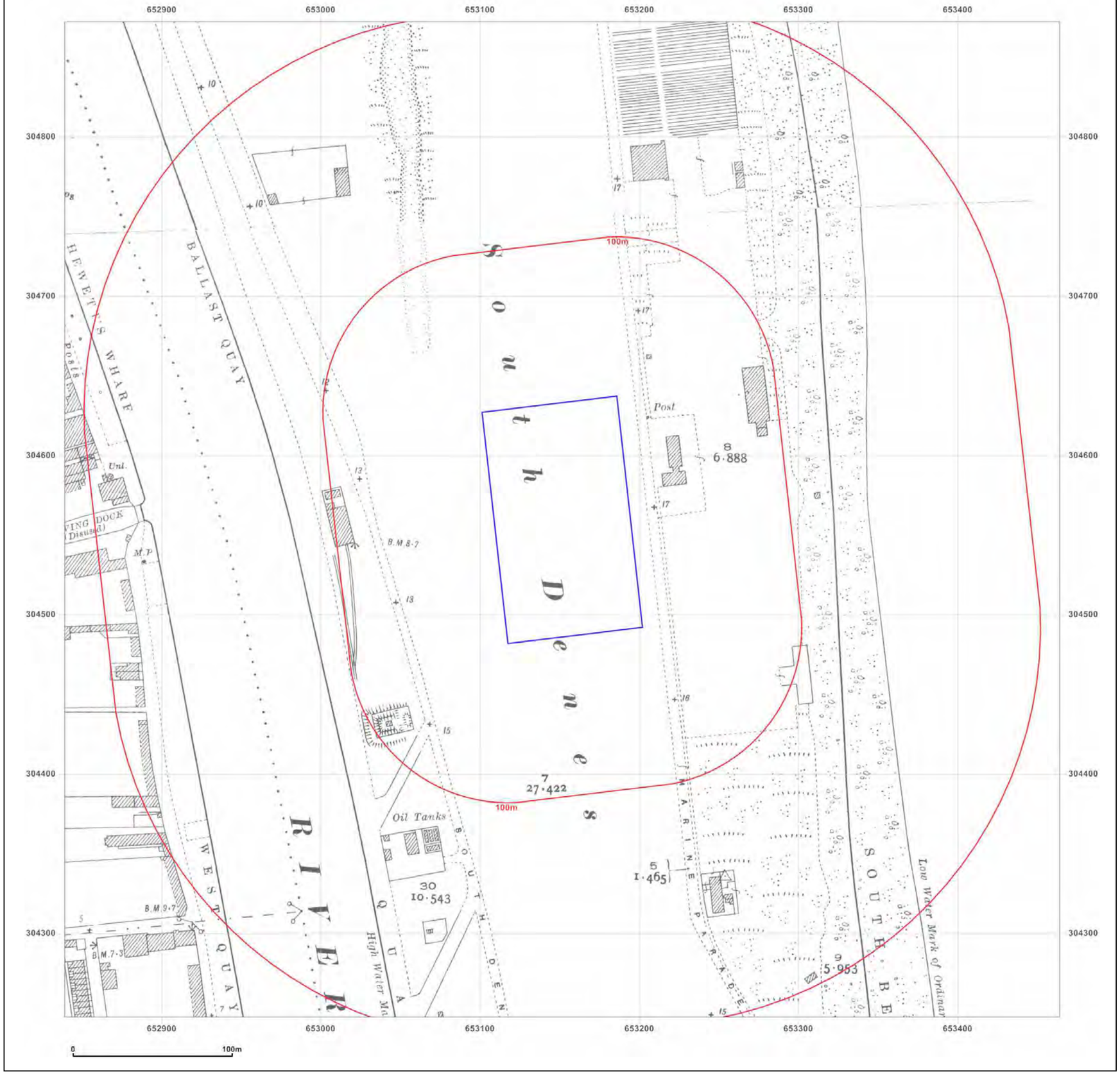

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Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: County Series
Map date: **1927**
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Surveyed 1927
Revised 1927
Edition N/A
Copyright N/A
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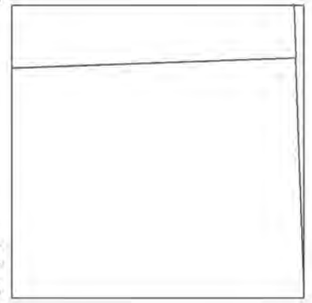

Surveyed 1927
Revised 1927
Edition N/A
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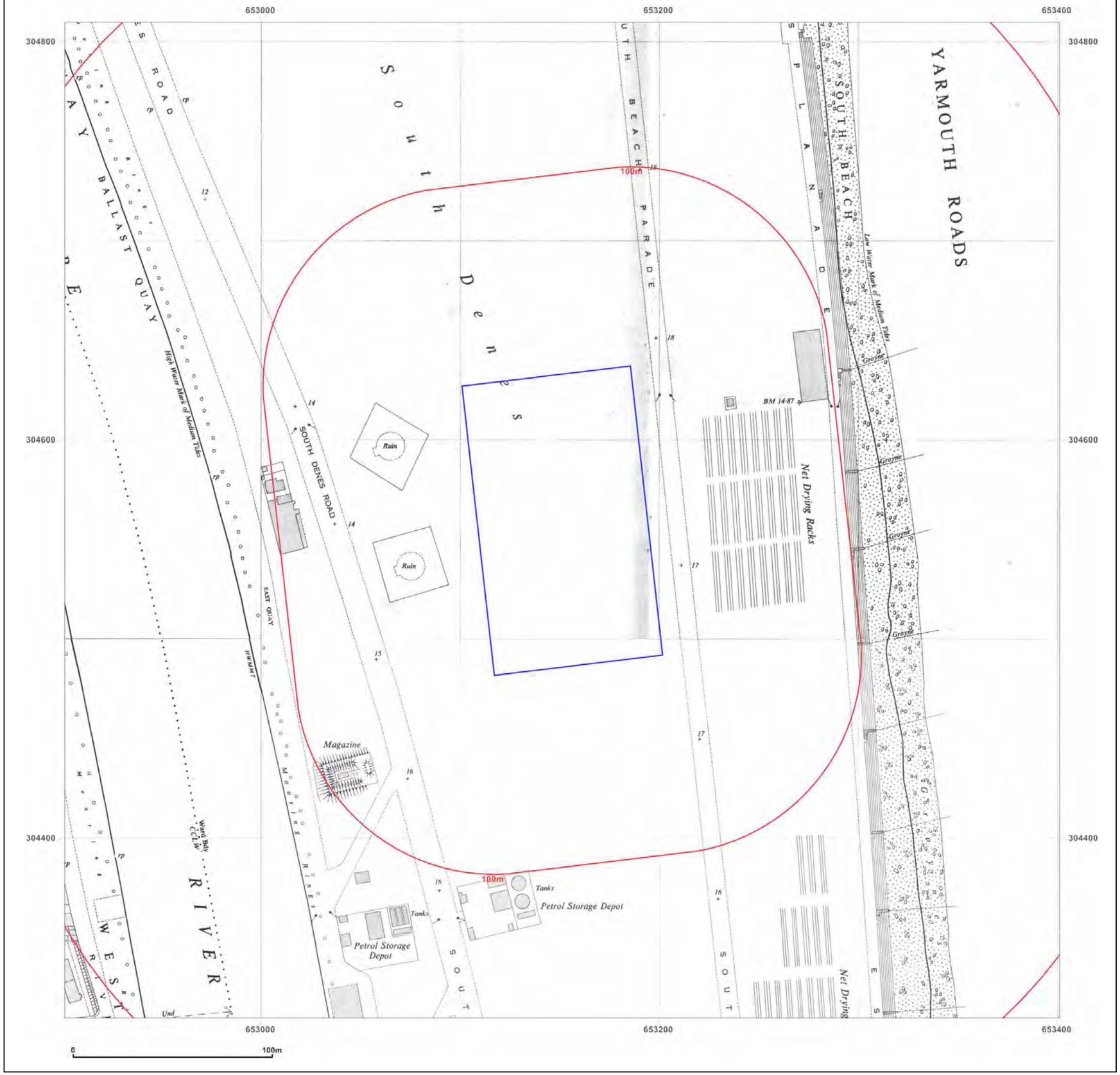

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Grid Ref: 653151, 304560

Map Name: National Grid

Map date: **1949**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed 1949
Revised 1949
Edition N/A
Copyright N/A
Levelled 1947

Surveyed 1949
Revised 1949
Edition N/A
Copyright N/A
Levelled 1946

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Revised 1949
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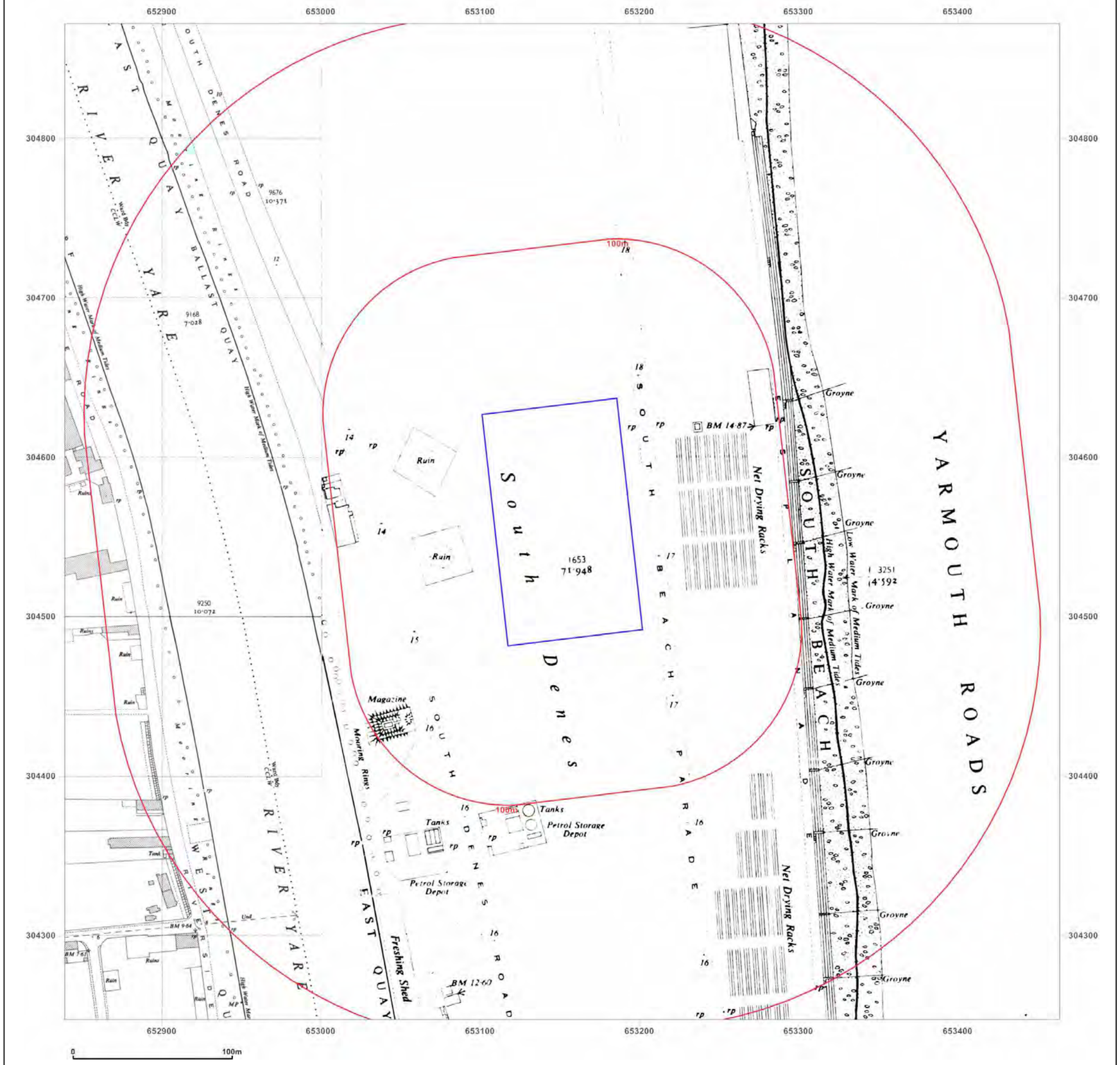

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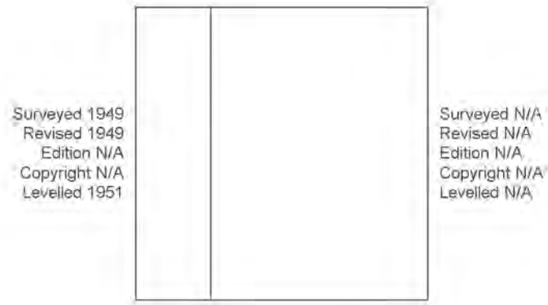

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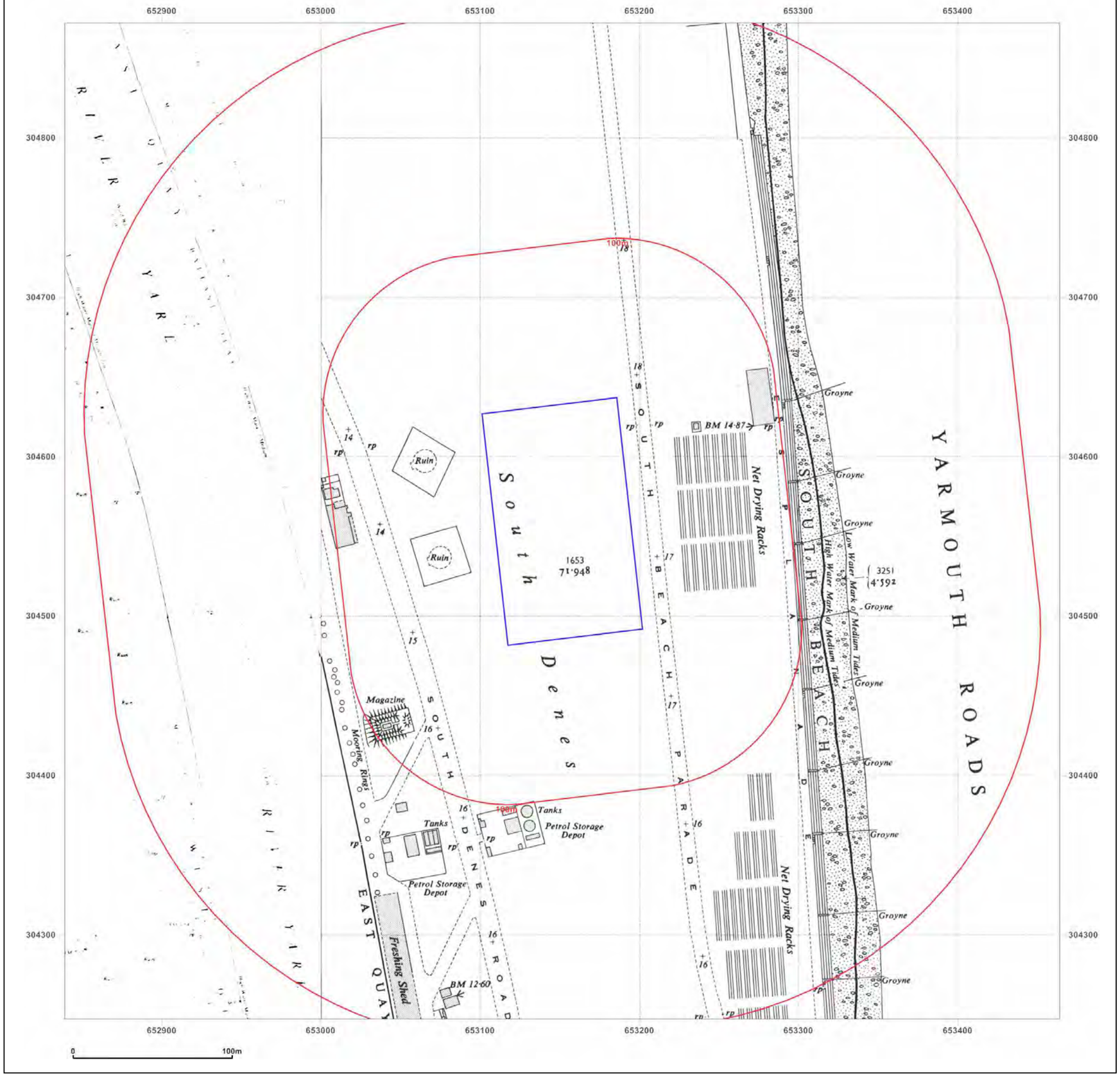

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Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid

Map date: **1949-1951**

Scale: 1:2,500

Printed at: 1:2,500

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Revised N/A
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Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid

Map date: **1950-1955**

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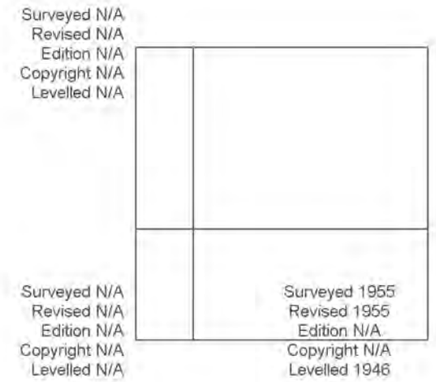

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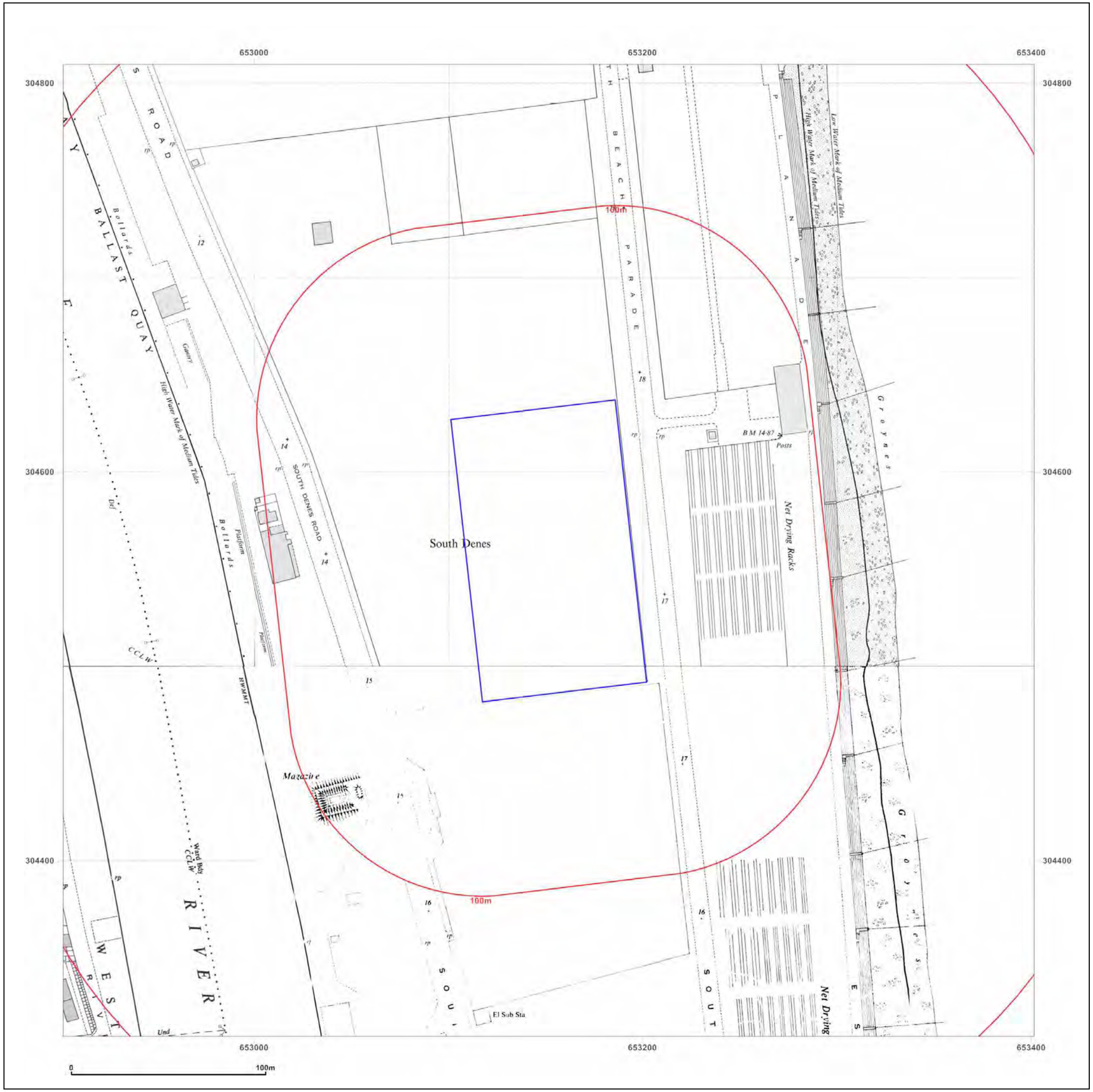

Groundsure INSIGHTS

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GREAT YARMOUTH

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Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid

Map date: **1953-1957**

Scale: 1:1,250

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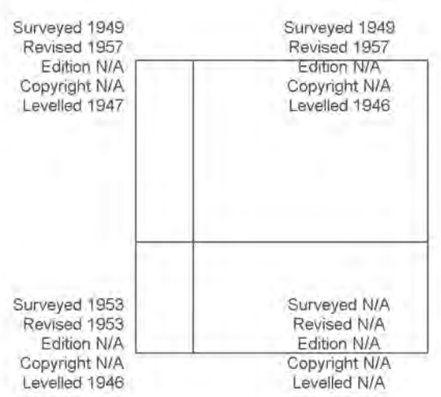

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Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid

Map date: **1954-1958**

Scale: 1:1,250

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Edition N/A
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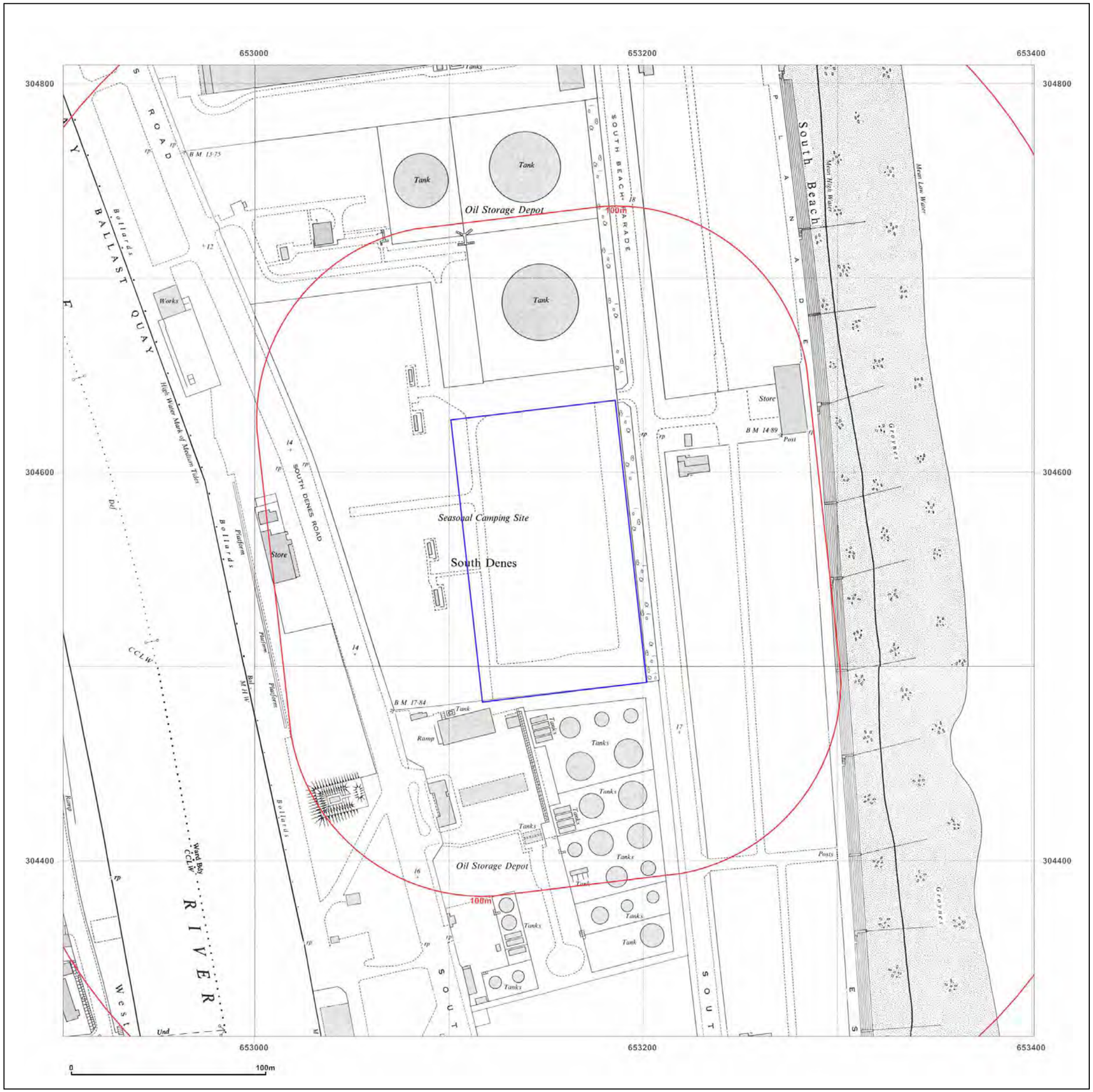

Groundsure INSIGHTS

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Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid

Map date: **1965-1966**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed 1949 Revised 1964 Edition N/A Copyright 1965 Levelled 1958	Surveyed 1965 Revised 1965 Edition N/A Copyright 1965 Levelled 1958
Surveyed 1949 Revised 1966 Edition N/A Copyright 1966 Levelled 1958	Surveyed 1949 Revised 1965 Edition N/A Copyright 1965 Levelled 1959

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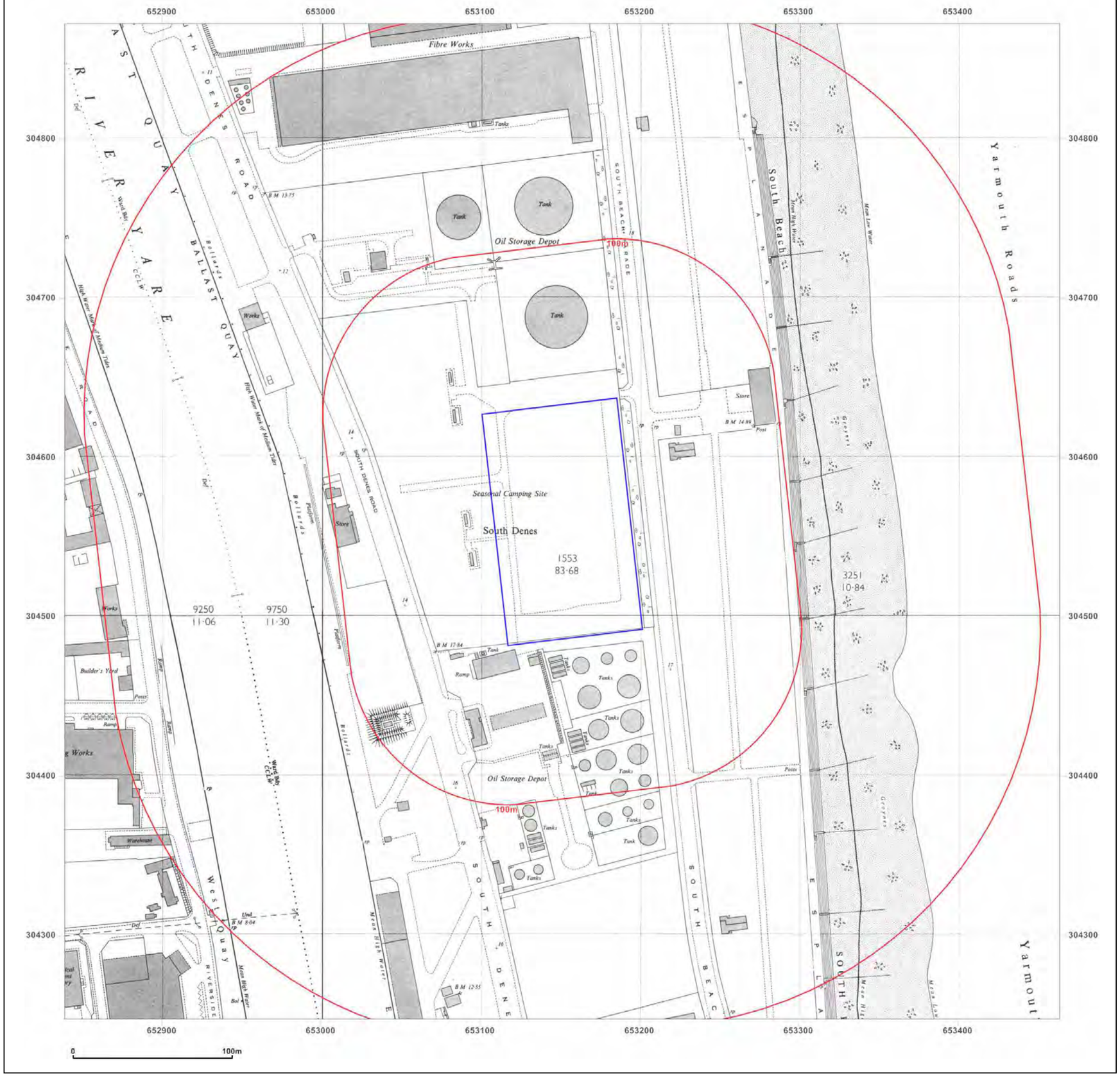

Groundsure INSIGHTS

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid

Map date: **1966**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed 1958
Revised 1966
Edition N/A
Copyright 1967
Levelled 1958

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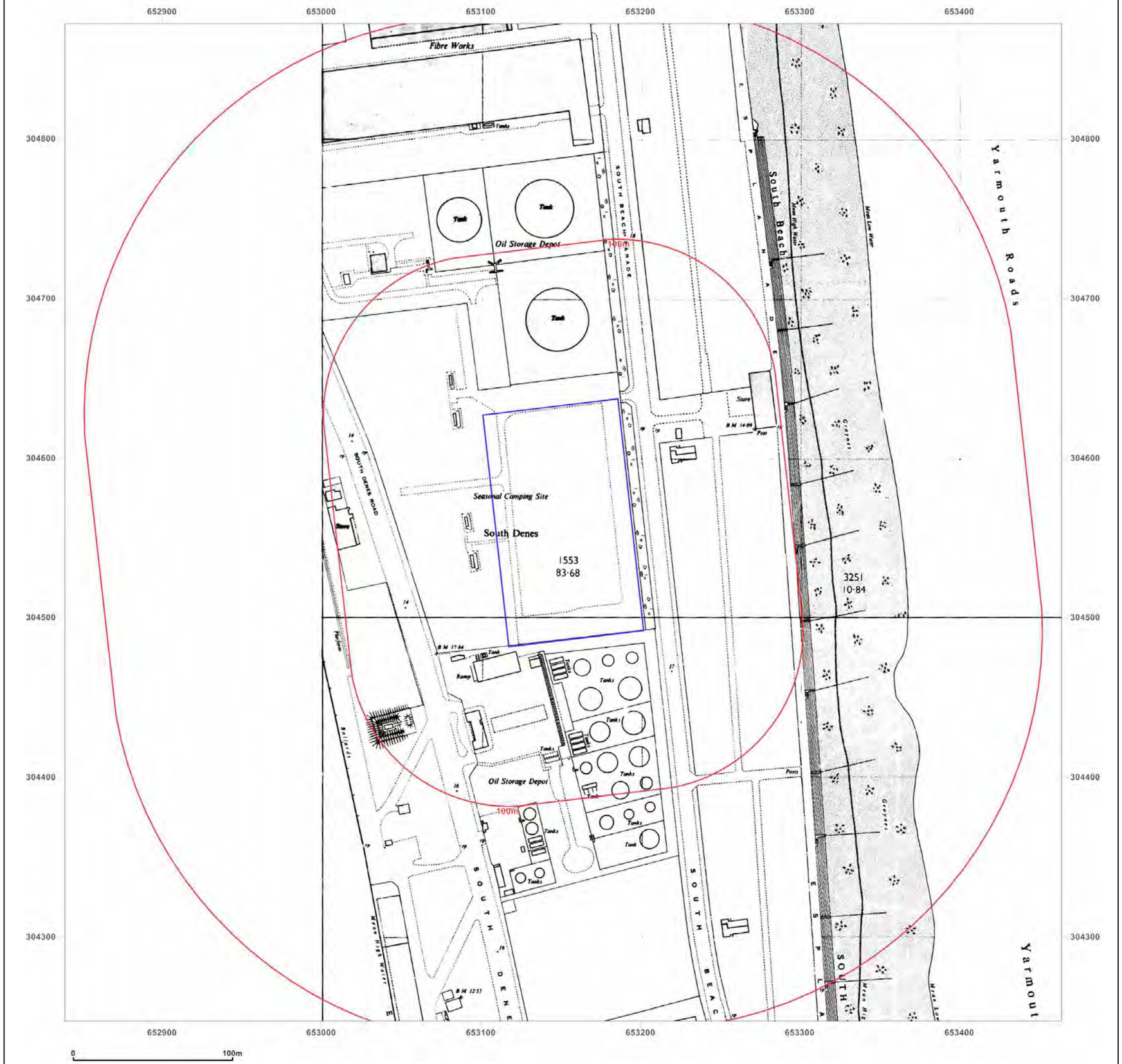

Groundsure INSIGHTS

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid

Map date: **1967**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

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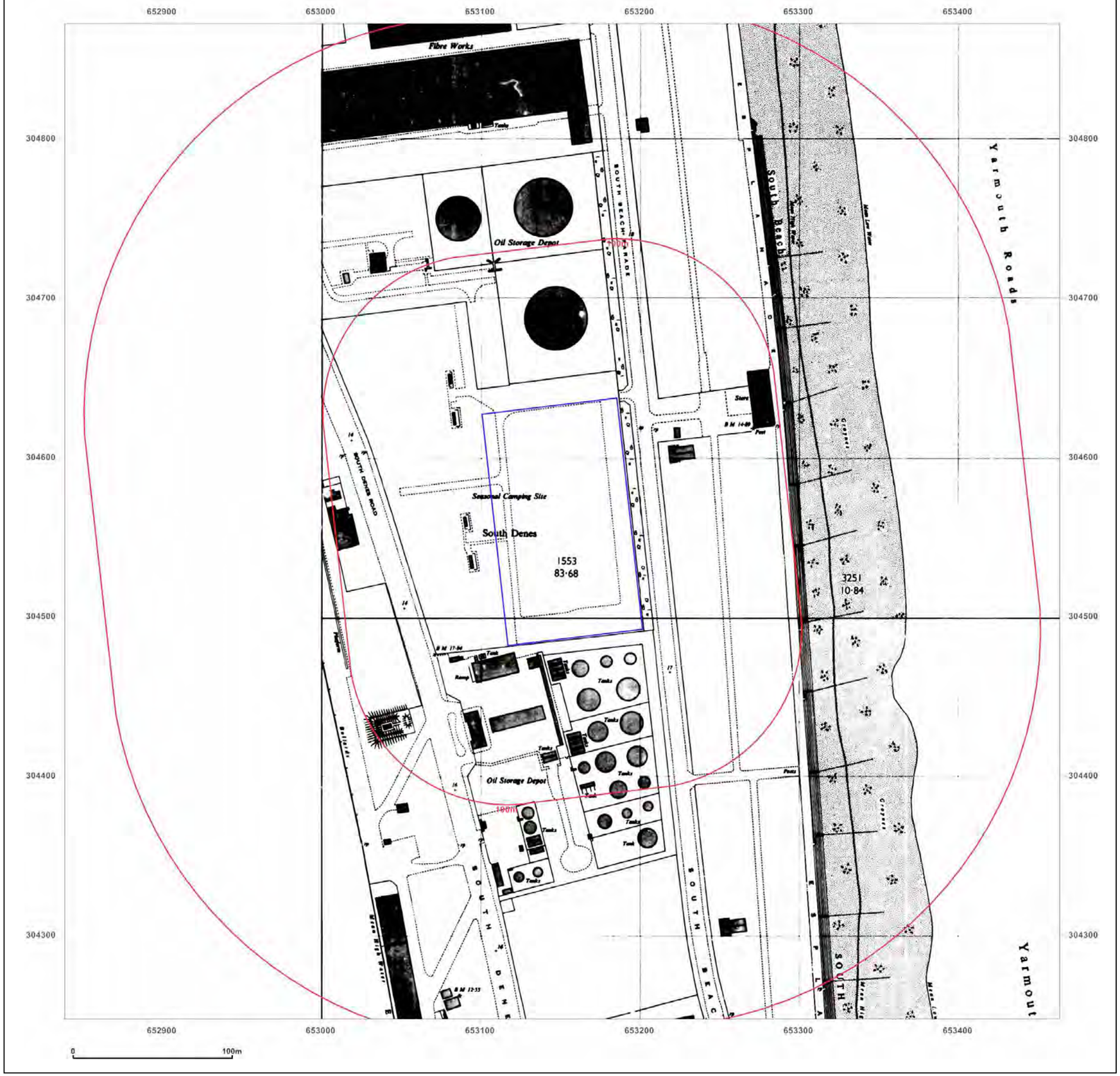

Groundsure INSIGHTS

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid
Map date: **1967**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

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Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid

Map date: **1970-1974**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
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Surveyed 1949
Revised 1974
Edition N/A
Copyright 1974
Levelled 1958

Surveyed 1949
Revised 1971
Edition N/A
Copyright 1971
Levelled 1958

Surveyed 1949
Revised 1969
Edition N/A
Copyright 1970
Levelled 1958

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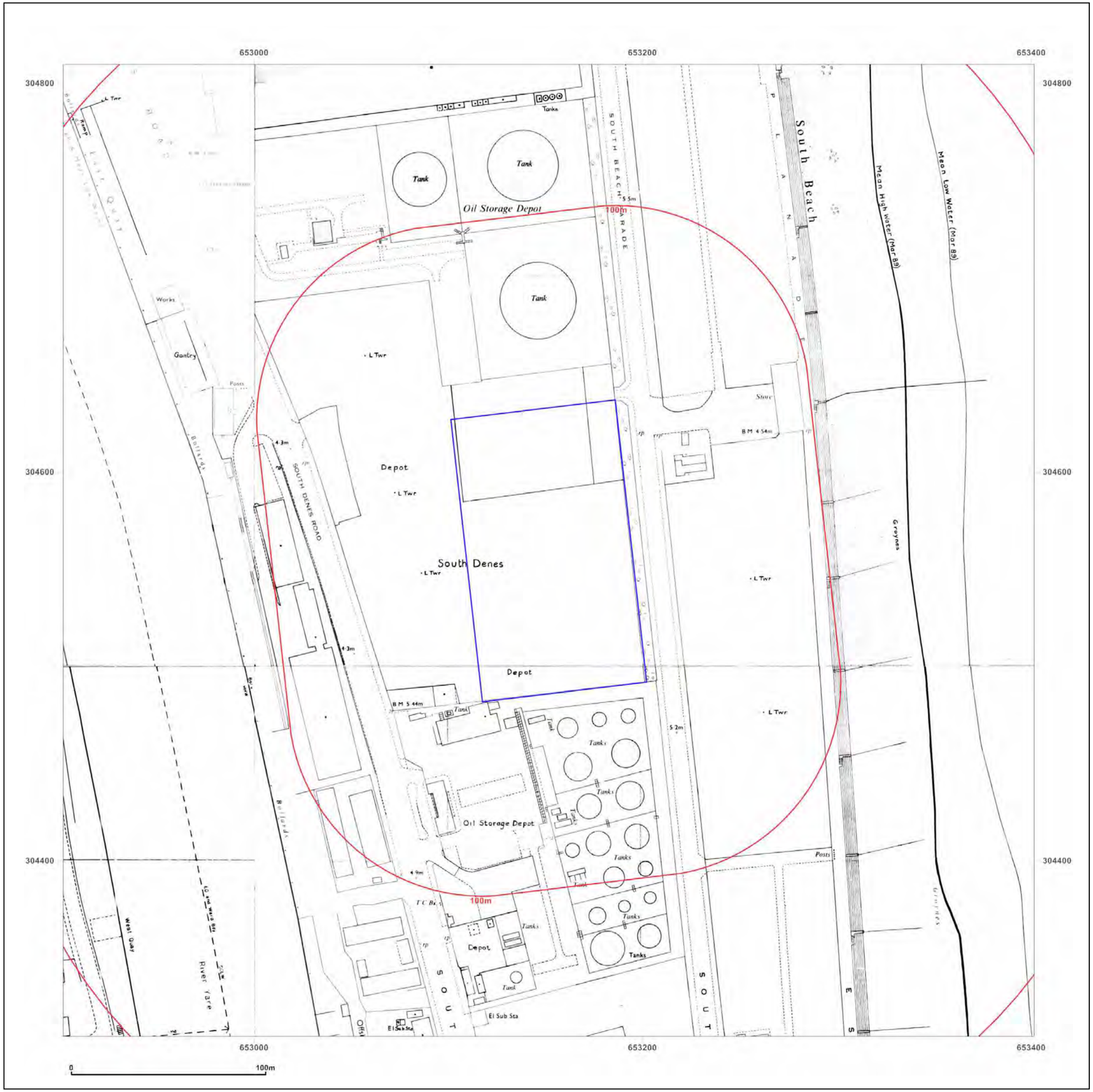

Groundsure INSIGHTS

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid

Map date: **1986-1990**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

Surveyed 1958 Revised 1990 Edition N/A Copyright 1990 Levelled 1958	Surveyed 1958 Revised 1990 Edition N/A Copyright 1990 Levelled 1958
Surveyed N/A Revised N/A Edition N/A Copyright 1986 Levelled N/A	Surveyed 1958 Revised 1989 Edition N/A Copyright 1989 Levelled 1958

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Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid

Map date: **1994**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
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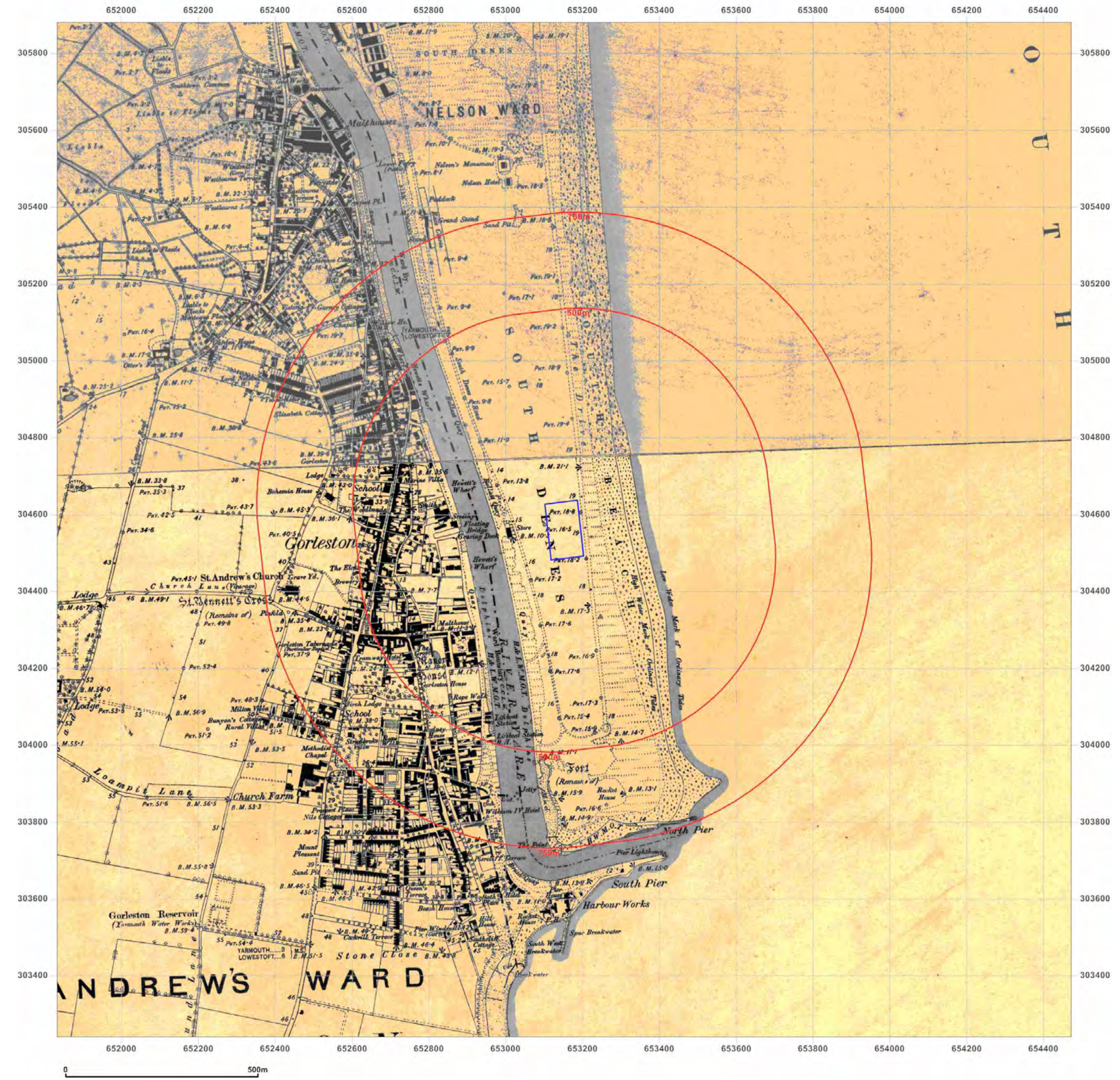


Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

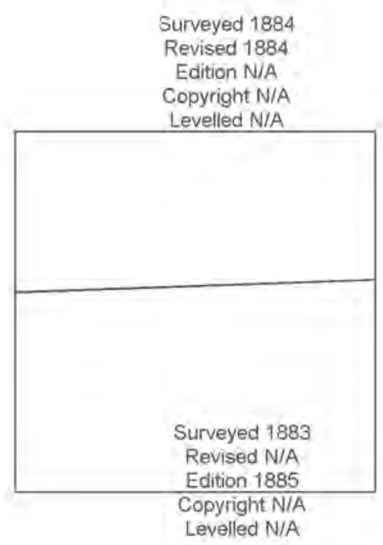
Map Name: County Series

Map date: **1884-1885**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S



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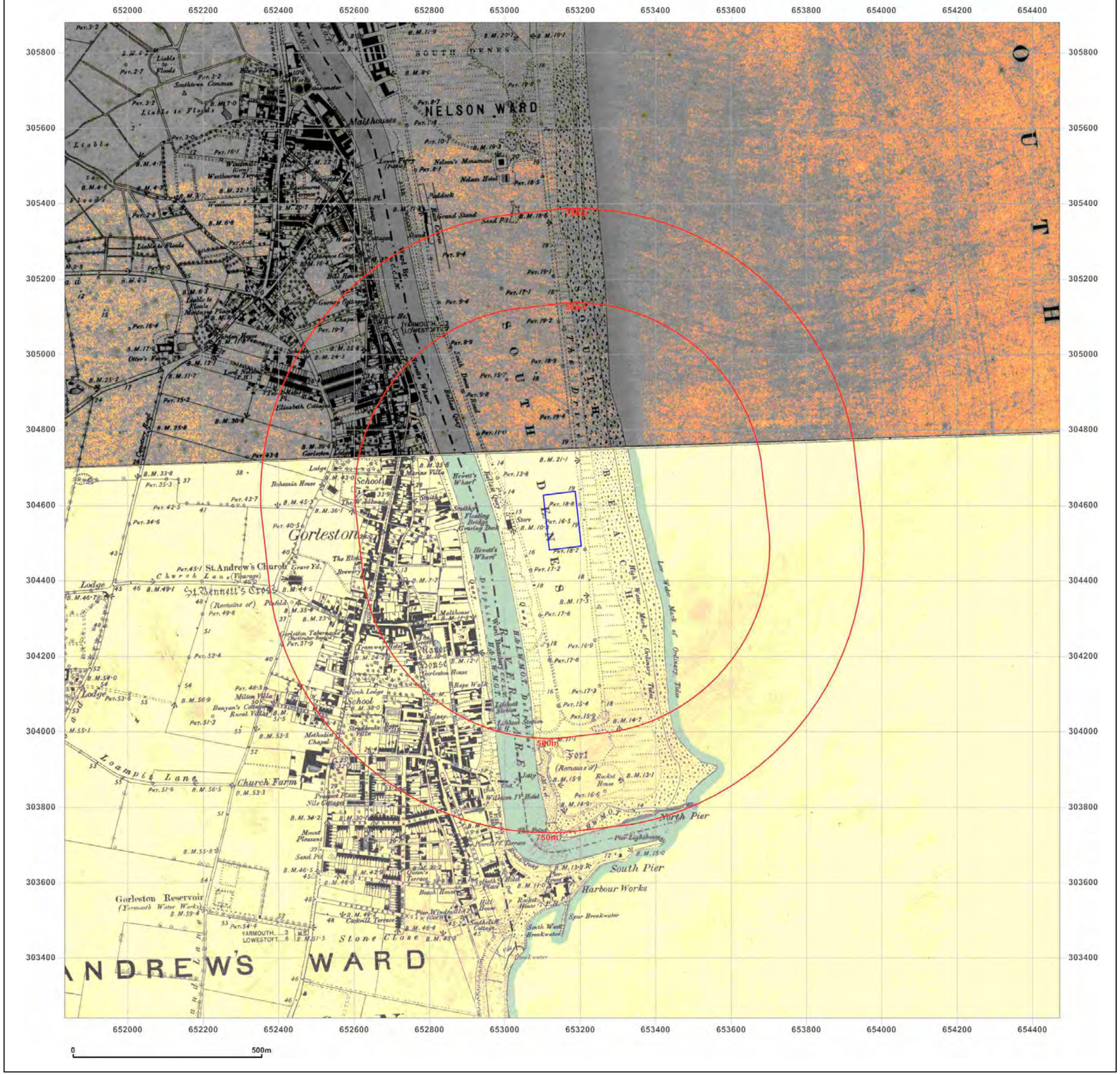


Groundsure INSIGHTS

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

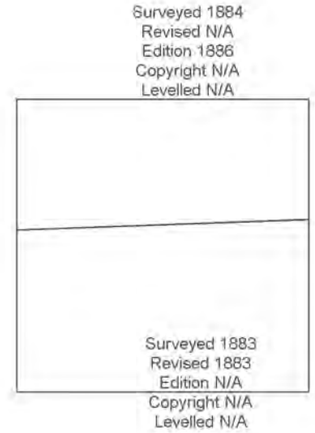
Map Name: County Series

Map date: **1883-1886**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S



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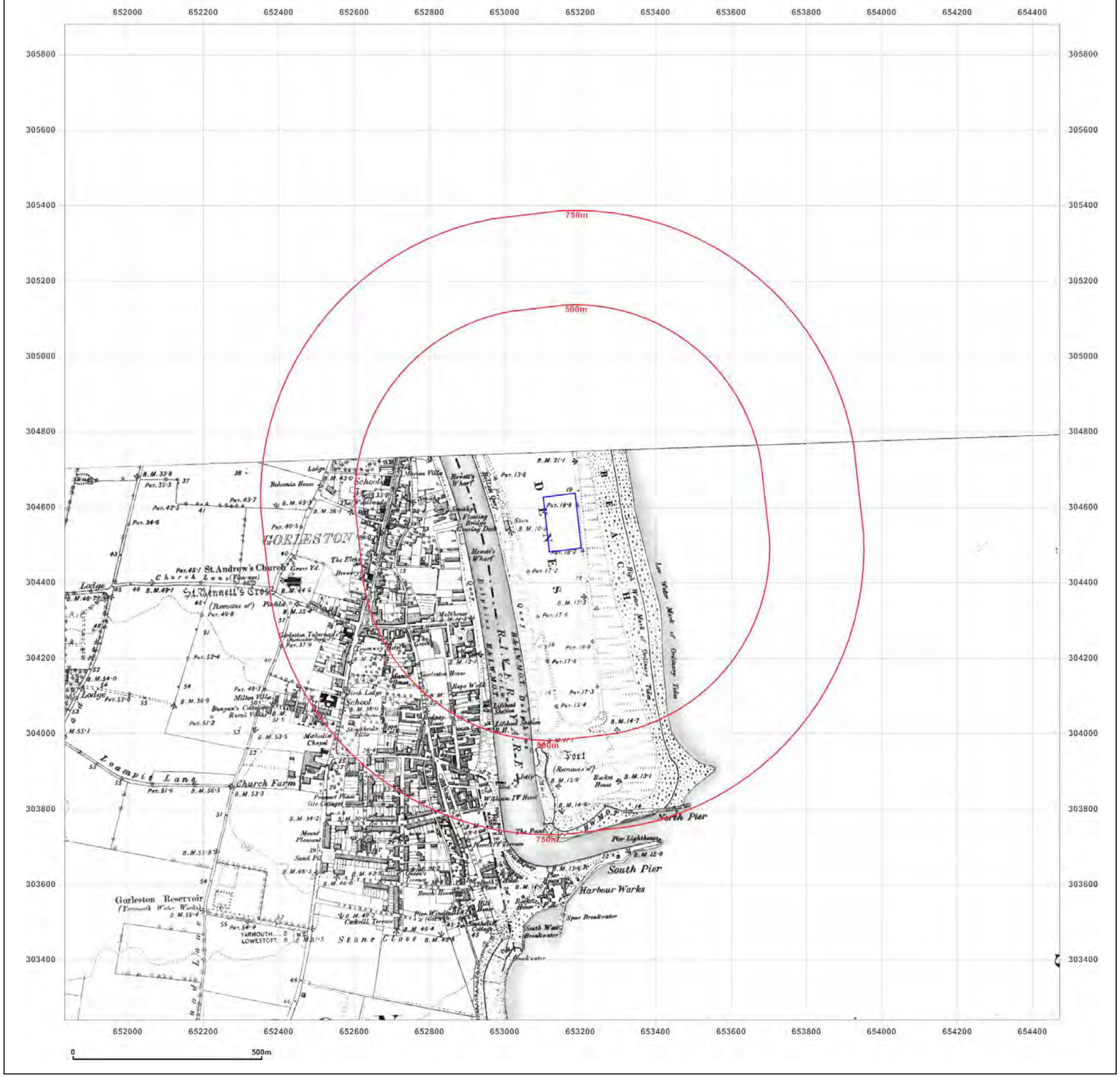

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Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: County Series
Map date: **1889**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

Surveyed 1885
Revised N/A
Edition 1889
Copyright N/A
Levelled N/A

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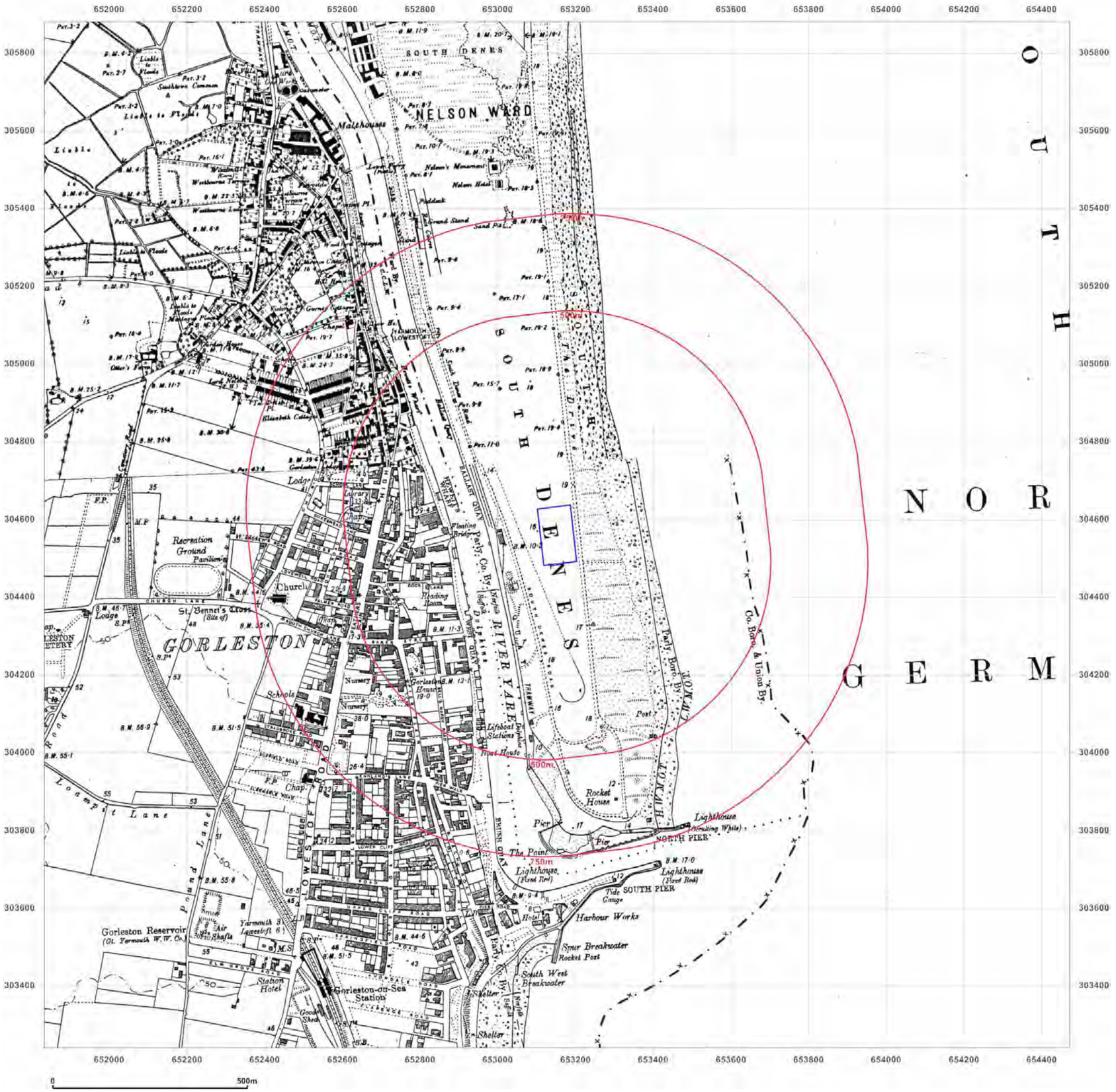

Groundsure INSIGHTS

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: County Series

Map date: **1901-1904**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
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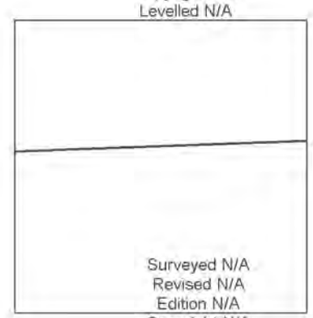
Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A



Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

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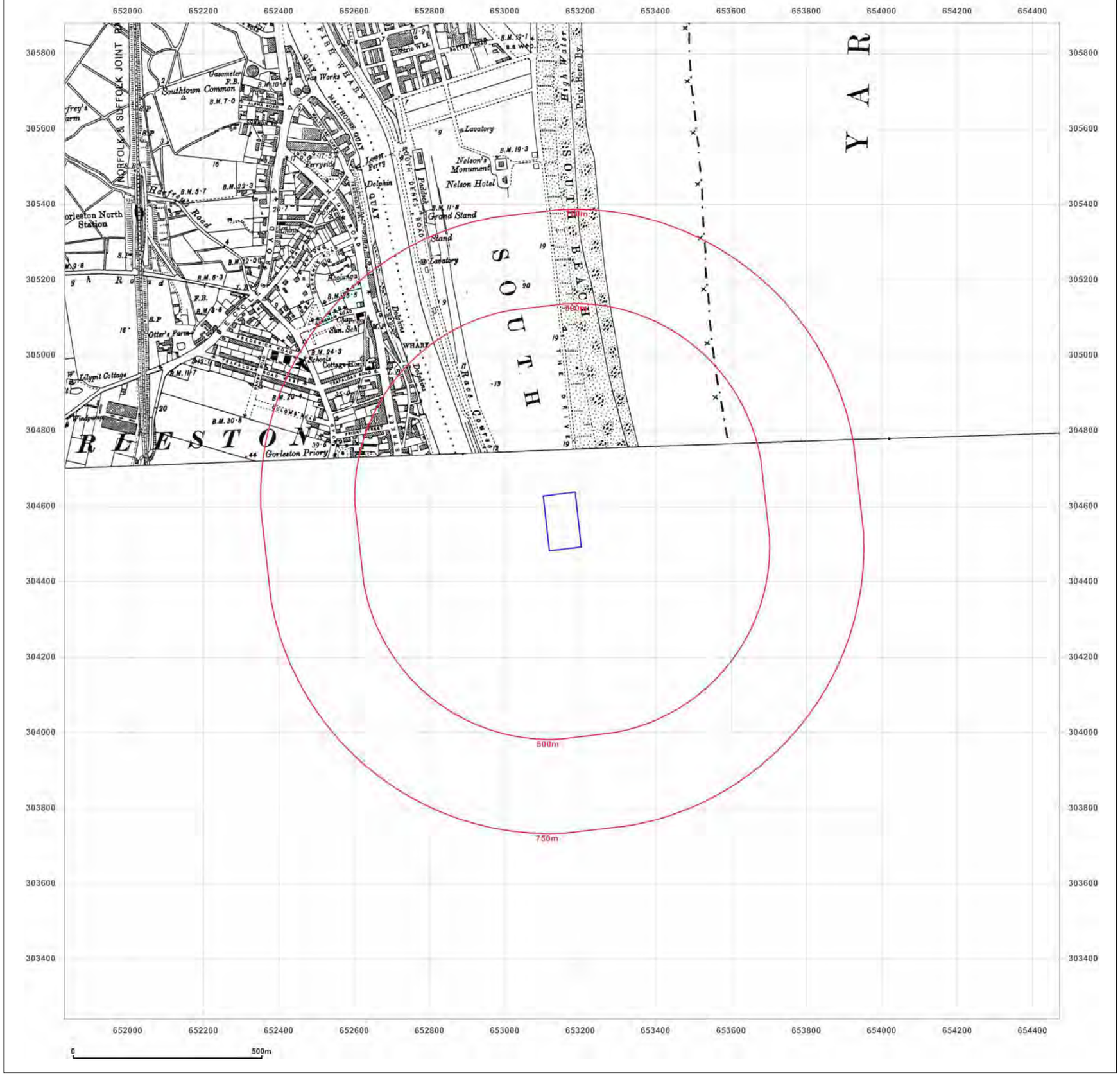

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Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: County Series

Map date: **1905**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
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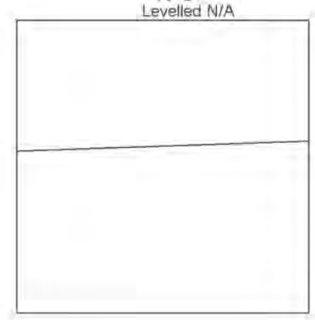
Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A



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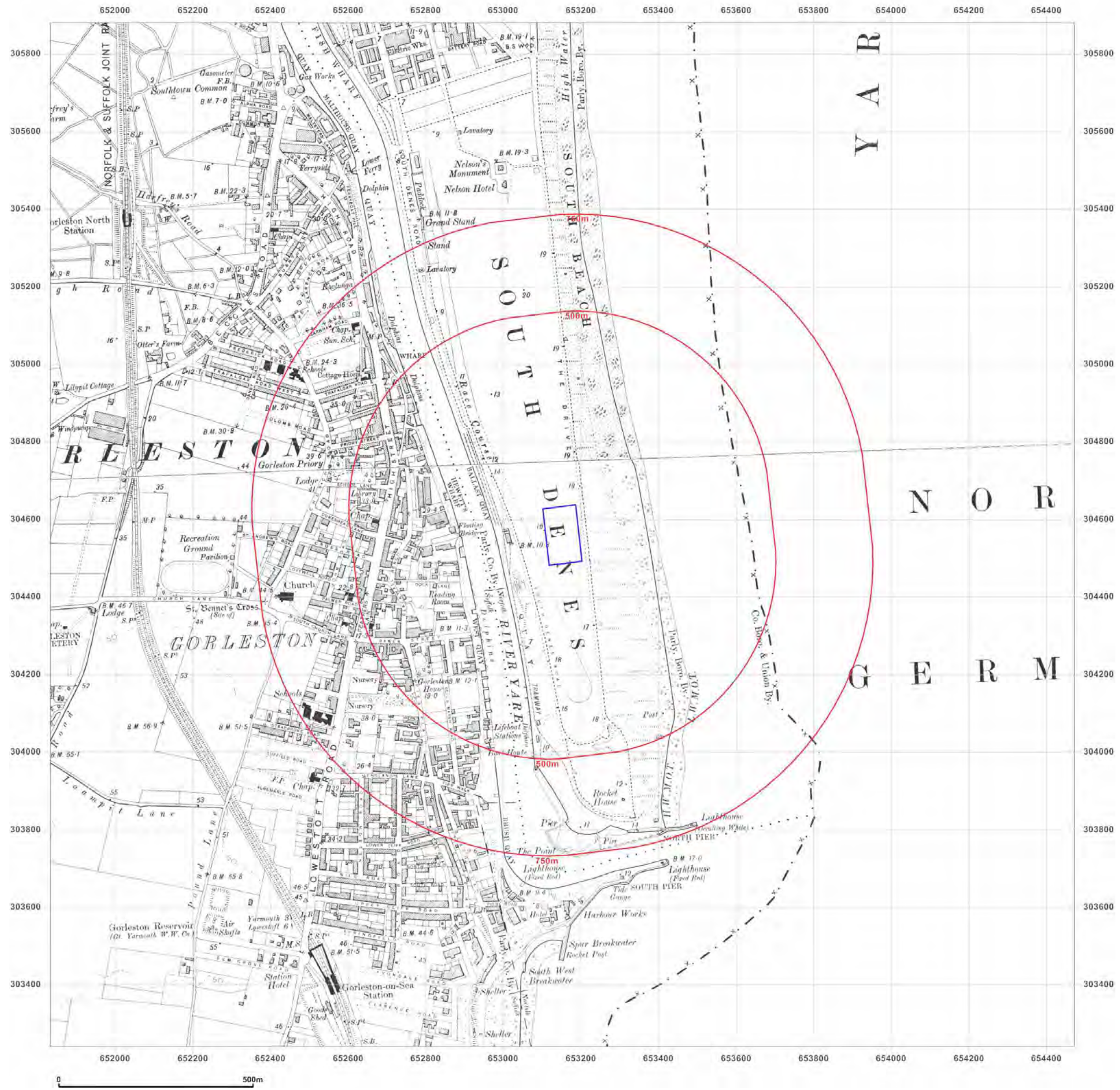

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: County Series

Map date: **1904-1906**

Scale: 1:10,560

Printed at: 1:10,560

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W E
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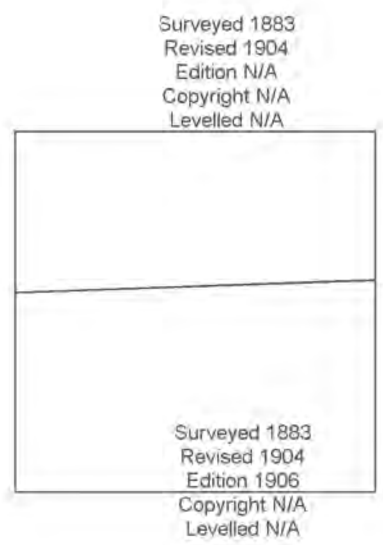

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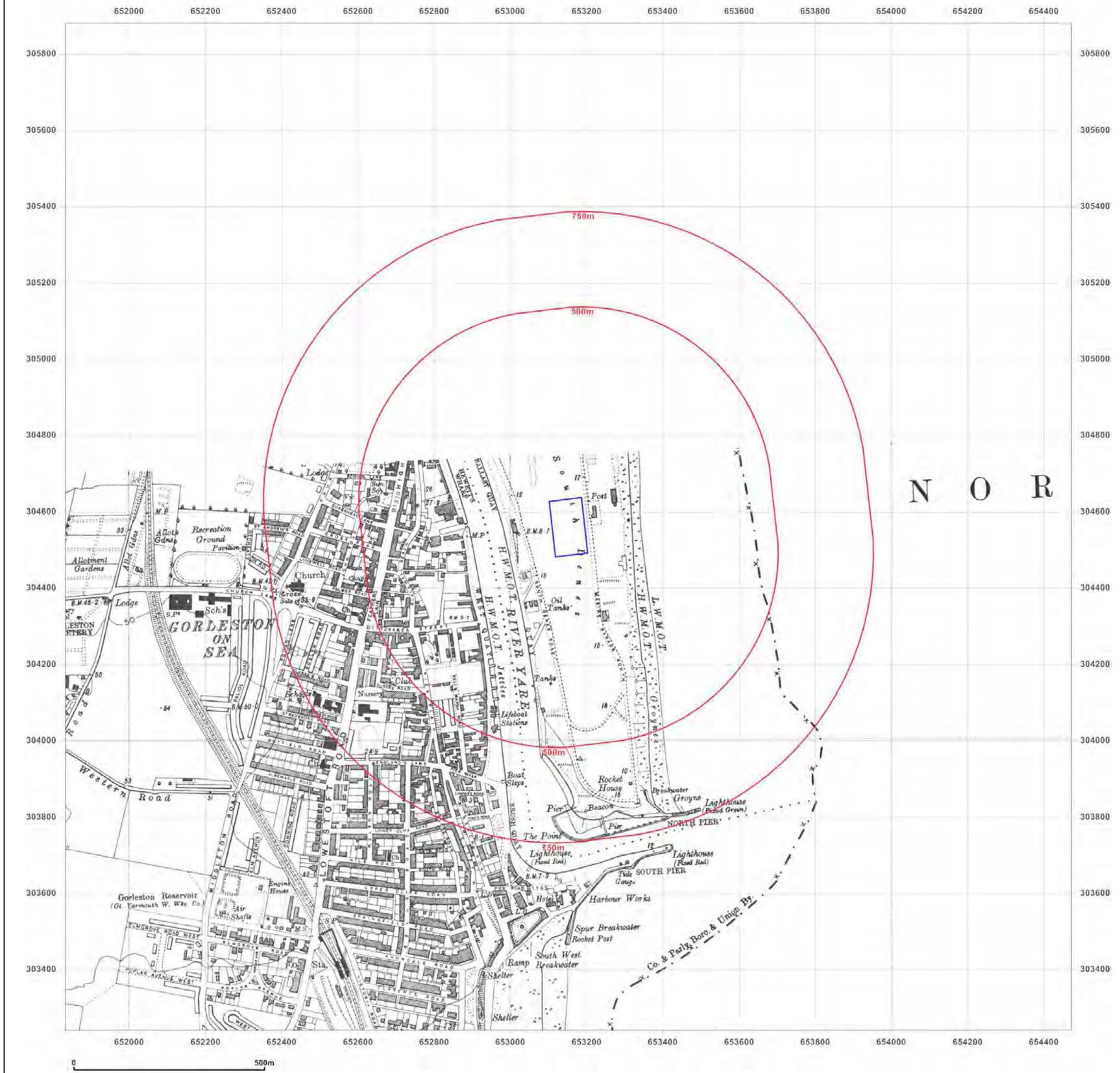

Groundsure INSIGHTS

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: County Series
Map date: **1926**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
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Surveyed 1883
Revised 1926
Edition N/A
Copyright N/A
Levelled N/A

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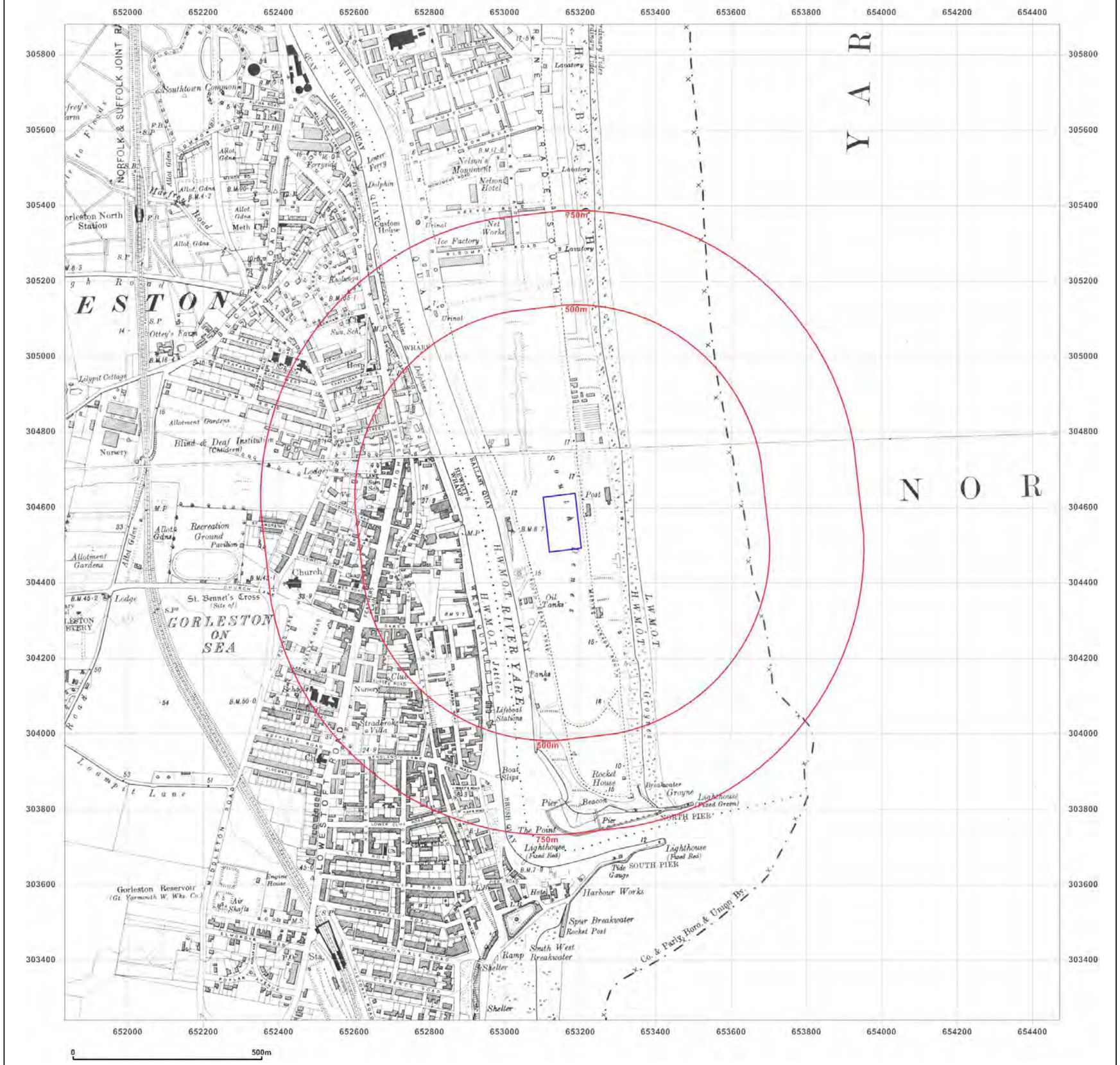


Groundsure INSIGHTS

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

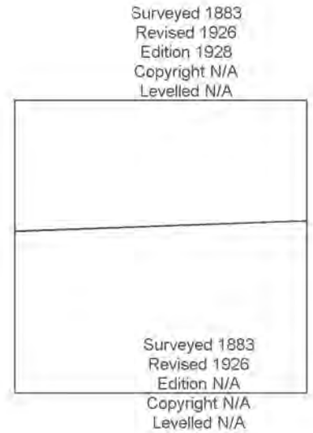
Map Name: County Series

Map date: **1926-1928**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S



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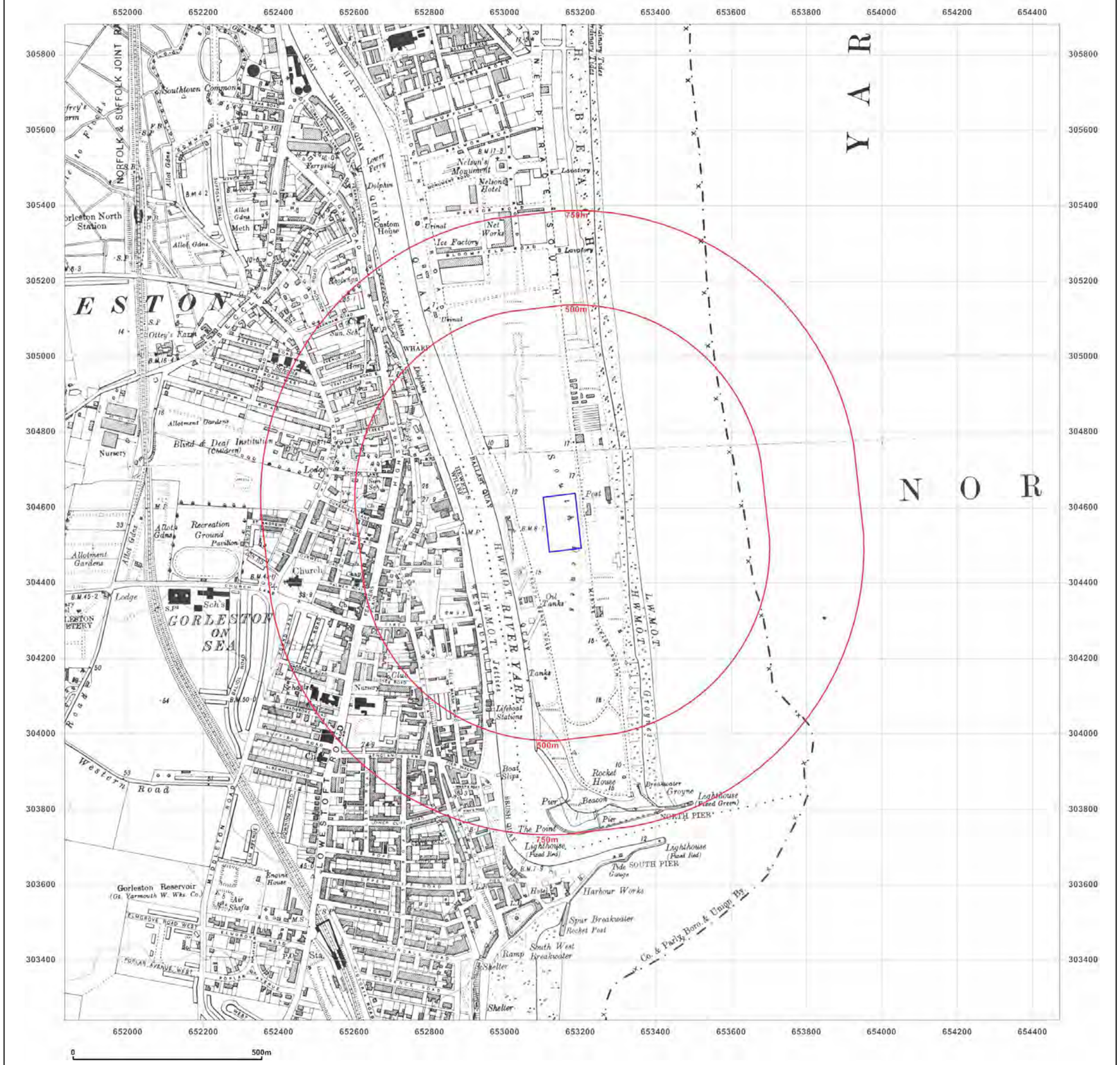

Groundsure INSIGHTS

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: County Series

Map date: **1938**

Scale: 1:10,560

Printed at: 1:10,560

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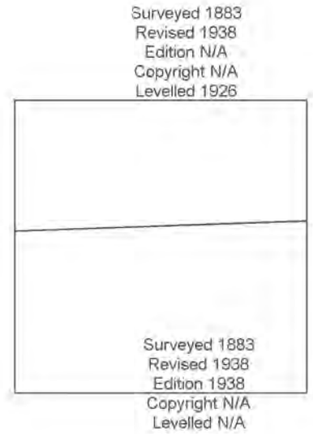

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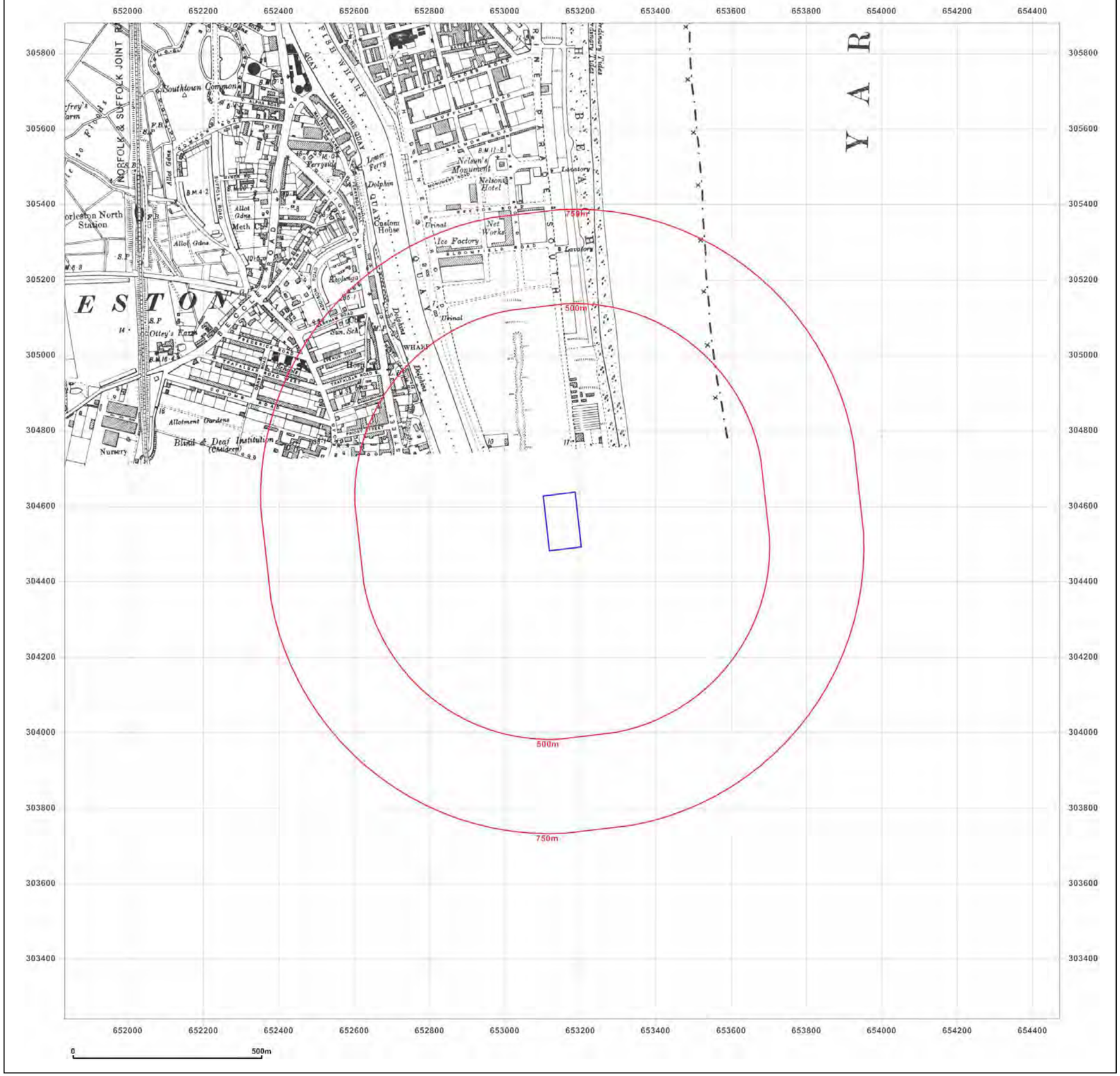

Groundsure INSIGHTS

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: County Series

Map date: **1938**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
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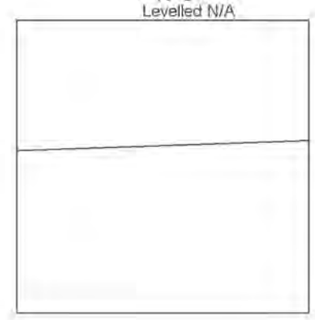
Surveyed 1883
Revised 1938
Edition 1938
Copyright N/A
Levelled N/A



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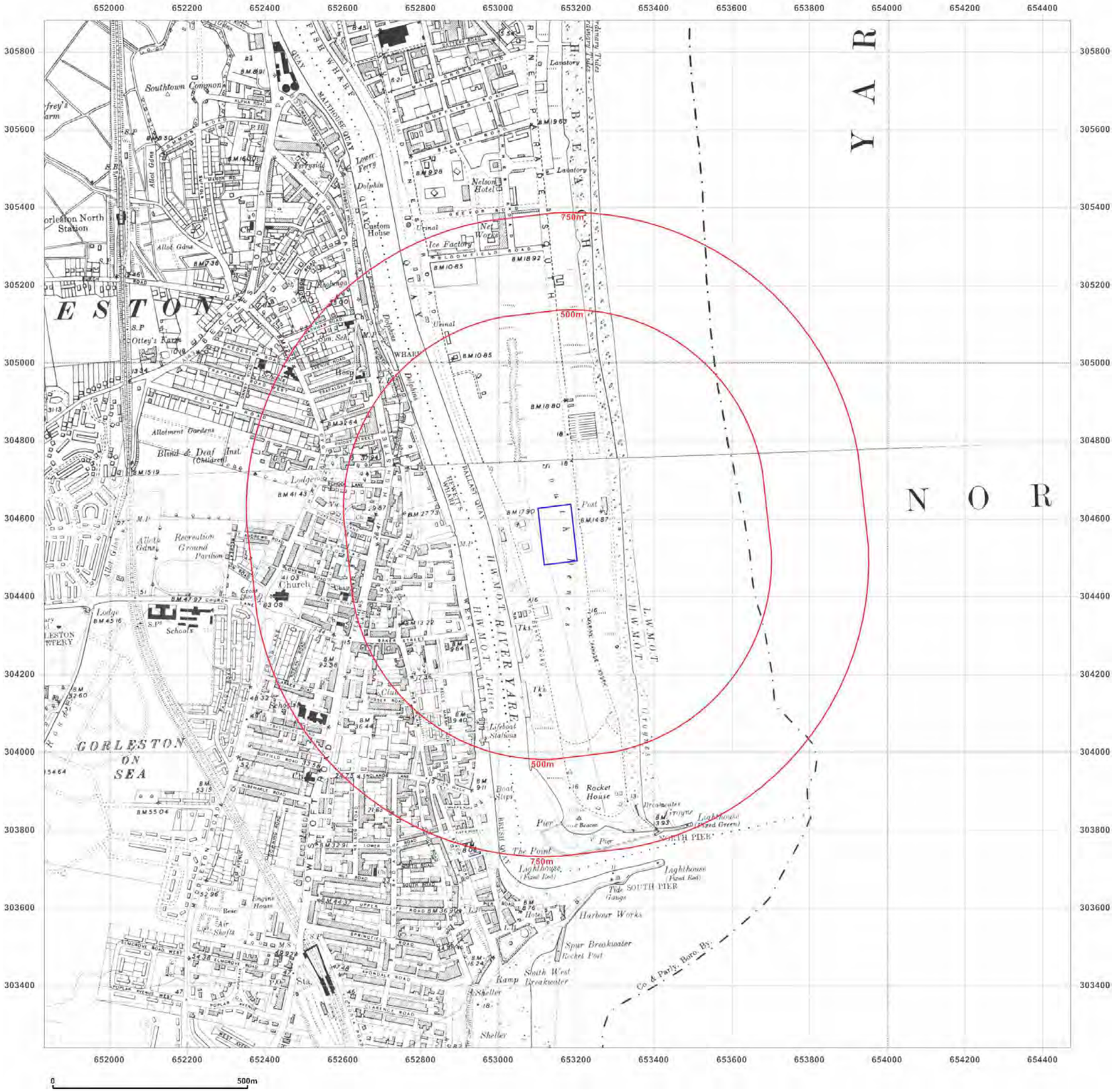

Groundsure INSIGHTS

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: County Series
Map date: **1946**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
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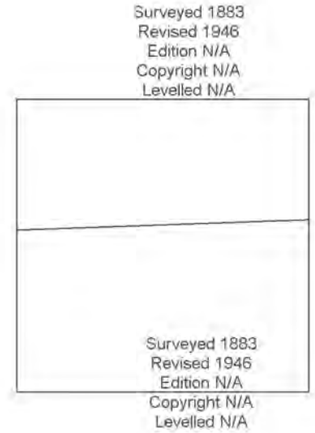

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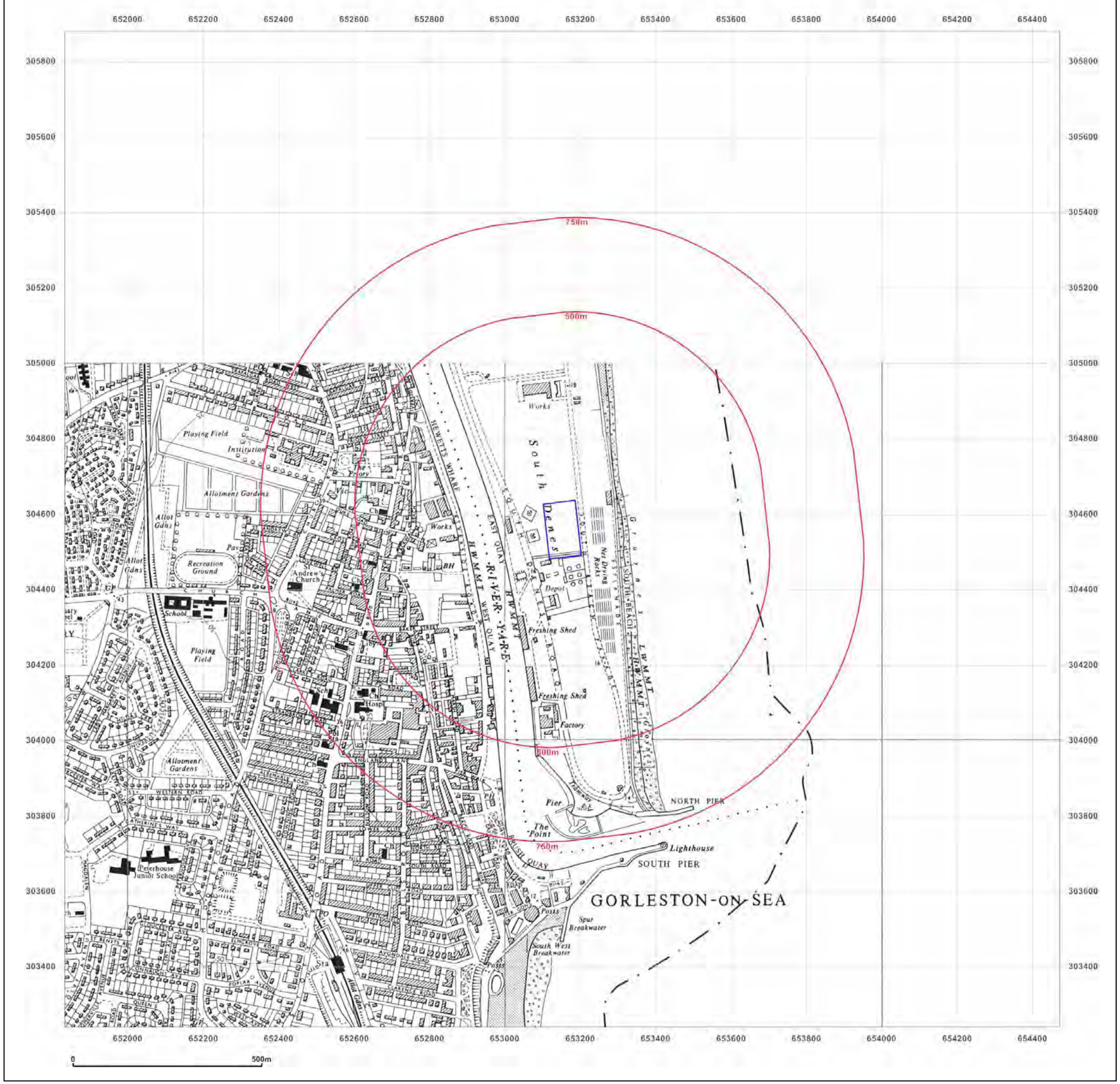

Groundsure INSIGHTS

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: Provisional
Map date: **1952**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
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Surveyed 1952
Revised 1952
Edition N/A
Copyright N/A
Levelled N/A

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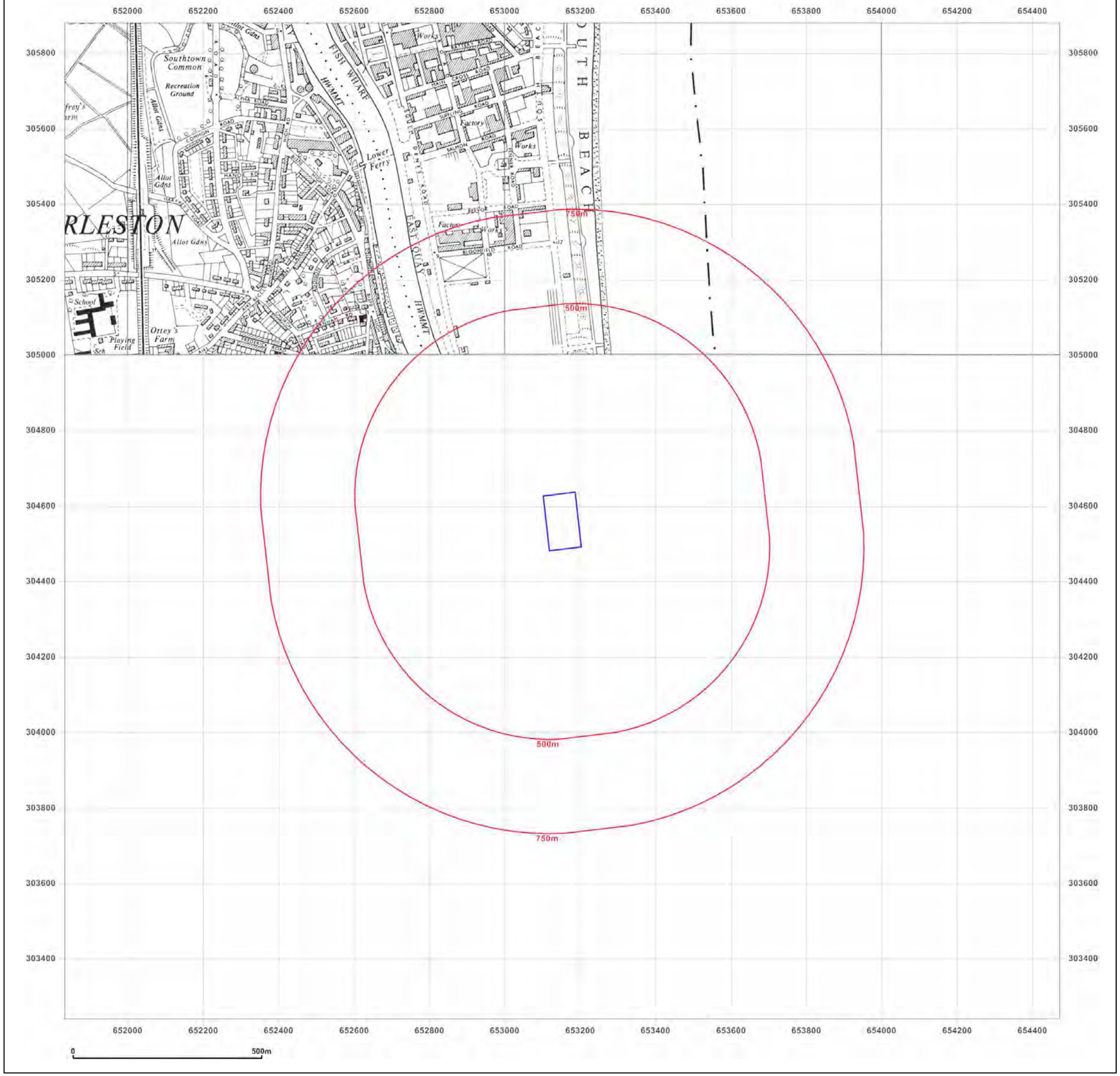

Groundsure INSIGHTS

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: Provisional
Map date: **1958**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

Surveyed 1956
Revised 1956
Edition N/A
Copyright 1958
Levelled N/A

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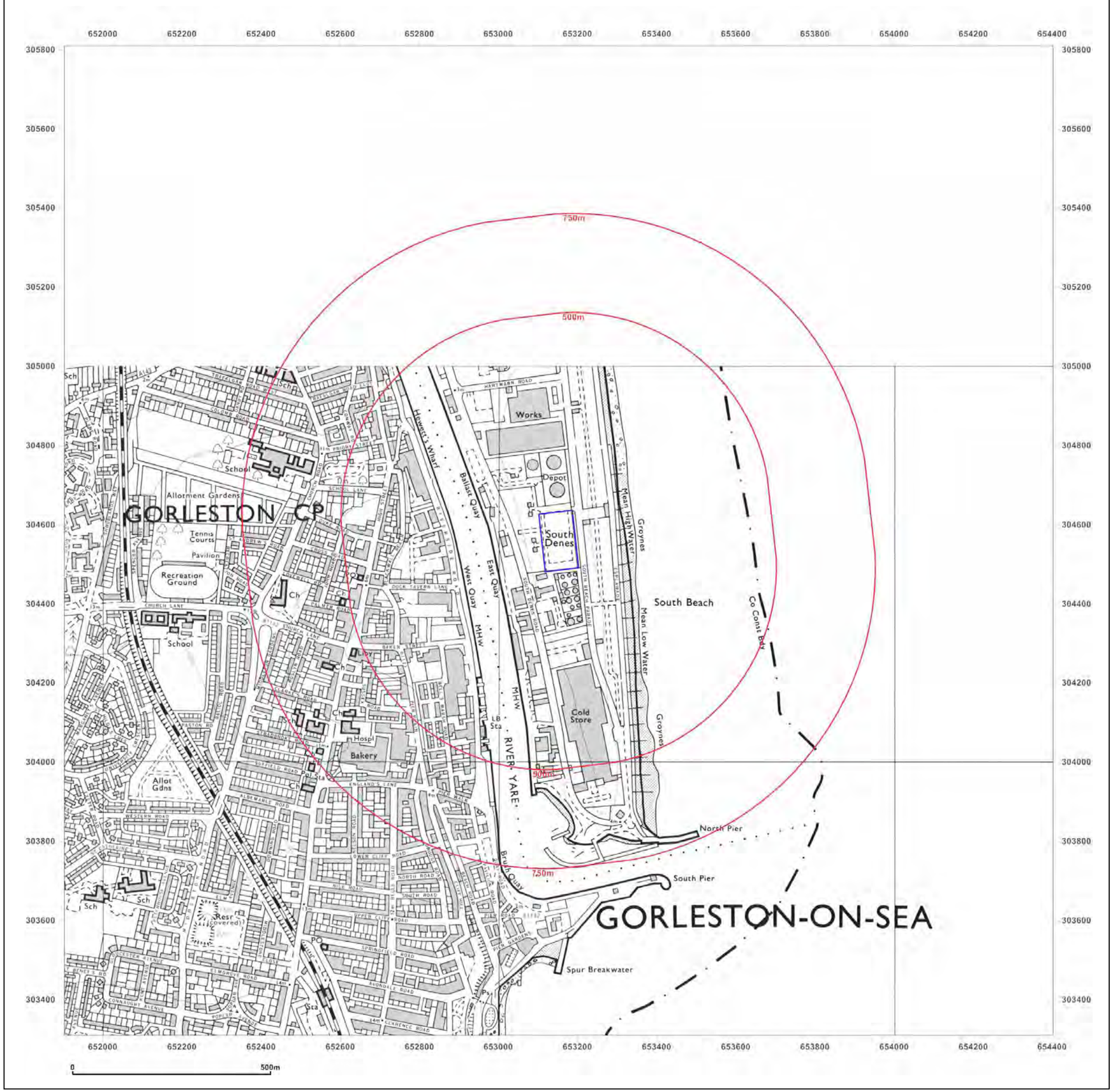

Groundsure INSIGHTS

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid

Map date: **1970**

Scale: 1:10,000

Printed at: 1:10,000

N
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Surveyed 1970
Revised 1970
Edition N/A
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Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid

Map date: **1978-1981**

Scale: 1:10,000

Printed at: 1:10,000

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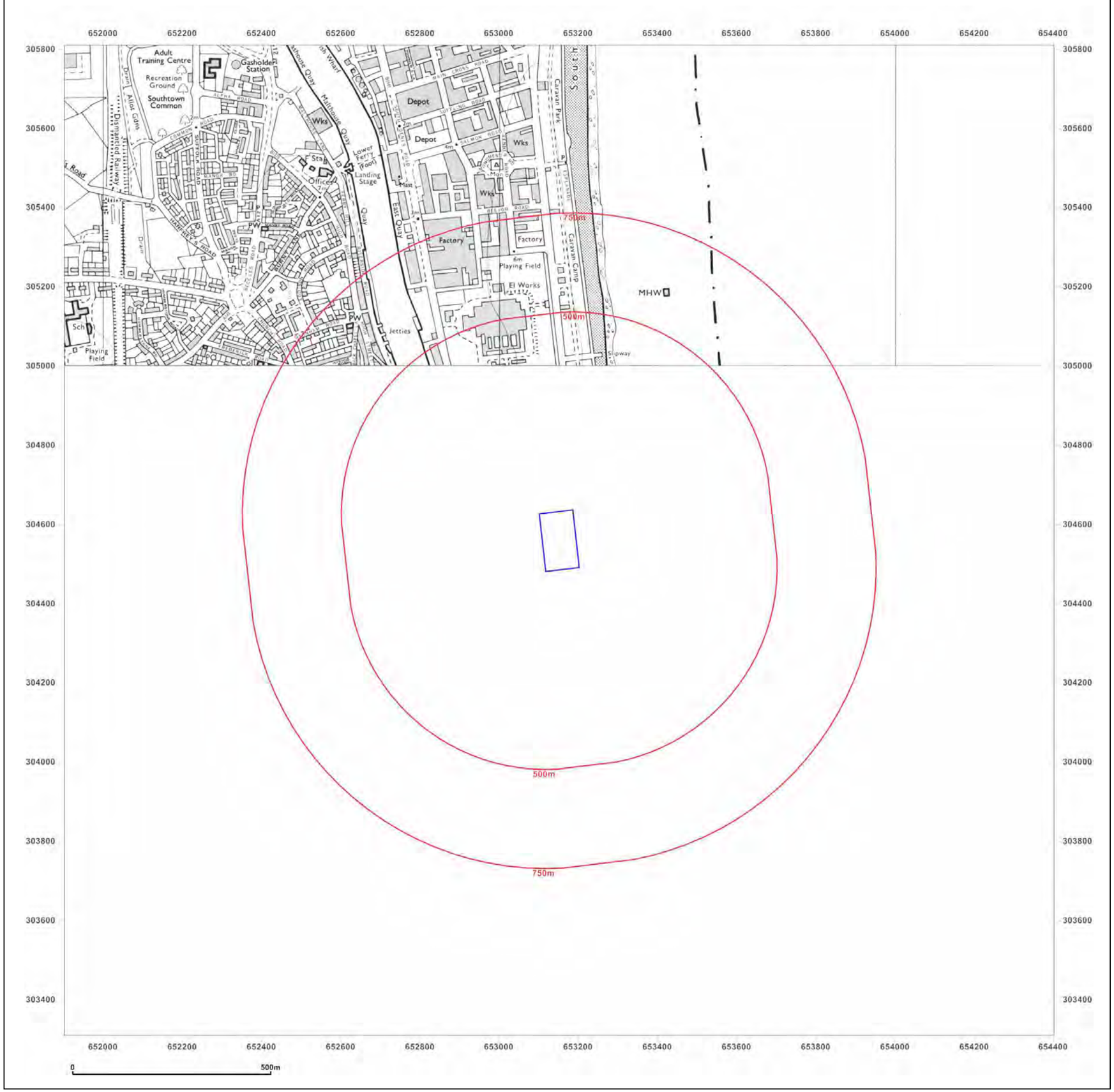

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Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid

Map date: **1988**

Scale: 1:10,000

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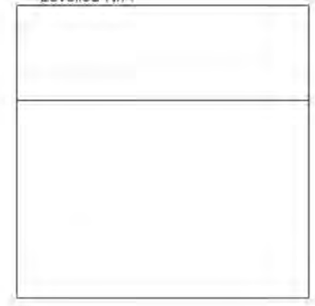

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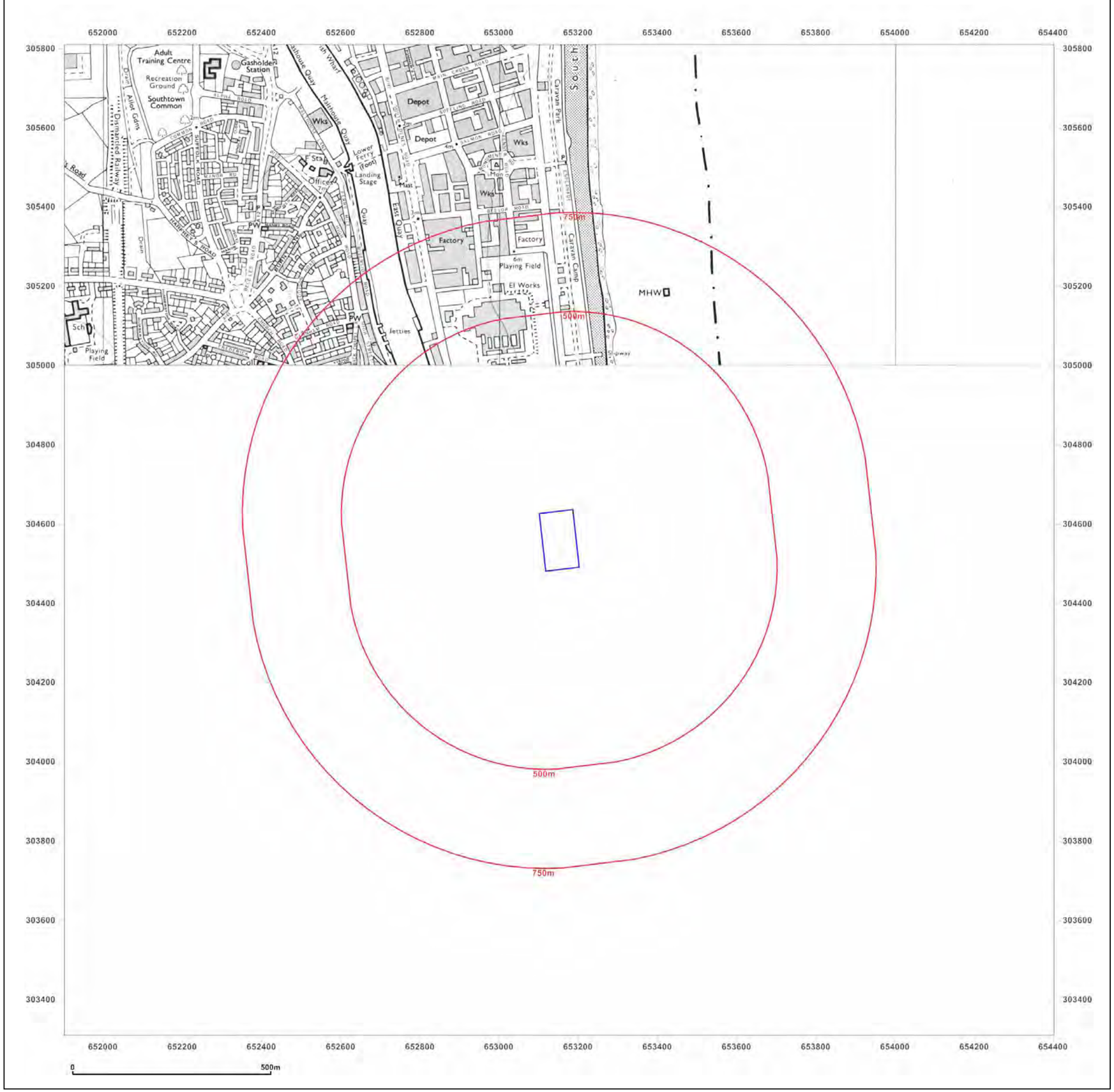

Groundsure INSIGHTS

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid

Map date: **1988**

Scale: 1:10,000

Printed at: 1:10,000

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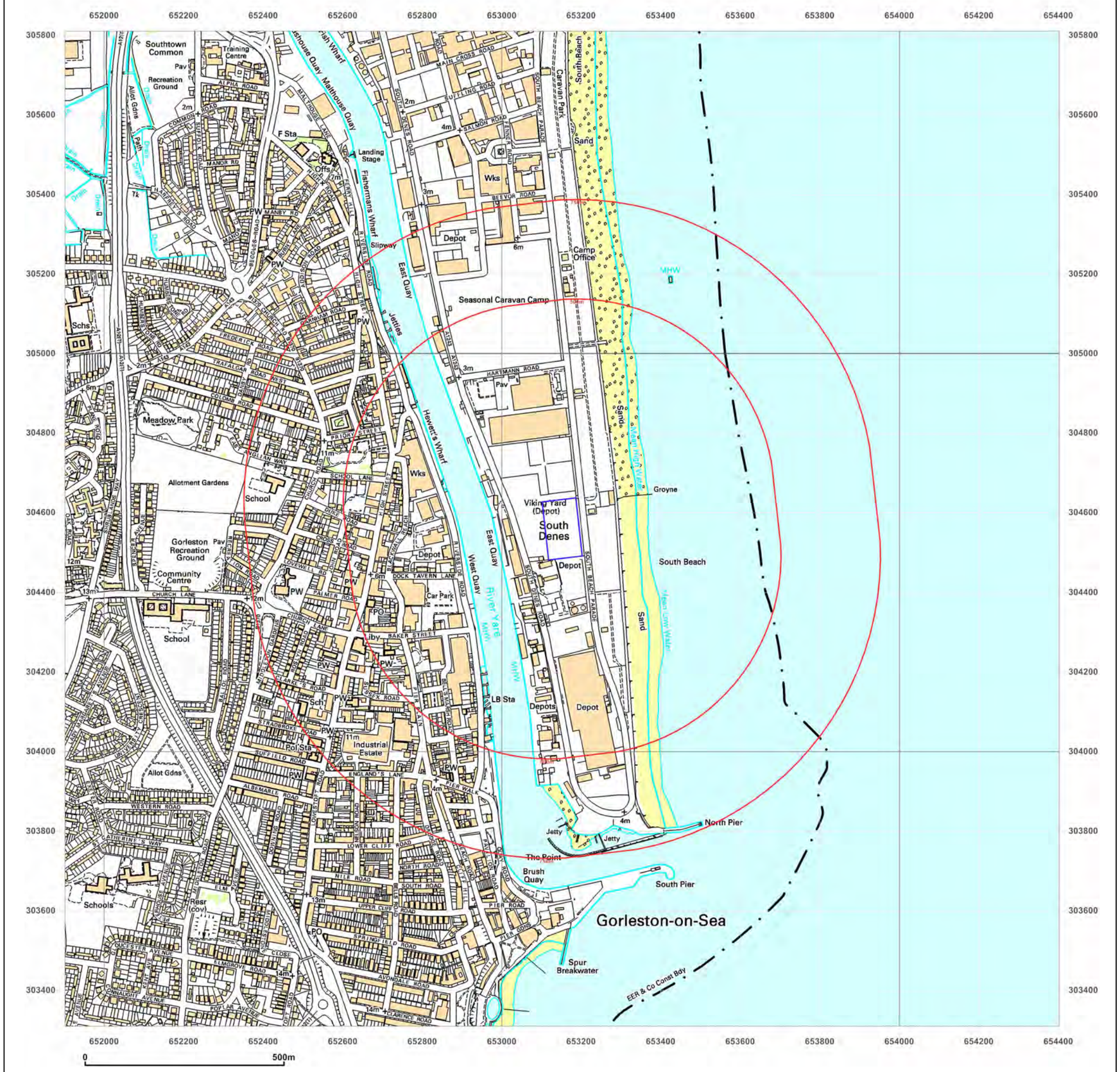

Groundsure INSIGHTS

Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: 1:10,000 Raster
Map date: **2002**
Scale: 1:10,000
Printed at: 1:10,000

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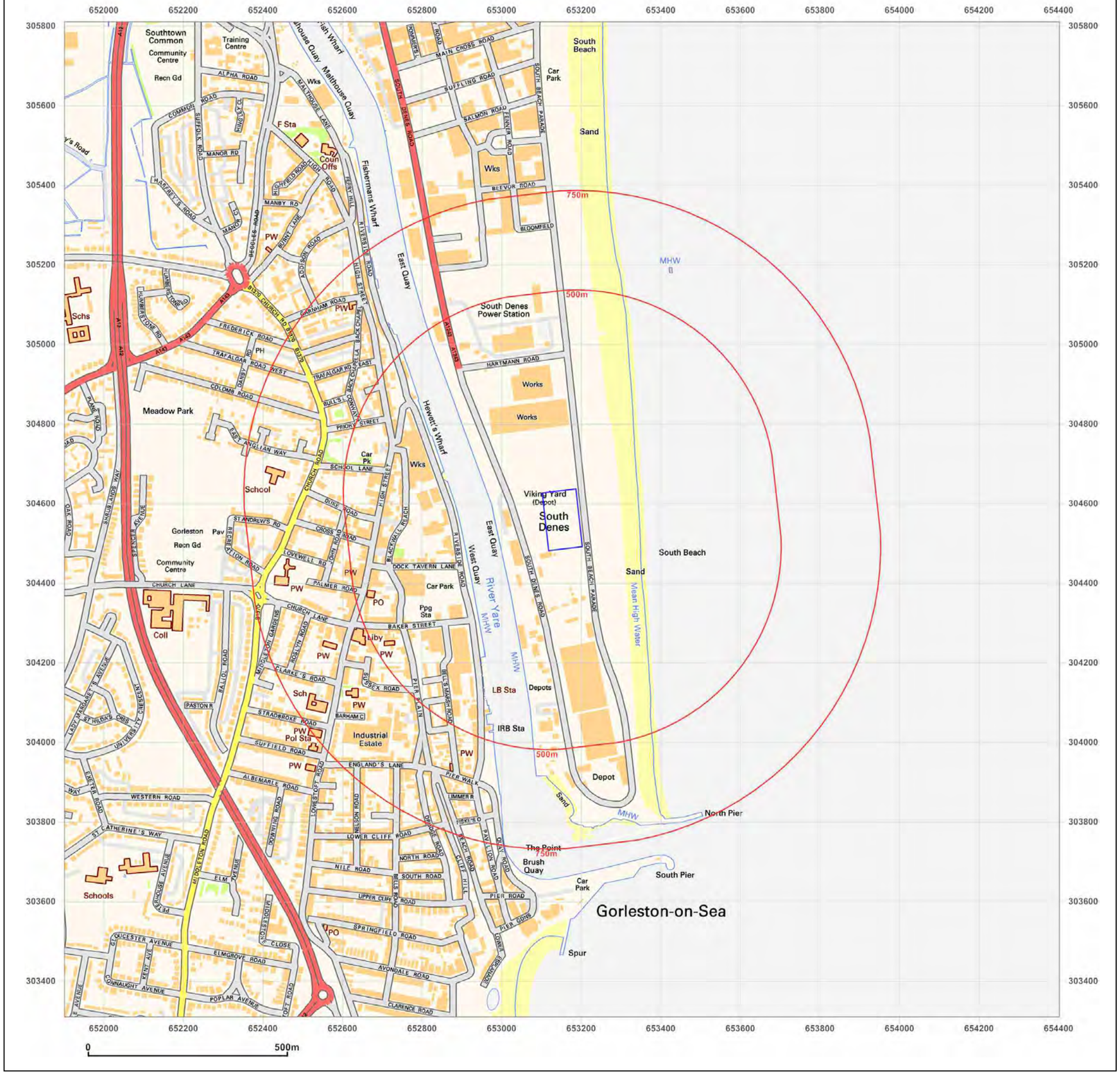

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Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid
Map date: **2010**
Scale: 1:10,000
Printed at: 1:10,000

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Site Details:

GREAT YARMOUTH

Client Ref: 10444
Report Ref: GS-6215234
Grid Ref: 653151, 304560

Map Name: National Grid
Map date: 2014
Scale: 1:10,000
Printed at: 1:10,000

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Appendix D

Groundsure Report

TerraConsult South Limited

9 THE COURTYARDS, WYNCOLLS ROAD,
COLCHESTER, CO4 9PE

Groundsure Reference:	GS-6215232
Your Reference:	10444
Report Date	1 Aug 2019
Report Delivery Method:	Email - pdf

Enviro Insight

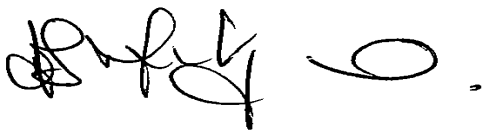
Address: GREAT YARMOUTH,

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Enviro Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Enviroinsight

Enviro Insight

Address:	**GREAT YARMOUTH,**
Date:	**1 Aug 2019**
Reference:	**GS-6215232**
Client:	**TerraConsult South Limited**

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	28-Aug-2017
Grid Reference:	653146,304562
Site Size:	1.2448ha

Report Reference: GS-6215232
Client Reference: 10444

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Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	3	10	61	46
1.2 Additional Information – Historical Tank Database	0	19	60	48
1.3 Additional Information – Historical Energy Features Database	0	0	5	29
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	4	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	0	5
1.6 Historical military sites	0	0	0	0
1.7 Potentially Infilled Land	0	2	31	10

Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	33	1
2.1.3 Records of Red List Discharge Consents	0	0	1	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	0	1
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	0	2	1
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	1	0
2.1.8 Records of Licensed Discharge Consents	0	0	8	8
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	8	1
2.2 Records of COMAH and NIHHS sites	0	1	3	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	2	11
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites	On-site	0-50m	51-250	251-500	501-1000	1000-1500
3.1 Landfill Sites						
3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	0	0	0	0
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	0	0
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	0	0	0	0	0
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	7	0	0	3

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	3	35	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	1
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology	
5.1 Records of Artificial Ground and Made Ground present beneath the study site	Identified
5.2 Records of Superficial Ground and Drift Geology present beneath the study site	Identified
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology	0-500m
6.1 Records of Strata Classification in the Superficial Geology within 500m of the study site	Identified
6.2 Records of Strata Classification in the Bedrock Geology within 500m of the study site	Identified

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	2
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.6 Source Protection Zones (within 500m of the study site)	0	0	0	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	1	0	1	0	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

	0-500m					
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site	No	No	No	No	No	No
6.10 Ordnance Survey MasterMap Water Network entries within 500m of the site	0	0	2	2	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	No	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Enviroment Agency Zone 2 floodplains within 250m of the study site	Identified
7.2 Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	Identified
7.3 Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site	Very Low
7.4 Flood Defences within 250m of the study site	None identified
7.5 Areas benefiting from Flood Defences within 250m of the study site	None identified
7.6 Areas used for Flood Storage within 250m of the study site	None identified
7.7 Maximum BGS Groundwater Flooding susceptibility within 50m of the study site	Limited potential
7.8 BGS confidence rating for the Groundwater Flooding susceptibility areas	Low

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	0
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	1	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	1	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	0	0	0
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	0
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	1	0	0	0	0	0
8.14 Records of Green Belt land	0	0	0	0	0	0

Section 9: Natural Hazards

9.1 Maximum risk of natural ground subsidence	Low
9.1.1 Maximum Shrink-Swell hazard rating identified on the study site	Negligible
9.1.2 Maximum Landslides hazard rating identified on the study site	Very Low
9.1.3 Maximum Soluble Rocks hazard rating identified on the study site	Negligible
9.1.4 Maximum Compressible Ground hazard rating identified on the study site	Very Low
9.1.5 Maximum Collapsible Rocks hazard rating identified on the study site	Negligible
9.1.6 Maximum Running Sand hazard rating identified on the study site	Low
9.2 Radon	
9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary.

Section 10: Mining

10.1 Coal mining areas within 75m of the study site	None identified
10.2 Non-Coal Mining areas within 50m of the study site boundary	None identified
10.3 Brine affected areas within 75m of the study site	None identified

Using this report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between Groundsure and the Client. The document contains the following sections:

1. Historical Industrial Sites

Provides information on past land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. Potentially Infilled Land features are also included. This search is conducted using radii of up to 500m.

2. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

3. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

4. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure gas pipelines and underground electricity transmission lines.

5. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

6. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licences, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

7. Flooding

Provides information on river and coastal flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

8. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites and Scheduled Ancient Woodland. These searches are conducted using radii of up to 2000m.

9. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence and radon..

10. Mining

Provides information on areas of coal and non-coal mining and brine affected areas.

11. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, Groundsure provide a free Technical Helpline (08444 159000) for further information and guidance.

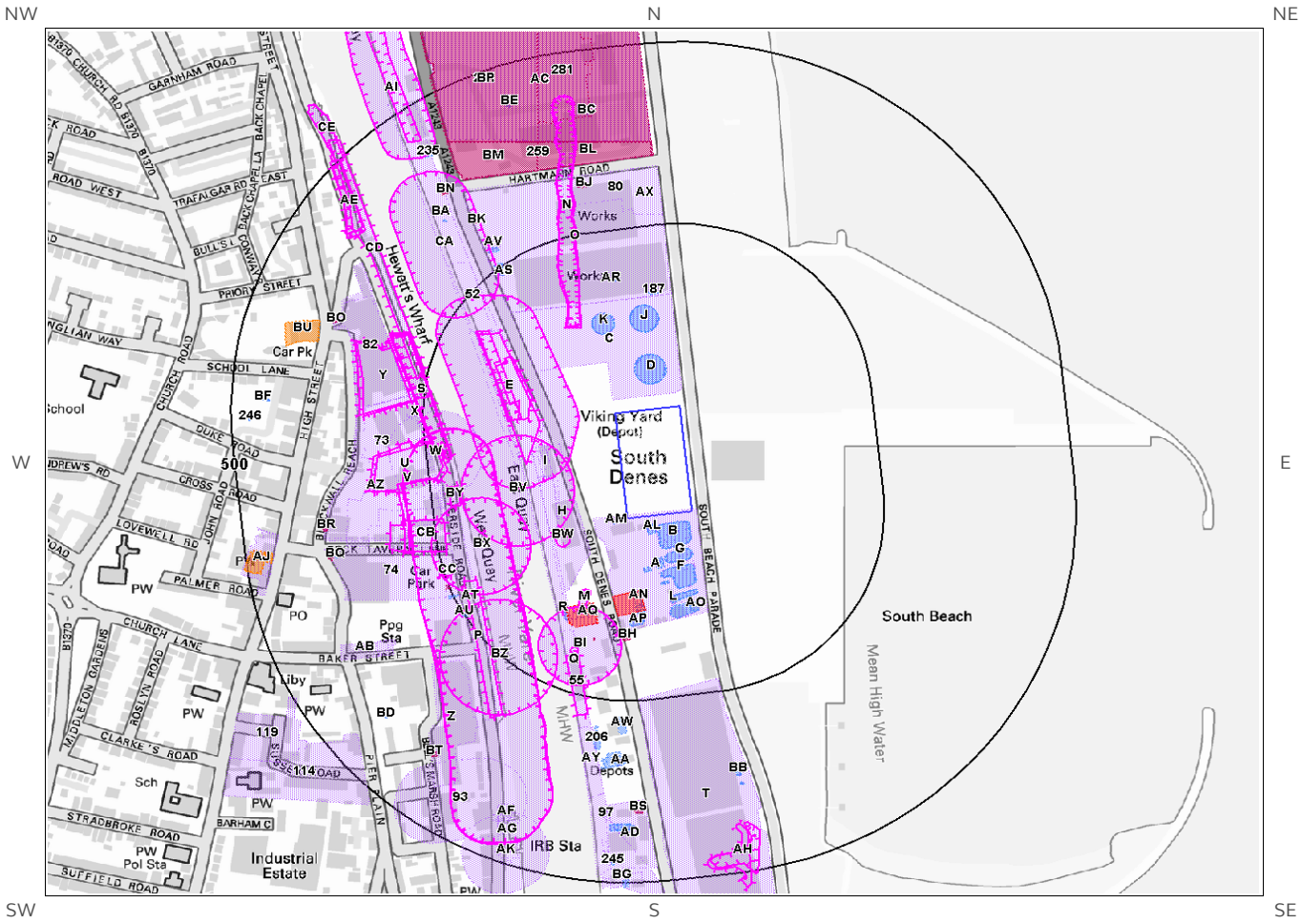
Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier “A” on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as “Not Shown”.

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

1. Historical Land Use



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Site Outline

250
500
Search Buffers (m)

Historical 1:10,000 and 1:10,560 scale mapping

Industrial Land Use

Potentially Infilled Land

Historical 1:2,500, 1:1,250 and 1:500 scale mapping

Energy Features

Petrol Stations

Historical military sites

Tanks

Garages

1. Historical Industrial Sites

1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping

The systematic analysis of data extracted from standard 1:10,560 and 1:10,000 scale historical maps provides the following information:

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 120

ID	Distance [m]	Direction	Use	Date
1A	0	On Site	Unspecified Depot	1952
2A	0	On Site	Unspecified Commercial/Industrial	1970
3A	0	On Site	Unspecified Depot	1981
4B	11	S	Unspecified Tanks	1970
5B	11	S	Unspecified Tanks	1981
6C	18	N	Unspecified Depot	1970
7C	18	N	Unspecified Depot	1981
8B	24	S	Unspecified Tanks	1952
9D	34	N	Unspecified Tank	1970
10D	34	N	Unspecified Tank	1981
11G	47	S	Unspecified Tanks	1952
12E	47	W	Quay	1904
13E	47	W	Quay	1946
14F	51	S	Unspecified Tanks	1981
15F	51	S	Unspecified Tanks	1970
16H	58	W	Unspecified Commercial/Industrial	1938
17BV	64	W	Quay	1981
18G	67	S	Unspecified Tanks	1952
19BW	80	W	Unspecified Pit	1904
20R	85	W	Tramway Sidings	1904
21H	88	W	Railway Sidings	1938
22H	89	W	Railway Sidings	1946
23I	90	W	Railway Buildings	1904
24I	97	W	Unspecified Store	1901
25E	99	W	Quay	1883
26J	106	N	Unspecified Tank	1981
27J	106	N	Unspecified Tank	1970
28E	109	W	Quay	1970
29K	110	N	Unspecified Tank	1981
30K	110	N	Unspecified Tank	1970
31M	110	SW	Unspecified Heap	1904
32L	112	S	Unspecified Tank	1970
33L	112	S	Unspecified Tank	1981

34L	122	S	Unspecified Tanks	1981
35L	122	S	Unspecified Tanks	1970
36E	122	W	Quay	1938
37E	122	W	Quay	1938
38N	125	N	Sand Pit	1938
39M	127	S	Unspecified Tanks	1946
40N	128	N	Sand Pit	1946
41M	128	S	Oil Tanks	1938
42BX	129	W	Quay	1981
43E	129	W	Unspecified Quay	1901
44BI	132	S	Quay	1904
45O	154	N	Unspecified Works	1970
46O	154	N	Unspecified Works	1981
47P	157	W	Quay	1904
48P	159	W	Quay	1946
49Q	167	SW	Unspecified Shed	1952
50W	179	W	Smithy	1883
51Q	189	S	Quay	1883
52	189	NW	Railway Sidings	1904
53BA	196	NW	Unspecified Quay	1901
54R	198	S	Quay	1938
55	198	S	Quay	1938
56BY	213	W	Unspecified Wharf	1883
57AT	214	W	Unspecified Quay	1901
58P	214	SW	Quay	1938
59P	214	SW	Quay	1938
60S	217	W	Unspecified Wharf	1938
61S	217	W	Unspecified Wharf	1938
62S	218	W	Unspecified Wharf	1946
63S	218	W	Unspecified Wharf	1904
64CA	224	NW	Quay	1884
65V	225	W	Graving Dock	1883
66U	231	W	Graving Dock	1901
67T	232	S	Cold Store	1970
68T	232	S	Cold Store	1981
69U	234	W	Unspecified Works	1952
70V	238	W	Unspecified Works	1981
71CB	238	W	Unspecified Wharf	1901
72CC	239	W	Quay	1883
73	239	W	Unspecified Commercial/Industrial	1970
74	241	W	Unspecified Works	1981
75W	253	W	Smithy	1901
76CD	256	W	Unspecified Wharf	1981
77X	256	W	Smithy	1883
78Y	261	W	Unspecified Wharf	1883

79X	261	W	Smithy	1901
80	264	N	Unspecified Works	1952
81Y	267	W	Unspecified Wharf	1901
82	267	W	Unspecified Works	1981
83AV	273	NW	Unspecified Tanks	1981
84AY	290	S	Unspecified Shed	1952
85Z	294	SW	Unspecified Commercial/Industrial	1981
86Z	294	SW	Unspecified Commercial/Industrial	1970
87AA	332	S	Unspecified Tanks	1938
88AA	333	S	Unspecified Tanks	1946
89AB	345	SW	Malthouse	1883
90AB	349	SW	Malthouse	1901
91AC	366	N	Electric Works	1988
92AC	366	N	Electric Works	1978
93	373	SW	Rope Walk	1883
94AD	386	S	Unspecified Commercial/Industrial	1981
95AD	386	S	Unspecified Factory	1952
96AD	386	S	Unspecified Commercial/Industrial	1970
97	402	S	Railway Building	1904
98AE	412	NW	Unspecified Wharf	1884
99AE	416	NW	Unspecified Wharf	1901
100AG	419	S	Lifeboat Stations	1938
101AF	421	S	Lifeboat Station	1981
102AF	421	S	Lifeboat Station	1970
103AG	425	S	Lifeboat Stations	1946
104AF	425	S	Lifeboat Stations	1904
105AK	430	S	Lifeboat Station	1883
106AI	431	NW	Quay	1946
107AH	433	S	Unspecified Pit	1904
108AH	433	S	Unspecified Pit	1901
109AF	434	S	Lifeboat Station	1901
110AF	437	S	Lifeboat Station	1883
111AD	442	S	Railway Building	1904
112AI	451	NW	Quay	1952
113AJ	453	W	Brewery	1883
114	459	SW	Nursery	1904
115AJ	469	W	Brewery	1901
116AK	474	S	Lifeboat Station	1901
117BG	481	S	Unspecified Depots	1981
118AK	493	S	Boat House	1904
119	497	SW	Nursery	1904
120CE	497	NW	Unspecified Wharf	1884

1.2 Additional Information – Historical Tank Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical tanks within 500m of the search boundary: 127

ID	Distance (m)	Direction	Use	Date
121AL	10	S	Tanks	1966
122AL	11	S	Unspecified Tank	1989
123AL	11	S	Tanks	1965
124AL	11	S	Tanks	1970
125AL	12	S	Tanks	1966
126AL	13	S	Tanks	1965
127AL	13	S	Tanks	1970
128AL	13	S	Tanks	1989
129AM	16	W	Unspecified Tank	1966
130AM	16	W	Unspecified Tank	1965
131AM	16	W	Unspecified Tank	1970
132AM	17	W	Unspecified Tank	1989
133D	34	N	Unspecified Tank	1965
134D	34	N	Unspecified Tank	1966
135D	36	N	Unspecified Tank	1990
136F	49	S	Tanks	1966
137F	50	S	Tanks	1970
138F	50	S	Tanks	1965
139F	50	S	Tanks	1989
140A	58	S	Tanks	1966
141A	59	S	Tanks	1970
142A	59	S	Tanks	1965
143A	59	S	Tanks	1989
144A	68	S	Tanks	1966
145A	69	S	Tanks	1970
146A	69	S	Tanks	1965
147F	72	S	Tanks	1966
148F	72	S	Tanks	1965
149F	72	S	Tanks	1970
150F	72	S	Tanks	1989
151F	91	S	Unspecified Tank	1966
152F	91	S	Unspecified Tank	1989
153F	91	S	Unspecified Tank	1965
154F	91	S	Unspecified Tank	1970
155AN	101	S	Tanks	1949
156AN	101	S	Tanks	1966
157AN	102	S	Tanks	1949

158AN	102	S	Tanks	1965
159AN	102	S	Tanks	1970
160J	106	N	Unspecified Tank	1965
161J	106	N	Unspecified Tank	1966
162L	107	S	Tanks	1966
163L	107	S	Tanks	1970
164L	107	S	Tanks	1965
165J	107	N	Unspecified Tank	1990
166L	107	S	Tanks	1989
167K	109	N	Unspecified Tank	1965
168K	110	N	Unspecified Tank	1990
169K	110	N	Unspecified Tank	1966
170AN	119	S	Tanks	1966
171AN	120	S	Tanks	1989
172AO	123	S	Unspecified Tank	1966
173L	124	S	Tanks	1989
174AO	124	S	Unspecified Tank	1965
175L	124	S	Tanks	1970
176M	124	S	Tanks	1949
177M	125	S	Tanks	1949
178AN	127	S	Tanks	1966
179M	129	SW	Oil Tanks	1927
180M	137	SW	Oil Tanks	1927
181AQ	138	S	Oil Tanks	1927
182AP	139	S	Tanks	1966
183AP	140	S	Tanks	1970
184AP	140	S	Tanks	1965
185AP	140	S	Unspecified Tank	1989
186AQ	146	SW	Oil Tanks	1927
187	156	N	Tanks	1990
188AR	179	N	Tanks	1965
189AR	180	N	Tanks	1966
190AR	180	N	Tanks	1965
191AR	180	N	Tanks	1966
192AS	239	NW	Tanks	1974
193AS	239	NW	Tanks	1990
194AS	242	NW	Tanks	1965
195AS	242	NW	Tanks	1974
196AS	242	NW	Tanks	1966
197AT	244	SW	Tanks	1953
198AU	246	SW	Tanks	1953
199AU	249	SW	Tanks	1949
200AU	251	SW	Unspecified Tank	1949
201AV	269	NW	Tanks	1990
202AW	272	S	Tanks	1989
203AW	287	S	Unspecified Tank	1989

204AX	291	N	Unspecified Tank	1949
205AX	292	N	Unspecified Tank	1949
206	293	S	Tanks	1989
207AY	320	S	Tanks	1989
208AZ	320	W	Unspecified Tank	1949
209AZ	320	W	Unspecified Tank	1949
210AA	325	S	Tanks	1989
211AA	330	S	Tanks	1927
212AA	331	S	Tanks	1989
213AA	336	S	Tanks	1989
214BA	343	NW	Unspecified Tank	1974
215BB	357	S	Tanks	1989
216BB	358	S	Tanks	1970
217BB	377	S	Unspecified Tank	1989
218BB	378	S	Unspecified Tank	1970
219BQ	380	W	Tanks	1927
220BC	411	N	Unspecified Tank	1968
221BC	412	N	Unspecified Tank	1968
222BC	412	N	Unspecified Tank	1990
223BD	412	SW	Unspecified Tank	1949
224BD	412	SW	Unspecified Tank	1953
225BD	413	SW	Unspecified Tank	1949
226AD	418	S	Tanks	1955
227AD	419	S	Tanks	1970
228AD	419	S	Tanks	1989
229AD	419	S	Tanks	1965
230AD	419	S	Tanks	1966
231AD	420	S	Tanks	1970
232AD	420	S	Tanks	1989
233AD	421	S	Tanks	1966
234AD	422	S	Unspecified Tank	1955
235	426	NW	Tanks	1990
236BE	442	N	Tanks	1976
237BE	442	N	Tanks	1967
238BE	442	N	Tanks	1968
239BE	443	N	Tanks	1990
240BF	451	W	Tanks	1957
241BF	451	W	Tanks	1949
242BF	451	W	Tanks	1966
243BF	451	W	Tanks	1949
244BF	451	W	Tanks	1965
245	469	S	Tanks	1970
246	474	W	Unspecified Tank	1990
247BG	495	S	Tanks	1970

1.3 Additional Information – Historical Energy Features Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical energy features within 500m of the search boundary: 34

ID	Distance (m)	Direction	Use	Date
248BH	158	S	Electricity Substation	1970
249BH	158	S	Electricity Substation	1955
250BH	158	S	Electricity Substation	1989
251BI	169	S	Electricity Substation	1989
252AT	249	W	Electricity Substation	1971
253BJ	313	N	Electricity Substation	1949
254BJ	314	N	Electricity Substation	1949
255BK	316	NW	Electricity Substation	1949
256BK	317	NW	Electricity Substation	1949
257BL	344	N	Electricity Works	1990
258BL	344	N	Electricity Works	1965
259	345	N	Electricity Works	1966
260BM	348	N	Electricity Works	1990
261BM	349	N	Electricity Works	1974
262AC	365	N	Electricity Works	1968
263BN	373	NW	Electricity Substation	1974
264BN	373	NW	Electricity Substation	1990
265BO	382	W	Electricity Substation	1974
266BO	384	W	Electricity Substation	1990
267BP	386	N	Electricity Works	1967
268BP	386	N	Electricity Works	1976
269BQ	386	W	Electricity Substation	1988
270BQ	386	W	Electricity Substation	1988
271	386	N	Electricity Works	1990
272BR	388	W	Electricity Substation	1971
273BR	389	W	Electricity Substation	1988
274BR	389	W	Electricity Substation	1988
275BS	395	S	Electricity Substation	1989
276BS	396	S	Electricity Substation	1970
277BS	396	S	Electricity Substation	1955
278BT	406	SW	Electricity Substation	1971
279BT	407	SW	Electricity Substation	1988
280BT	407	SW	Electricity Substation	1988
281	407	N	Electricity Works	1968

1.4 Additional Information – Historical Petrol and Fuel Site Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical petrol stations and fuel sites within 500m of the search boundary: 4

ID	Distance (m)	Direction	Use	Date
282AN	99	S	Petrol Storage Depot	1949
283AN	100	S	Petrol Storage Depot	1949
284AQ	123	S	Petrol Storage Depot	1949
285AQ	123	S	Petrol Storage Depot	1949

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 5

ID	Distance (m)	Direction	Use	Date
286BU	398	W	Garage	1974
287BU	400	W	Garage	1990
288AJ	464	W	Garage	1966
289AJ	464	W	Garage	1966
290AJ	474	W	Garage	1953

1.6 Historical military sites

Certain military installations were not noted on historic mapping for security reasons. Whilst not all military land is necessarily of concern, Groundsure has researched and digitised a number of Ordnance Factories and other military industrial features (e.g. Ordnance Depots, Munitions Testing Grounds) which may be of contaminative concern. This research was drawn from a number of different sources, and should not be regarded as a definitive or exhaustive database of potentially contaminative military installations. The boundaries of sites within this database have been estimated from the best evidence available to Groundsure at the time of compilation.

Records of historical military sites within 500m of the search boundary: 0

Database searched and no data found.

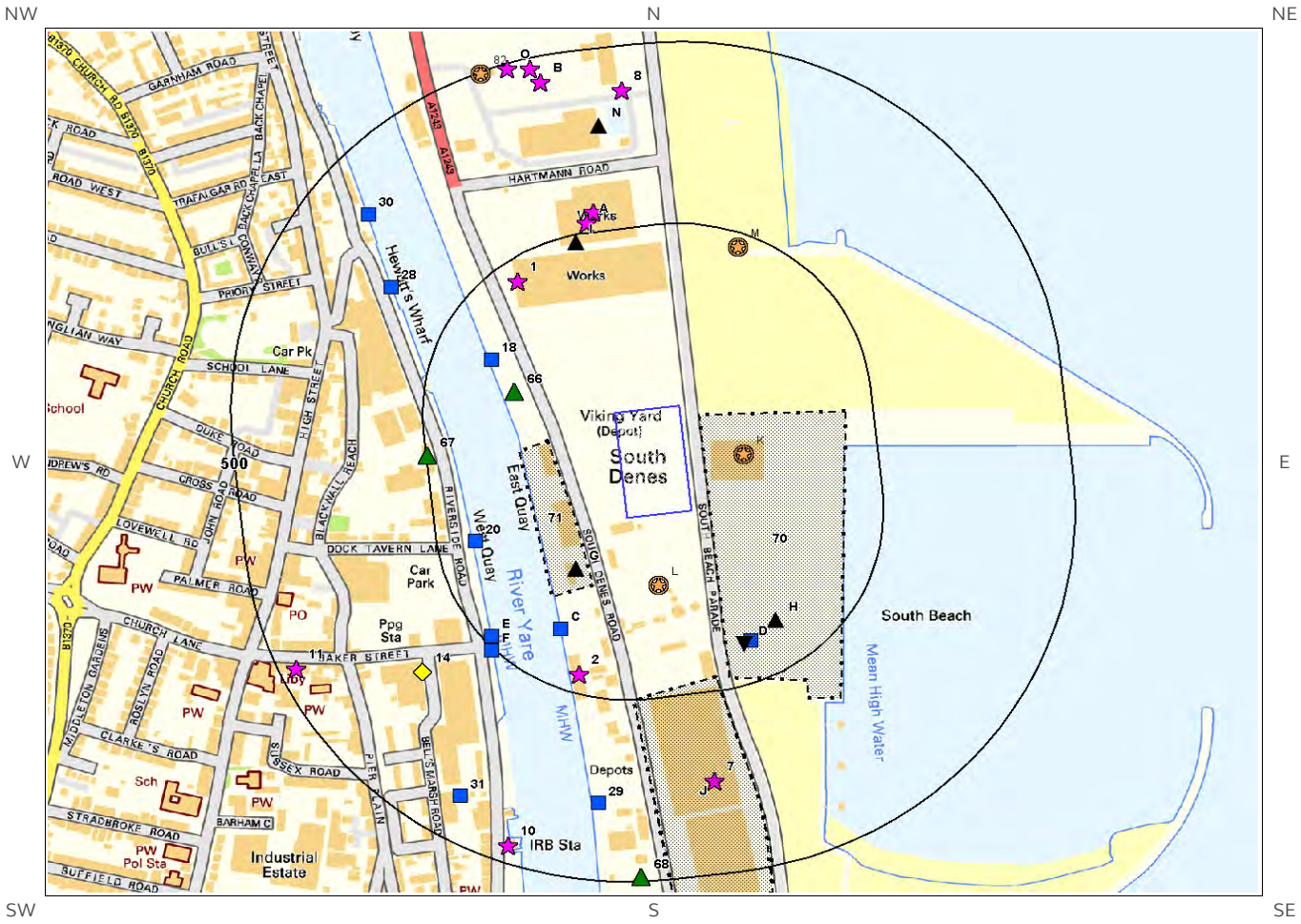
1.7 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 43

The following Historical Potentially Infilled Features derived from the Historical Mapping information is provided by Groundsure:

ID	Distance(m)	Direction	Use	Date
291E	47	W	Quay	1904
292E	47	W	Quay	1946
293BV	64	W	Quay	1952
294BV	64	W	Quay	1970
295BW	80	W	Unspecified Pit	1904
296E	99	W	Quay	1883
297E	109	W	Quay	1970
298M	110	SW	Unspecified Heap	1904
299E	122	W	Quay	1938
300E	122	W	Quay	1938
301N	125	N	Sand Pit	1938
302N	128	N	Sand Pit	1946
303BX	129	W	Quay	1981
304BX	129	W	Quay	1970
305BI	132	S	Quay	1904
306P	157	W	Quay	1904
307P	159	W	Quay	1946
308BZ	176	SW	Quay	1952
309BI	189	S	Quay	1883
310R	198	S	Quay	1938
311R	198	S	Quay	1938
312BY	213	W	Unspecified Wharf	1883
313BZ	214	SW	Quay	1938
314P	214	SW	Quay	1938
315S	217	W	Unspecified Wharf	1938
316S	217	W	Unspecified Wharf	1938
317S	218	W	Unspecified Wharf	1946
318S	218	W	Unspecified Wharf	1904
319CA	224	NW	Quay	1884
320V	225	W	Graving Dock	1883
321U	231	W	Graving Dock	1901
322CB	238	W	Unspecified Wharf	1901
323CC	239	W	Quay	1883
324CD	256	W	Unspecified Wharf	1981
325Y	261	W	Unspecified Wharf	1883
326Y	267	W	Unspecified Wharf	1901
327AE	412	NW	Unspecified Wharf	1884
328AE	416	NW	Unspecified Wharf	1901
329AI	431	NW	Quay	1946
330AH	433	S	Unspecified Pit	1904
331AH	433	S	Unspecified Pit	1901
332AI	451	NW	Quay	1952
333CE	497	NW	Unspecified Wharf	1884

2. Environmental Permits, Incidents and Registers Map



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- Site Outline
- Search Buffers (m) — 250 — 500
- Recorded Pollution Incident
- Dangerous Substances (List 1)
- Dangerous Substances (List 2)
- Water Industry Referrals
- Licenced Discharge Consents
- Red List Discharge Consents
- RAS 3 & 4 Authorisations
- Part A(1) Authorised Processes and Historic IPC Authorisations
- Part A(2) and Part B Authorised Processes
- COMAH / NIHHS Sites
- Sites Determined as Contaminated Land
- Hazardous Substance Consents and Enforcements

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency/Natural Resources Wales and Local Authorities reveal the following information:

2.1.1 Records of historic IPC Authorisations within 500m of the study site:

0

Database searched and no data found.

2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:

34

The following Part A(1) and IPPC Authorised Activities are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
83G	99	SW	653050 304410	Operator: ASCO UK LIMITED Installation Name: ASCO ENVIRONMENTAL SERVICES Process: WASTE LANDFILLING; >10 T/D WITH CAPACITY >25,000T EXCLUDING INERT WASTE	Permit Number: VP3136SZ Original Permit Number: VP3136SZ EPR Reference: - Issue Date: 15/05/2006 Effective Date: 15/05/2006 Last date noted as effective: 2007-04-02 Status: EFFECTIVE
84G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WM CENTRE EPR/PP3532UT Process: OTHER WASTE DISPOSAL; WASTE OILS >10 T/D	Permit Number: PP3532UT Original Permit Number: PP3532UT EPR Reference: EA/EPR/PP3532UT/V002 Issue Date: 04/10/2007 Effective Date: 04/10/2007 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
85G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WM CENTRE EPR/PP3532UT Process: TEMPORARY STORAGE OF HAZ WASTE NOT UNDER S 5.2 PENDING ACTIVITIES LISTED IN S 5.1, 5.2, 5.3 AND PARAGRAPH (B) OF THIS SECTION WITH A TOTAL CAPACITY > 50 TONNES, EXCL TEMP STORAGE WHERE GENERATED	Permit Number: QP3239ZQ Original Permit Number: PP3532UT EPR Reference: - Issue Date: 16/05/2013 Effective Date: 16/05/2013 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
86G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH	Permit Number: MP3536RF Original Permit Number: PP3532UT

ID	Distance (m)	Direction	NGR	Details	
				TECHNICAL WASTE MANAGEMENT CENTRE Process: DISPOSAL OR RECOVERY OF HAZARDOUS WASTE WITH A CAPACITY EXCEEDING 10 TONNES PER DAY INVOLVING PHYSICO-CHEMICAL TREATMENT	EPR Reference: - Issue Date: 25/01/2016 Effective Date: 25/01/2016 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
87G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WASTE MANAGEMENT CENTRE Process: OTHER WASTE DISPOSAL; NON-HAZARDOUS WASTE >50T/D BY PHYSICO-CHEMICAL TREATMENT	Permit Number: QP3239ZQ Original Permit Number: PP3532UT EPR Reference: - Issue Date: - Effective Date: - Last date noted as effective: 2013-04-01 Status: DETERMINATION
88G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WM CENTRE EPR/PP3532UT Process: OTHER WASTE DISPOSAL; NON-HAZARDOUS WASTE >50T/D BY PHYSICO-CHEMICAL TREATMENT	Permit Number: PP3430KW Original Permit Number: PP3532UT EPR Reference: - Issue Date: 26/08/2009 Effective Date: 26/08/2009 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
89G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WM CENTRE EPR/PP3532UT Process: OTHER WASTE DISPOSAL; HAZARDOUS WASTE >10T/D	Permit Number: PP3430KW Original Permit Number: PP3532UT EPR Reference: - Issue Date: 26/08/2009 Effective Date: 26/08/2009 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
90G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WASTE MANAGEMENT CENTRE Process: DISPOSAL OR RECOVERY OF HAZ WASTE WITH CAPACITY EXCEEDING 10 TONNES PER DAY INVOLVING REPACKAGING PRIOR TO SUBMISSION TO ANY OF THE OTHER ACTIVITIES LISTED IN THIS SECTION OR IN SECTION 5.1	Permit Number: MP3536RF Original Permit Number: PP3532UT EPR Reference: - Issue Date: 25/01/2016 Effective Date: 25/01/2016 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
91G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WM CENTRE EPR/PP3532UT Process: OTHER WASTE DISPOSAL; HAZARDOUS WASTE >10T/D	Permit Number: KP3430GK Original Permit Number: PP3532UT EPR Reference: - Issue Date: 16/01/2009 Effective Date: 19/01/2009 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
92G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WM CENTRE EPR/PP3532UT Process: OTHER WASTE DISPOSAL; WASTE OILS >10 T/D	Permit Number: PP3430KW Original Permit Number: PP3532UT EPR Reference: - Issue Date: 26/08/2009 Effective Date: 26/08/2009 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
93G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WM CENTRE EPR/PP3532UT Process: OTHER WASTE DISPOSAL; NON-HAZARDOUS WASTE >50T/D BY PHYSICO-CHEMICAL TREATMENT	Permit Number: KP3430GK Original Permit Number: PP3532UT EPR Reference: - Issue Date: 16/01/2009 Effective Date: 19/01/2009 Last date noted as effective: 2019-04-30

ID	Distance (m)	Direction	NGR	Details	
					Status: SUPERCEDED
94G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WASTE MANAGEMENT CENTRE Process: CREATED BY IED - DISPOSAL OR RECOVERY OF HAZARDOUS WASTE WITH A CAPACITY EXCEEDING 10 TONNES PER DAY INVOLVING PHYSICO-CHEMICAL TREATMENT	Permit Number: QP3239ZQ Original Permit Number: PP3532UT EPR Reference: - Issue Date: 16/05/2013 Effective Date: 16/05/2013 Last date noted as effective: 2013-07-01 Status: EFFECTIVE
95G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WASTE MANAGEMENT CENTRE Process: TEMPORARY STORAGE OF HAZ WASTE NOT UNDER S 5.2 PENDING ACTIVITIES LISTED IN S 5.1, 5.2, 5.3 AND PARAGRAPH (B) OF THIS SECTION WITH A TOTAL CAPACITY > 50 TONNES, EXCL TEMP STORAGE WHERE GENERATED	Permit Number: MP3536RF Original Permit Number: PP3532UT EPR Reference: - Issue Date: 25/01/2016 Effective Date: 25/01/2016 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
96G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WM CENTRE EPR/PP3532UT Process: DISPOSAL OR RECOVERY OF HAZARDOUS WASTE WITH A CAPACITY EXCEEDING 10 TONNES PER DAY INVOLVING PHYSICO-CHEMICAL TREATMENT	Permit Number: QP3239ZQ Original Permit Number: PP3532UT EPR Reference: - Issue Date: 16/05/2013 Effective Date: 16/05/2013 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
97G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WM CENTRE EPR/PP3532UT Process: OTHER WASTE DISPOSAL; NON-HAZARDOUS WASTE >50T/D BY PHYSICO-CHEMICAL TREATMENT	Permit Number: PP3532UT Original Permit Number: PP3532UT EPR Reference: EA/EPR/PP3532UT/V002 Issue Date: 04/10/2007 Effective Date: 04/10/2007 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
98G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WASTE MANAGEMENT CENTRE Process: OTHER WASTE DISPOSAL; WASTE OILS >10 T/D	Permit Number: QP3239ZQ Original Permit Number: PP3532UT EPR Reference: - Issue Date: - Effective Date: - Last date noted as effective: 2013-04-01 Status: DETERMINATION
99G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WASTE MANAGEMENT CENTRE Process: OTHER WASTE DISPOSAL; HAZARDOUS WASTE >10T/D	Permit Number: QP3239ZQ Original Permit Number: PP3532UT EPR Reference: - Issue Date: - Effective Date: - Last date noted as effective: 2013-04-01 Status: DETERMINATION
100G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WM CENTRE EPR/PP3532UT Process: OTHER WASTE DISPOSAL; WASTE OILS >10 T/D	Permit Number: KP3430GK Original Permit Number: PP3532UT EPR Reference: - Issue Date: 16/01/2009 Effective Date: 19/01/2009 Last date noted as effective: 2019-04-30 Status: SUPERCEDED

ID	Distance (m)	Direction	NGR	Details	
101G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WM CENTRE EPR/PP3532UT Process: DISPOSAL OR RECOVERY OF HAZ WASTE WITH CAPACITY EXCEEDING 10 TONNES PER DAY INVOLVING REPACKAGING PRIOR TO SUBMISSION TO ANY OF THE OTHER ACTIVITIES LISTED IN THIS SECTION OR IN SECTION 5.1	Permit Number: QP3239ZQ Original Permit Number: PP3532UT EPR Reference: - Issue Date: 16/05/2013 Effective Date: 16/05/2013 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
102G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WM CENTRE EPR/PP3532UT Process: OTHER WASTE DISPOSAL; HAZARDOUS WASTE >10T/D	Permit Number: PP3532UT Original Permit Number: PP3532UT EPR Reference: EA/EPR/PP3532UT/V002 Issue Date: 04/10/2007 Effective Date: 04/10/2007 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
103G	99	SW	653050 304410	Operator: ASCO UK LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WASTE MANAGEMENT CENTRE - EPR/GP3630YS Process: DISPOSAL OR RECOVERY OF HAZ WASTE WITH CAPACITY EXCEEDING 10 TONNES PER DAY INVOLVING REPACKAGING PRIOR TO SUBMISSION TO ANY OF THE OTHER ACTIVITIES LISTED IN THIS SECTION OR IN SECTION 5.1	Permit Number: GP3630YS Original Permit Number: GP3630YS EPR Reference: - Issue Date: 11/01/2017 Effective Date: 11/01/2017 Last date noted as effective: 2019-04-30 Status: TRANSFER EFFECTIVE
104G	99	SW	653050 304410	Operator: ASCO UK LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WASTE MANAGEMENT CENTRE - EPR/GP3630YS Process: TEMPORARY STORAGE OF HAZ WASTE NOT UNDER S 5.2 PENDING ACTIVITIES LISTED IN S 5.1, 5.2, 5.3 AND PARAGRAPH (B) OF THIS SECTION WITH A TOTAL CAPACITY > 50 TONNES, EXCL TEMP STORAGE WHERE GENERATED	Permit Number: GP3630YS Original Permit Number: GP3630YS EPR Reference: - Issue Date: 11/01/2017 Effective Date: 11/01/2017 Last date noted as effective: 2019-04-30 Status: TRANSFER EFFECTIVE
105G	99	SW	653050 304410	Operator: ASCO UK LIMITED Installation Name: ASCO ENVIRONMENTAL SERVICES Process: OTHER WASTE DISPOSAL; NON-HAZARDOUS WASTE >50T/D BY PHYSICO-CHEMICAL TREATMENT	Permit Number: VP3136SZ Original Permit Number: VP3136SZ EPR Reference: - Issue Date: 15/05/2006 Effective Date: 15/05/2006 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
106G	99	SW	653050 304410	Operator: ASCO UK LIMITED Installation Name: ASCO ENVIRONMENTAL SERVICES Process: OTHER WASTE DISPOSAL; WASTE OILS >10 T/D	Permit Number: VP3136SZ Original Permit Number: VP3136SZ EPR Reference: - Issue Date: 15/05/2006 Effective Date: 15/05/2006 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
107G	99	SW	653050 304410	Operator: ASCO UK LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WASTE MANAGEMENT CENTRE - EPR/GP3630YS Process: DISPOSAL OR RECOVERY OF HAZARDOUS WASTE WITH A CAPACITY EXCEEDING 10 TONNES	Permit Number: GP3630YS Original Permit Number: GP3630YS EPR Reference: - Issue Date: 11/01/2017 Effective Date: 11/01/2017 Last date noted as effective: 2019-04-30

ID	Distance (m)	Direction	NGR	Details	
				PER DAY INVOLVING PHYSICO-CHEMICAL TREATMENT	Status: TRANSFER EFFECTIVE
108G	99	SW	653050 304410	Operator: ASCO UK LIMITED Installation Name: ASCO ENVIRONMENTAL SERVICES Process: OTHER WASTE DISPOSAL; HAZARDOUS WASTE >10T/D	Permit Number: VP3136SZ Original Permit Number: VP3136SZ EPR Reference: - Issue Date: 15/05/2006 Effective Date: 15/05/2006 Last date noted as effective: 2019-04-30 Status: SUPERCEDED
109G	99	SW	653050 304410	Operator: ASCO UK LIMITED Installation Name: ASCO ENVIRONMENTAL SERVICES Process: WASTE LANDFILLING; ANY OTHER LANDFILL TO WHICH THE 2002 LANDFILL REGULATIONS APPLY	Permit Number: VP3136SZ Original Permit Number: VP3136SZ EPR Reference: - Issue Date: 15/05/2006 Effective Date: 15/05/2006 Last date noted as effective: 2007-04-02 Status: EFFECTIVE
110G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WASTE MANAGEMENT CENTRE Process: TEMPORARY STORAGE OF HAZ WASTE NOT UNDER S 5.2 PENDING ACTIVITIES LISTED IN S 5.1, 5.2, 5.3 AND PARAGRAPH (B) OF THIS SECTION WITH A TOTAL CAPACITY > 50 TONNES, EXCL TEMP STORAGE WHERE GENERATED	Permit Number: QP3239ZQ Original Permit Number: PP3532UT EPR Reference: - Issue Date: 16/05/2013 Effective Date: 16/05/2013 Last date noted as effective: 2013-07-01 Status: EFFECTIVE
111G	99	SW	653050 304410	Operator: ENVIROCO LIMITED Installation Name: GREAT YARMOUTH TECHNICAL WASTE MANAGEMENT CENTRE Process: DISPOSAL OR RECOVERY OF HAZ WASTE WITH CAPACITY EXCEEDING 10 TONNES PER DAY INVOLVING REPACKAGING PRIOR TO SUBMISSION TO ANY OF THE OTHER ACTIVITIES LISTED IN THIS SECTION OR IN SECTION 5.1	Permit Number: QP3239ZQ Original Permit Number: PP3532UT EPR Reference: - Issue Date: 16/05/2013 Effective Date: 16/05/2013 Last date noted as effective: 2013-07-01 Status: EFFECTIVE
112H	187	SE	653310 304340	Operator: VEOLIA ES (UK) LIMITED Installation Name: GREAT YARMOUTH DECOMMISSIONING FACILITY Process: DISPOSAL OR RECOVERY OF HAZ WASTE WITH CAPACITY EXCEEDING 10 TONNES PER DAY INVOLVING REPACKAGING PRIOR TO SUBMISSION TO ANY OF THE OTHER ACTIVITIES LISTED IN THIS SECTION OR IN SECTION 5.1	Permit Number: CP3230QX Original Permit Number: CP3230QX EPR Reference: - Issue Date: - Effective Date: - Last date noted as effective: 2019-04-30 Status: DETERMINATION
113H	187	SE	653310 304340	Operator: VEOLIA ES (UK) LIMITED Installation Name: GREAT YARMOUTH DECOMMISSIONING FACILITY Process: TEMPORARY STORAGE OF HAZ WASTE NOT UNDER S 5.2 PENDING ACTIVITIES LISTED IN S 5.1, 5.2, 5.3 AND PARAGRAPH (B) OF THIS SECTION WITH A TOTAL CAPACITY > 50 TONNES, EXCL TEMP STORAGE WHERE GENERATED	Permit Number: CP3230QX Original Permit Number: CP3230QX EPR Reference: - Issue Date: - Effective Date: - Last date noted as effective: 2019-04-30 Status: DETERMINATION
114I	238	N	653050 304860	Operator: OMNI-PAC UK LIMITED Installation Name: GREAT YARMOUTH PAPER REPROCESSOR Process: PAPER, PULP AND BOARD; PRODUCING PAPER/BOARD >20T/D	Permit Number: BK0094IA Original Permit Number: BK0094IA EPR Reference: - Issue Date: 24/04/2002 Effective Date: 24/04/2002

ID	Distance (m)	Direction	NGR	Details	
					Last date noted as effective: 2019-04-30 Status: SUPERCEDED
115I	238	N	653050 304860	Operator: OMNI-PAC UK LTD Installation Name: - Process: PAPER, PULP & BOARD; PRODUCING PAPER/BOARD >20T/D	Permit Number: BK0094 Original Permit Number: BK0094 EPR Reference: - Issue Date: 24/04/2002 Effective Date: 24/04/2002 Last date noted as effective: 2004-10-01 Status: SUPERSEDED BY PAS
116N	393	N	653080 305020	Operator: GREAT YARMOUTH POWER LIMITED Installation Name: GREAT YARMOUTH POWER STATION Process: COMBUSTION; ANY FUEL =>50MW	Permit Number: BP3235LH Original Permit Number: BP3235LH EPR Reference: - Issue Date: 30/03/2007 Effective Date: 30/03/2007 Last date noted as effective: 2019-04-30 Status: SUPERCEDED

2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:

1

The following Red List Discharge Consent records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
15D	194	SE	653278 304314	Address: VEOLIA ES (UK) LIMITED, GT YARMOUTH DECOMMISSIONINGFACILITY, VEOLIA ES (UK) LIMITED, SOUTH BEACH PARADE, GREAT YARMOUTH, NORFOLK, NR30 3QD Permit Number: EPRFB3490AQ Permit Version: 1 Status: NEW ISSUED UNDER EPR 2010	Discharge Type: Waste Collection/Treatment/Disposal/Materials Recovery Effluent Type: TRADE DISCHARGES - SITE DRAINAGE Catchment: - Approval Date: 13-Jan-2017

2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:

1

The following List 2 Dangerous Substance Inventory Site records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
14	341	SW	652850 304270	Name: Bluelimit Surveys Ltd Status: Not Active Receiving Water: Na	Authorised Substances: pH

2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site:

3

The following Part A(2) and Part B Activities are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
66	134	W	652970 304653	Address: East Port UK, Berth 5, East Quay, Southdenes Road, NR30 3PF Process: Coal & Coke Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
67	249	W	652857 304566	Address: Yarecrete Concrete Products Ltd, Riverside Road, Gorleston, NR31 6PX Process: Use of Bulk Cement Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
68	496	S	653135 303986	Address: Haliburton Manufacturing & Services Ltd, Berth 1A, South Denes Road, Great Yarmouth, NR30 3PF Process: Use of Bulk Cement Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

1

The following RAS Licence (3 or 4) records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Address	Operator	Type	Permission Number	Dates	Status
117D	194	S	653270 304310	Great Yarmouth Decommissioning Facility, South Beach Parade, Great Yarmouth, NR30 3QD	Veolia ES (UK) Limited	-	EB3595DZ	Date of Approval:- Effective from:18-12-2014 Last date of update:2018-11-01	Issued

2.1.8 Records of Licensed Discharge Consents within 500m of the study site:

16

The following Licensed Discharge Consents records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
16C	175	SW	653030 304330	Address: SEA-MAR DIESEL LTD, POWER STATION QUAY, SOUTH DENES RD., GT.YARMOUTH Effluent Type: TRADE DISCHARGES - PROCESS EFFLUENT - NOT WATER COMPANY Permit Number: PRETS10749 Permit Version: 1	Receiving Water: River Yare Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 18/04/1997 Effective Date: 18-Apr-1997 Revocation Date: 15/06/2006
17C	175	SW	653030 304330	Address: SEA-MAR DIESEL LTD, POWER STATION QUAY, SOUTH DENES RD., GT.YARMOUTH Effluent Type: TRADE DISCHARGES - PROCESS EFFLUENT - NOT WATER COMPANY Permit Number: PRETS03618 Permit Version: 1	Receiving Water: - Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 15/10/1990 Effective Date: 15-Oct-1990 Revocation Date: 31/10/1996
18	177	NW	652940 304700	Address: BALLAST QUAY OUTFALL, GREAT YARMOUTH Effluent Type: SEWAGE DISCHARGES - UNSPECIFIED - WATER COMPANY Permit Number: AW4TS1366 Permit Version: 1	Receiving Water: River Yare T Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 14/10/1987 Effective Date: 14-Oct-1987 Revocation Date: 16/02/1998
19D	194	SE	653278 304314	Address: GT YARMOUTH DECOMMISSIONINGFACILITY, VEOLIA ES (UK) LIMITED, SOUTH BEACH PARADE, GREAT YARMOUTH, NORFOLK, NR30 3QD Effluent Type: TRADE DISCHARGES - SITE DRAINAGE Permit Number: EPRFB3490AQ Permit Version: 1	Receiving Water: INTO LAND Status: NEW ISSUED UNDER EPR 2010 Issue date: 13/01/2017 Effective Date: 13-Jan-2017 Revocation Date: -
20	200	W	652920 304450	Address: DOCK TAVERN LANE OUTFALL, GREAT YARMOUTH Effluent Type: SEWAGE DISCHARGES -	Receiving Water: River Yare T Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY)

ID	Distance (m)	Direction	NGR	Details	
				UNSPECIFIED - WATER COMPANY Permit Number: AW4TS1371 Permit Version: 1	Issue date: 14/10/1987 Effective Date: 14-Oct-1987 Revocation Date: 30/06/1994
21E	240	SW	652940 304320	Address: BAKER STREET OUTFALL, GREAT YARMOUTH Effluent Type: SEWAGE DISCHARGES - UNSPECIFIED - WATER COMPANY Permit Number: AW4TS1367 Permit Version: 1	Receiving Water: River Yare T Status: REVOKED (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 14/10/1987 Effective Date: 14-Oct-1987 Revocation Date: 22/03/2002
22E	247	SW	652940 304310	Address: BAKER STREET PUMPING STATION, GORLESTON-ON-SEA, NORFOLK, NR31 6PT Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: AEETS03294/12177 Permit Version: 1	Receiving Water: RIVER YARE Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 19/10/1999 Effective Date: 19-Oct-1999 Revocation Date: 19/10/1999
23E	247	SW	652940 304310	Address: BAKER STREET PUMPING STATION, GORLESTON-ON-SEA, NORFOLK, NR31 6PT Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: AEETS03294/12177 Permit Version: 1	Receiving Water: RIVER YARE Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 19/10/1999 Effective Date: 19-Oct-1999 Revocation Date: 19/10/1999
24F	254	SW	652940 304300	Address: BAKER STREET PUMPING STATION, GORLESTON-ON-SEA, NORFOLK, ., NR31 6PT Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: AEETS12177 Permit Version: 1	Receiving Water: TIDAL RIVER YARE Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 15/10/1999 Effective Date: 15-Oct-1999 Revocation Date: 31/03/2005
25F	254	SW	652940 304300	Address: BAKER STREET PUMPING STATION, GORLESTON-ON-SEA, NORFOLK, ., NR31 6PT Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: AEETS12177 Permit Version: 2	Receiving Water: TIDAL RIVER YARE Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 24/03/2005 Effective Date: 01-Apr-2005 Revocation Date: -
26F	254	SW	652940 304300	Address: BAKER STREET PUMPING STATION, GORLESTON-ON-SEA, NORFOLK, ., NR31 6PT Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: AEETS12177 Permit Version: 1	Receiving Water: TIDAL RIVER YARE Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 15/10/1999 Effective Date: 15-Oct-1999 Revocation Date: 31/03/2005
27F	254	SW	652940 304300	Address: BAKER STREET PUMPING STATION, GORLESTON-ON-SEA, NORFOLK, ., NR31 6PT Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: AEETS12177 Permit Version: 2	Receiving Water: TIDAL RIVER YARE Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 24/03/2005 Effective Date: 01-Apr-2005 Revocation Date: -
28	338	NW	652810 304800	Address: RIVERSIDE ROAD 2 OUTFALL, GREAT YARMOUTH Effluent Type: SEWAGE DISCHARGES - UNSPECIFIED - WATER COMPANY Permit Number: AW4TS1364 Permit Version: 1	Receiving Water: River Yare T Status: REVOKED NEW CONSENT ISSUED (WATER ACT 1989 SECTION 113) Issue date: 14/10/1987 Effective Date: 14-Oct-1987 Revocation Date: 16/02/1998
29	394	S	653080 304090	Address: COLD STORE OUTFALL, GREAT YARMOUTH Effluent Type: SEWAGE DISCHARGES - UNSPECIFIED - WATER COMPANY Permit Number: AW4TS1362 Permit Version: 1	Receiving Water: River Yare T Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 14/10/1987 Effective Date: 14-Oct-1987 Revocation Date: 16/02/1998

ID	Distance (m)	Direction	NGR	Details	
30	421	NW	652780 304900	Address: RIVERSIDE ROAD 1 OUTFALL, GREAT YARMOUTH Effluent Type: SEWAGE DISCHARGES - UNSPECIFIED - WATER COMPANY Permit Number: AW4TS1365 Permit Version: 1	Receiving Water: River Yare T Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 14/10/1987 Effective Date: 14-Oct-1987 Revocation Date: 16/02/1998
31	439	SW	652900 304100	Address: RIVERSIDE ROAD, GT YARMOUTH, NORFOLK Effluent Type: TRADE DISCHARGES - UNSPECIFIED Permit Number: PR4TS819X Permit Version: 1	Receiving Water: River Yare Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 10/03/1978 Effective Date: 10-Mar-1978 Revocation Date: 21/02/1992

2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site:

0

Database searched and no data found.

2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site:

9

The following records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	Application Reference Number	NGR	Application Status	Application Date	Address	Details	Details of Enforcement Action
118K	74	E	No Details	653268 304569	Approved	No Details	ASCO UK Ltd, Berths 1a, 1b and 32, Port of Great Yarmouth, Great Yarmouth, Norfolk, England	No Details	Enforcement: No Enforcements Notified Date of Enforcement: No Details Comment: No Details
119K	74	E	No Details	653268 304569	Approved	No Details	ASCO UK Ltd, Berth 26, Great Yarmouth, Norfolk, England	No Details	Enforcement: No Enforcements Notified Date of Enforcement: No Details Comment: No Details
120K	74	E	No Details	653268 304569	Approved	No Details	ASCO UK Ltd, Berths 1c, 12a-c,6a & 6b Yarmouth, Great Yarmouth, Norfolk, England	No Details	Enforcement: No Enforcements Notified Date of Enforcement: No Details Comment: No Details
121K	74	E	No Details	653268	Approved	No Details	Great	No Details	Enforcement: No

ID	Distance (m)	Direction	Application Reference Number	NGR	Application Status	Application Date	Address	Details	Details of Enforcement Action
				304569			Yarmouth Port Company, Berths 5, 7, 9, 13B, 15 Lo-Lo, 15 Ro-Ro, Port of Great Yarmouth, Great Yarmouth, Norfolk, England, NR30 3PZ		Enforcements Notified Date of Enforcement: No Details Comment: No Details
122L	97	S	HSC/0004	653158 304389	Approved	01/08/2002	ASCO Fuels & Lubricants, Yarmouth Offshore Supply Base, South Denes Road, Great Yarmouth, Norfolk, England, NR30 3LX	Marine Gas Oil, Derv and Kerosene	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
123L	97	S	HSC/0003	653158 304389	Approved	01/08/2002	ASCO UK Ltd, Gas House Quay, Southtown Road, Great Yarmouth, Norfolk, England	Marine Gas Oil.	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
124M	229	N	No Details	653261 304854	Approved	No Details	Great Yarmouth Port Company, Berth 6A and 6B, Port of Great Yarmouth, Great Yarmouth, Norfolk, England	No Details	Enforcement: No Enforcements Notified Date of Enforcement: No Details Comment: No Details
125M	229	N	No Details	653261 304854	Approved	No Details	Great Yarmouth Port Company, Berth 8 & 8A Great Yarmouth, Great Yarmouth, Norfolk, England	No Details	Enforcement: No Enforcements Notified Date of Enforcement: No Details Comment: No Details
126O	498	N	No Details	652926 305093	Approved	No Details	Halliburton Manufacturing and Services Ltd, South Denes Generating Station, South Denes Road, Great Yarmouth, Norfolk, England, NR30	No Details	Enforcement: No Enforcements Notified Date of Enforcement: No Details Comment: No Details

ID	Distance (m)	Direction	Application Reference Number	NGR	Application Status	Application Date	Address	Details	Details of Enforcement Action
							3PY		

2.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: 4

The following COMAH & NIHHS Authorisation records provided by the Health and Safety Executive are represented as polygons or buffered points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	Company	Address	Operational Status	Tier
70	23	E	Gleadell Agriculture Ltd	Gleadell Agriculture Ltd, Gleadell Grain Terminal, Outer Harbour, South Beach Parade, Great Yarmouth, Norfolk, NR30 3QA	Historical NIHHS Site	-
71	66	W	Asco Group Ltd (asco Oils Division)	Asco Group Ltd (asco Oils Division), South Denes Road, Great Yarmouth, NR30 3LX	Historical NIHHS Site	-
72J	230	S	Bunn Fertiliser Limited	Bunn Fertiliser Limited, Great Yarmouth, South Denes Road, Great Yarmouth, Norfolk, NR30 3PT	Historical NIHHS Site	-
73J	230	S	Origin UK Operations Limited	Origin UK Operations Limited, Great Yarmouth, South Beach Parade, Great Yarmouth, Norfolk, NR30 3QA	Current COMAH Site	COMAH Upper Tier Operator

2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents

2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:

13

The following NIRS List 2 records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
1	220	NW	652974.0 304807.0	Incident Date: 23-Jul-2002 Incident Identification: 93672.0 Pollutant: Contaminated Water Pollutant Description: Firefighting Run-Off	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
2	224	S	653054.0 304267.0	Incident Date: 18-Mar-2002 Incident Identification: 64922.0 Pollutant: Contaminated Water Pollutant Description: Firefighting Run-Off	Water Impact: Category 3 (Minor) Land Impact: Category 3 (Minor) Air Impact: Category 3 (Minor)
3A	263	N	653064.0 304888.0	Incident Date: 23-Jul-2002 Incident Identification: 98376.0 Pollutant: Atmospheric Pollutants and Effects:Contaminated Water Pollutant Description: Smoke:Firefighting Run-Off	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)

ID	Distance (m)	Direction	NGR	Details	
4A	263	N	653064.0 304888.0	Incident Date: 23-Jul-2002 Incident Identification: 98376.0 Pollutant: Contaminated Water Pollutant Description: Firefighting Run-Off	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
5A	263	N	653064.0 304888.0	Incident Date: 23-Jul-2002 Incident Identification: 98376.0 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
6A	276	N	653073.0 304902.0	Incident Date: 10-Aug-2001 Incident Identification: 23419.0 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Other Atmospheric Pollutant or Effect	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
7	373	S	653230.0 304120.0	Incident Date: 30-May-2003 Incident Identification: 161843.0 Pollutant: Organic Chemicals/Products Pollutant Description: Other Organic Chemical or Product	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
8	439	N	653110.0 305070.0	Incident Date: 03-Sep-2001 Incident Identification: 28802.0 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Sulphide Odour	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
9B	464	N	653003.0 305081.0	Incident Date: 10-Oct-2002 Incident Identification: 113942.0 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Other Atmospheric Pollutant or Effect	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
10	476	S	652962.0 304032.0	Incident Date: 05-Nov-2003 Incident Identification: 199907.0 Pollutant: Oils and Fuel Pollutant Description: Gas and Fuel Oils	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
11	479	SW	652685.0 304275.0	Incident Date: 24-Aug-2002 Incident Identification: 102877.0 Pollutant: Sewage Materials Pollutant Description: Storm Sewage	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
12B	486	N	652990.0 305100.0	Incident Date: 06-Sep-2001 Incident Identification: 29404.0 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Other Atmospheric Pollutant or Effect	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
13O	493	N	652960.0 305100.0	Incident Date: 17-Sep-2001 Incident Identification: 31244.0 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Other Atmospheric Pollutant or Effect	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)

2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:

0

Database searched and no data found.

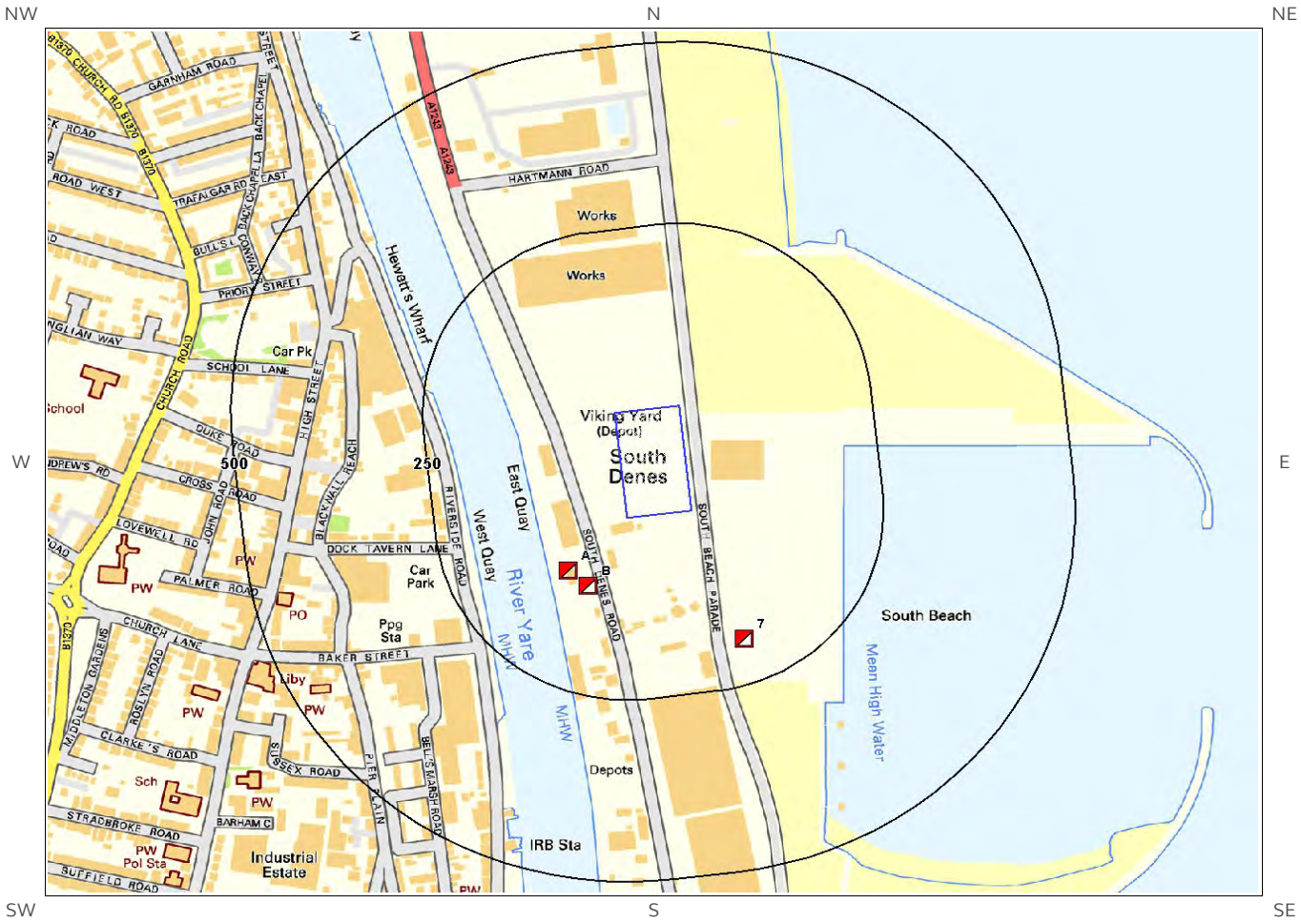
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

Records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site 0

Database searched and no data found.

---

3. Landfill and Other Waste Sites Map



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Site Outline

250 / 500 Search Buffers (m)

EA/NRW Active Landfill

EA/NRW Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

EA/NRW Licensed Waste Site

Local Authority/Historical Mapping Landfill Records

3. Landfill and Other Waste Sites

3.1 Landfill Sites

3.1.1 Records from Environment Agency/Natural Resources Wales landfill data within 1000m of the study site:

0

Database searched and no data found.

3.1.2 Records of Environment Agency/Natural Resources Wales historic landfill sites within 1500m of the study site:

0

Database searched and no data found.

3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site:

0

Database searched and no data found.

3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:

0

Database searched and no data found.

3.2 Other Waste Sites

3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site:

0

Database searched and no data found.

3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site:

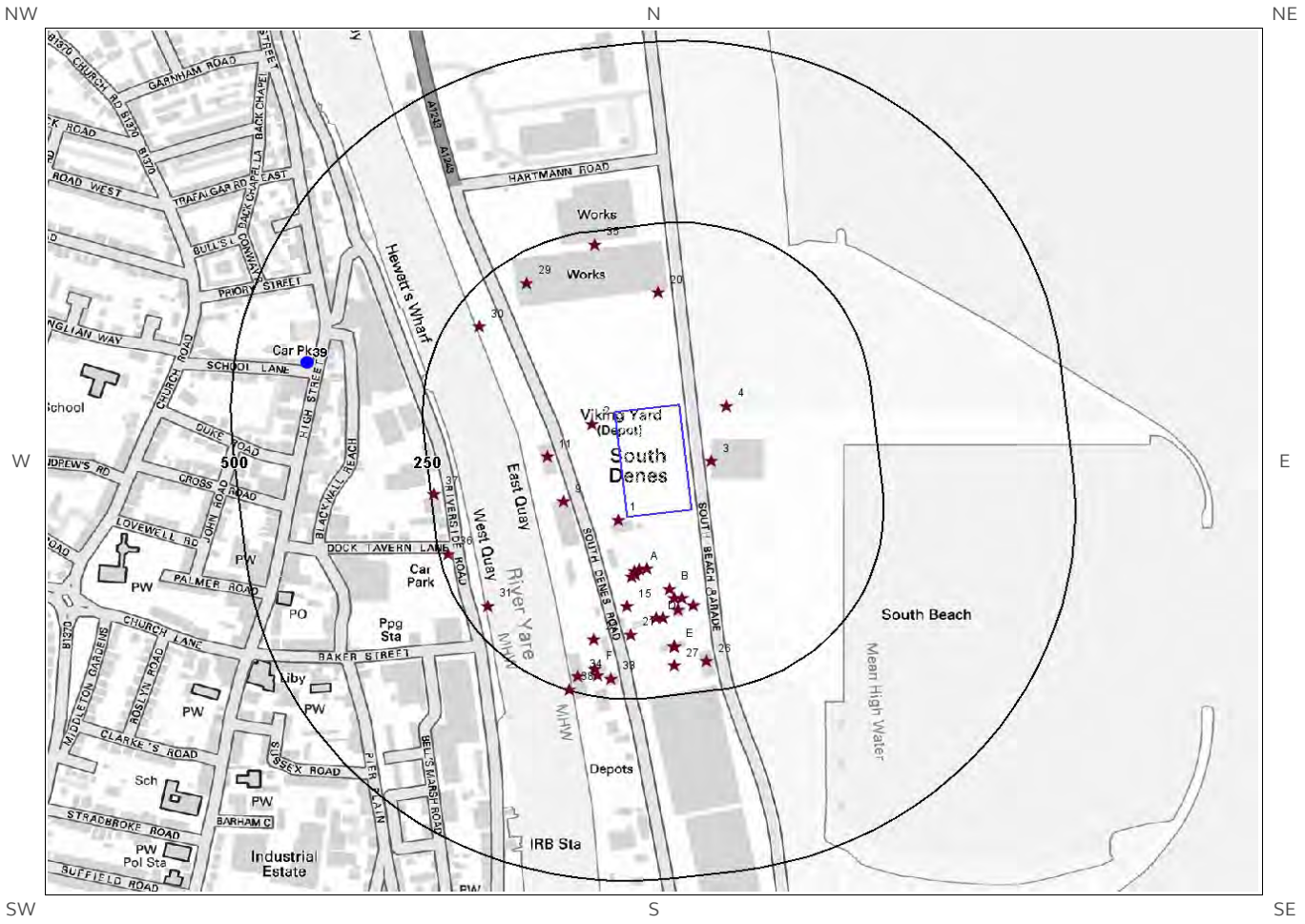
10

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
1A	105	SW	653041 304410	Site Address: Technical Waste Management Centre, South Denes Road, Great Yarmouth, Norfolk, NR30 3LY Type: Special Waste Transfer Station Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ENV230 EPR reference: EA/EPR/QP3898NL/T002 Operator: Enviroco Ltd Waste Management licence No: 71257 Annual Tonnage: 24999.0	Issue Date: 24/01/2001 Effective Date: 13/03/2008 Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Transferred Site Name: Great Yarmouth Correspondence Address: -
2A	105	SW	653041 304410	Site Address: Technical Waste Management Centre, South Denes Road, Great Yarmouth, Norfolk, NR30 3LY Type: Special Waste Transfer Station Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ASC002 EPR reference: - Operator: A S C O (U K) Ltd Waste Management licence No: 71257 Annual Tonnage: 24999.0	Issue Date: 24/01/2001 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Great Yarmouth Correspondence Address: Offshore Supply Base, South Denes Road, Great Yarmouth, Norfolk, NR30 3LY
3A	105	SW	653041 304410	Site Address: Technical Waste Management Centre, South Denes Road, Great Yarmouth, Norfolk, NR30 3LY Type: Special Waste Transfer Station Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ASC002 EPR reference: - Operator: A S C O (U K) Ltd Waste Management licence No: 71257 Annual Tonnage: 0.0	Issue Date: 24/01/2001 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Great Yarmouth Correspondence Address: Offshore Supply Base, South Denes Road, Great Yarmouth, Norfolk, NR30 3LY
4B	106	SW	653066 304389	Site Address: Great Yarmouth Technical Waste Management Centre, Berths 2-4, South Denes Road, Great Yarmouth, Norfolk, NR30 3QF Type: Physical Treatment Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ENV230 EPR reference: EA/EPR/PP3532UT/V004 Operator: Enviroco Ltd Waste Management licence No: 71257 Annual Tonnage: 24999.0	Issue Date: 24/01/2001 Effective Date: 13/03/2008 Modified: 16/05/2013 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Great Yarmouth Technical Waste Management Centre Correspondence Address: -
5B	106	SW	653066 304389	Site Address: Great Yarmouth Technical Waste Management Centre, Berths 2-4, South Denes Road, Great Yarmouth, Norfolk, NR30 3QF Type: Physical Treatment Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ENV230 EPR reference: EA/EPR/PP3532UT/V005 Operator: Enviroco Limited Waste Management licence No: 71257	Issue Date: 24/01/2001 Effective Date: 13/03/2008 Modified: 25/01/2016 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Great Yarmouth Technical Waste Management Centre Correspondence Address: -

ID	Distance (m)	Direction	NGR	Details	
				Annual Tonnage: 24999.0	
6B	106	SW	653066 304389	Site Address: Great Yarmouth Technical Waste Management Centre, Berths 2-4, South Denes Road, Great Yarmouth, Norfolk, NR30 3QF Type: Household, Commercial & Industrial Waste T Stn Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ASC001 EPR reference: EA/EPR/GP3630YS/T001 Operator: A S C O U K Limited Waste Management licence No: 71257 Annual Tonnage: 49999.0	Issue Date: 24/01/2001 Effective Date: 11/01/2017 Modified: 25/01/2016 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Transferred Site Name: Great Yarmouth Technical Waste Management Centre Correspondence Address: -
7	188	S	653270 304317	Site Address: Great Yarmouth Decommissioning Facility, South Beach Parade, Great Yarmouth, Norfolk, NR30 3QD Type: Metal Recycling Site (Vehicle Dismantler) Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: VEO210 EPR reference: EA/EPR/BB3808TU/V002 Operator: Veolia E S (U K) Limited Waste Management licence No: 401628 Annual Tonnage: 153650.0	Issue Date: 08/12/2014 Effective Date: - Modified: 30/10/2017 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Great Yarmouth Decommissioning Facility Correspondence Address: -
Not shown	1239	N	652900 305850	Site Address: Hendee House, Battery Road, Great Yarmouth, Norfolk, NR30 3NN Type: Asbestos Waste Transfer Station Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: LEA002 EPR reference: EA/EPR/VP3494NV/V002 Operator: Mr Rodney John Lear And Mrs Pamela Margaret Lear Waste Management licence No: 71491 Annual Tonnage: 3650.0	Issue Date: 10/11/2006 Effective Date: - Modified: 17/03/2011 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Hendee House Correspondence Address: -
Not shown	1239	N	652900 305850	Site Address: Hendee House, Battery Road, Great Yarmouth, Norfolk, NR30 3NN Type: Asbestos Waste Transfer Station Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: EAS147 EPR reference: EA/EPR/AB3801UE/S002 Operator: East Coast Insulations Limited Waste Management licence No: 71491 Annual Tonnage: 0.0	Issue Date: 10/11/2006 Effective Date: 14/11/2013 Modified: 17/03/2011 Surrendered Date: May 3 2016 12:00AM Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: Hendee House Correspondence Address: -
Not shown	1243	N	652905 305855	Site Address: Hendee House, Battery Road, Great Yarmouth, Norfolk, NR30 3NW Type: Special Waste Transfer Station Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: LEA002 EPR reference: VP3494NV/A001 Operator: R J Lear And P M Lear Waste Management licence No: 71491 Annual Tonnage: 3650.0	Issue Date: 10/11/2006 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Hendee House, Battery Road Correspondence Address: -

4. Current Land Use Map



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Site Outline

Search Buffers (m)
250
500

Current Industrial Sites

Petrol & Fuel Sites

Electricity Transmission Cables

Gas Transmission Pipelines

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: 38

The following records are represented as points on the Current Land Uses map.

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	12	W	Tank	653106 304479	Norfolk, NR30	Tanks (Generic)	Industrial Features
2	32	W	Viking Yard (Depot)	653071 304611	Norfolk, NR30	Container and Storage	Transport, Storage and Delivery
3	33	E	Electricity Sub Station	653227 304560	Norfolk, NR30	Electrical Features	Infrastructure and Facilities
4	60	E	Electricity Sub Station	653246 304636	Norfolk, NR30	Electrical Features	Infrastructure and Facilities
5A	72	S	Tank	653133 304411	Norfolk, NR30	Tanks (Generic)	Industrial Features
6A	73	S	Oil Storage Depot	653143 304412	Norfolk, NR30	Container and Storage	Transport, Storage and Delivery
7A	74	S	Tank	653127 304409	Norfolk, NR30	Tanks (Generic)	Industrial Features
8A	79	S	Tank	653128 304404	Norfolk, NR30	Tanks (Generic)	Industrial Features
9	80	W	Asco	653034 304504	Viking House, South Denes Road, Great Yarmouth, Norfolk, NR30 3QD	Marine Engineers and Services	Engineering Services
10A	81	S	Tank	653123 304401	Norfolk, NR30	Tanks (Generic)	Industrial Features
11	94	W	Warehouse	653013 304566	Norfolk, NR30	Container and Storage	Transport, Storage and Delivery
12B	104	S	Tank	653172 304384	Norfolk, NR30	Tanks (Generic)	Industrial Features
13B	116	S	Tank	653178 304372	Norfolk, NR30	Tanks (Generic)	Industrial Features
14B	119	S	Tank	653188 304371	Norfolk, NR30	Tanks (Generic)	Industrial Features
15	122	S	Depot	653117 304360	Norfolk, NR30	Container and Storage	Transport, Storage and Delivery
16C	129	S	Tank	653203 304362	Norfolk, NR30	Tanks (Generic)	Industrial Features
17C	134	S	Tank	653183 304355	Norfolk, NR30	Tanks (Generic)	Industrial Features
18D	141	S	Tank	653155 304344	Norfolk, NR30	Tanks (Generic)	Industrial Features
19D	142	S	Tank	653164 304345	Norfolk, NR30	Tanks (Generic)	Industrial Features

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
20	157	N	Tank	653158 304792	Norfolk, NR30	Tanks (Generic)	Industrial Features
21	161	S	Electricity Sub Station	653122 304321	Norfolk, NR30	Electrical Features	Infrastructure and Facilities
22	172	S	Electricity Sub Station	653074 304315	Norfolk, NR30	Electrical Features	Infrastructure and Facilities
23E	183	S	International Tubular Services Ltd	653179 304305	Havenshore Base, South Denes Road, Great Yarmouth, Norfolk, NR30 3QD	Special Purpose Machinery and Equipment	Industrial Products
24E	183	S	Oilfield Containers Ltd	653179 304305	Havenshore Base, South Denes Road, Great Yarmouth, Norfolk, NR30 3QD	Packaging	Industrial Products
25E	183	S	Beckett Logistics Management Ltd	653179 304305	South Denes Road, Great Yarmouth, Norfolk, NR30 3QD	Container and Storage	Transport, Storage and Delivery
26	208	S	Depot	653221 304285	Norfolk, NR30	Container and Storage	Transport, Storage and Delivery
27	209	S	O C S	653179 304279	Havenshore Base, South Denes Road, Great Yarmouth, Norfolk, NR30 3QD	General Construction Supplies	Industrial Products
28F	212	S	M I Drilling Fluids UK Ltd	653075 304274	Marine Base, South Denes Road, Great Yarmouth, Norfolk, NR30 3QF	Tools Including Machine Shops	Industrial Products
29	212	NW	Works	652986 304805	Norfolk, NR30	Unspecified Works Or Factories	Industrial Features
30	213	NW	East Quay	652924 304745	Norfolk, NR31	Moorings and Unloading Facilities	Water
31	218	SW	West Quay	652936 304361	Norfolk, NR31	Moorings and Unloading Facilities	Water
32F	219	S	Depot	653079 304266	Norfolk, NR30	Container and Storage	Transport, Storage and Delivery
33	222	S	Depot	653096 304261	Norfolk, NR30	Container and Storage	Transport, Storage and Delivery
34	227	S	Certas Energy	653053 304264	Former Customs Building Marine Base, South Denes Road, Great Yarmouth, Norfolk, NR30 3NU	Fuel Distributors and Suppliers	Household, Office, Leisure and Garden
35	232	N	Works	653075 304858	Norfolk, NR30	Unspecified Works Or Factories	Industrial Features
36	239	W	Sub Sea Technology & Rental	652883 304432	36, Riverside Road, Gorleston, Great Yarmouth, Norfolk, NR31 6PX	Marine Equipment Including Boats and Ships	Industrial Products
37	246	W	Autotune Service & Repair Ltd	652865 304514	Riverside Road, Gorleston, Great Yarmouth, Norfolk, NR31 6PX	Vehicle Repair, Testing and Servicing	Repair and Servicing
38	248	S	East Quay	653042 304246	Norfolk, NR30	Moorings and Unloading Facilities	Water

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site: 1

The following petrol or fuel site records provided by Catalist are represented as points on the Current Land Use map:

ID	Distance (m)	Direction	NGR	Company	Address	LPG	Status
39	407	W	652700 304695	OBSOLETE	188-189 High Street, Gorleston, Great Yarmouth, Norfolk, NR31 6RP	Not Applicable	Obsolete

4.3 National Grid High Voltage Underground Electricity Transmission Cables

This dataset identifies the high voltage electricity transmission lines running between generating power plants and electricity substations. The dataset does not include the electricity distribution network (smaller, lower voltage cables distributing power from substations to the local user network). This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site: 0

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

This dataset identifies high-pressure, large diameter pipelines which carry gas between gas terminals, power stations, compressors and storage facilities. The dataset does not include the Local Transmission System (LTS) which supplies gas directly into homes and businesses. This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high pressure gas transmission pipelines within 500m of the study site: 0

Database searched and no data found.

5. Geology

5.1 Artificial Ground and Made Ground

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

5.2 Superficial Ground and Drift Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
BSA-S	BLOWN SAND	SAND

5.3 Bedrock and Solid Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
CRAG-XSV	CRAG GROUP	SAND AND GRAVEL

(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology

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Site Outline

250 — Search Buffers (m)
500

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

Secondary (B) Aquifer - Lower Permeability Layers

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

6b. Aquifer Within Bedrock Geology and Abstraction Licences

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Site Outline

250 — 500 — Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

Secondary (B) Aquifer - Lower Permeability Layers

Groundwater Abstraction Licence

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

Surface Water Abstraction Licence

6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licences

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Site Outline

250
500
Search Buffers (m)

Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2 - Outer Catchment

Source Protection Zone 3 - Total Catchment

Source Protection Zone 4 - Zone of Special Interest

Potable Water Abstraction Licence

6d. Hydrogeology – Source Protection Zones within confined aquifer

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Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2C - Outer Catchment within Confined Aquifer

Source Protection Zone 3C - Total Catchment within Confined Aquifer

Potable Water Abstraction Licence

Site Outline

250
500
Search Buffers (m)

6e. Hydrology – Watercourse Network and River Quality

NW N NE

W E

SW S SE

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Site Outline

250 Search Buffers (m)
500

Watercourse type

- Tidal River
- Inland River
- Canal
- Lock or Flight of Locks
- Lake, Reservoir, or Marsh
- Foreshore
- Drain or Transfer

Watercourse level

- On ground surface
- Underground or Elevated
- Level unknown

- General Quality Assessment: Biology
- General Quality Assessment: Chemistry

6.Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Records of strata classification within the superficial geology at or in proximity to the property Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
5	131	W	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
2	347	W	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
3	363	N	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
6	479	NW	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

6.2 Aquifer within Bedrock Deposits

Records of strata classification within the bedrock geology at or in proximity to the property Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers
2	363	N	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers

6.3 Groundwater Abstraction Licences

Groundwater Abstraction Licences within 2000m of the study site — Identified

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details	
Not shown	1937	NW	651820 306080	Status: Historical Licence No: AN/034/0015/020 Details: Laundry Use Direct Source: GROUND WATER SOURCE OF SUPPLY Point: WELLPOINTS AT THE LAUNDRY, PORTLAND LANE, GREAT YARMOUTH Data Type: Point Name: Camplings Limited	Annual Volume (m^3): 60000 Max Daily Volume (m^3): 210 Original Application No: - Original Start Date: 01/12/2016 Expiry Date: 31/03/2030 Issue No: 1 Version Start Date: 01/12/2016 Version End Date:
Not shown	1937	NW	651820 306080	Status: Active Licence No: AN/034/0015/020 Details: Laundry Use Direct Source: GROUND WATER SOURCE OF SUPPLY Point: WELLPOINTS AT 20 OWEN RD, HAFREYS INDUSTRIAL ESTATE Data Type: Point Name: Camplings Limited	Annual Volume (m^3): 60000 Max Daily Volume (m^3): 210 Original Application No: - Original Start Date: 01/12/2016 Expiry Date: 31/03/2030 Issue No: 2 Version Start Date: 09/05/2017 Version End Date:

6.4 Surface Water Abstraction Licences

Surface Water Abstraction Licences within 2000m of the study site — None identified

Database searched and no data found.

6.5 Potable Water Abstraction Licences

Potable Water Abstraction Licences within 2000m of the study site — None identified

Database searched and no data found.

6.6 Source Protection Zones

Source Protection Zones within 500m of the study site — None identified

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

Source Protection Zones within the Confined Aquifer within 500m of the study site None identified

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Environment Agency/Natural Resources Wales information on groundwater vulnerability and soil leaching potential within 500m of the study site Identified

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Major Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
244	W	Major Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.

6.9 River Quality

Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site None identified

6.9.1 Biological Quality:

Database searched and no data found.

6.9.2 Chemical Quality:

Database searched and no data found.

6.10 Ordnance Survey MasterMap Water Network

Ordnance Survey MasterMap Water Network entries within 500m of the study site

This watercourse information is provided by Ordnance Survey MasterMap Water Network. The data provides a detailed centre line following the curve of the waterway precisely, so all distances provided in the report should be understood as measurements to the centreline rather than a measurement to the nearest point of the watercourse. Underground watercourses are inferred from entry and exit points so caution is advised in using these to indicate precise locations of underground watercourses when planning site investigation and development.

The following Ordnance Survey MasterMap Water Network records are represented on the Hydrology Map (6e):

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
1	163 W	River Yare	Tidal river or stream.	Catchment Area: Wensum and Yare Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 64.6
3	163 W	River Yare	Tidal river or stream.	Catchment Area: Wensum and Yare Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 64.6
2	376 NW	-	Inland river not influenced by normal tidal action.	Catchment Area: Bure Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	376 NW	-	Inland river not influenced by normal tidal action.	Catchment Area: Bure Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided

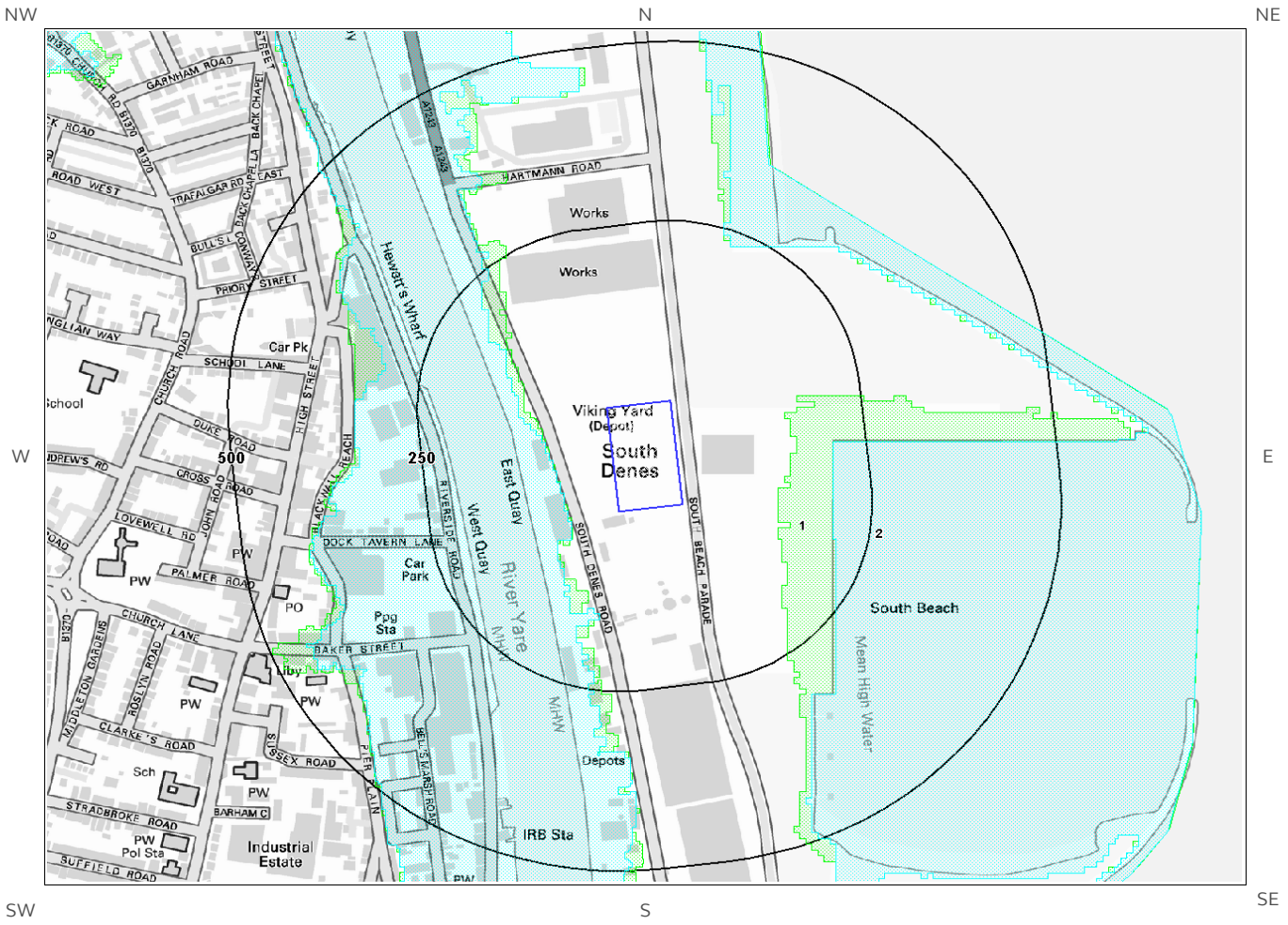
6.11 Surface Water Features

Surface water features within 250m of the study site Identified

The following surface water records are not represented on mapping:

Distance (m)	Direction
116	W

7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)



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Site Outline

100
250
Search Buffers (m)

Zone 2 Floodplain

Zone 3 Floodplain

Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map

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Site Outline

100
250
Search Buffers (m)

RoFRaS Rating

Very Low

Low

Medium

High

7 Flooding

7.1 River and Coastal Zone 2 Flooding

Environment Agency/Natural Resources Wales Zone 2 floodplain within 250m — Identified

Environment Agency/Natural Resources Wales Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning:

ID	Distance (m)	Direction	Update	Type
1	63	W	20-Jun-2019	Zone 2 - (Fluvial /Tidal Models)

7.2 River and Coastal Zone 3 Flooding

Environment Agency/Natural Resources Wales Zone 3 floodplain within 250m — Identified

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

ID	Distance (m)	Direction	Update	Type
1	64	W	20-Jun-2019	Zone 3 - (Fluvial Models)

7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

Highest risk of flooding onsite — Very Low

The Environment Agency/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a Very Low (less than 1 in 1000) chance of flooding in any given year.

7.4 Flood Defences

Flood Defences within 250m of the study site — None identified

Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Areas benefiting from Flood Defences within 250m of the study site — None identified

7.6 Areas benefiting from Flood Storage

Areas used for Flood Storage within 250m of the study site — None identified

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site — Identified

Clearwater Flooding or Superficial Deposits Flooding — Clearwater Flooding

Notes: Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding).

7.7.2 Highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions

Limited potential

Where limited potential for groundwater flooding to occur is indicated, this means that although given the geological conditions there may be a groundwater flooding hazard, unless other relevant information, e.g. records of previous flooding, suggests groundwater flooding has occurred before in this area, you need take no further action in relation to groundwater flooding hazard.

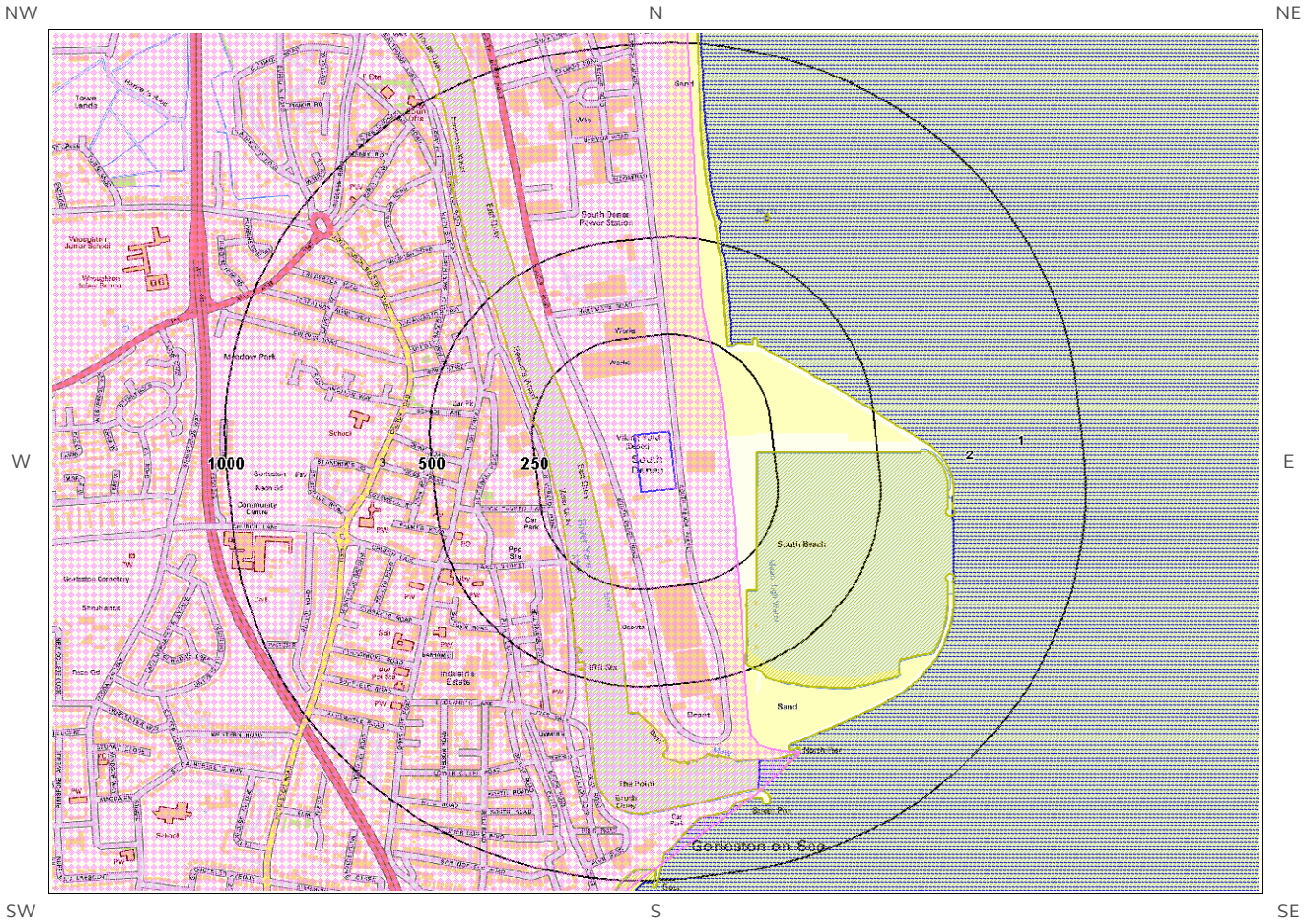
7.8 Groundwater Flooding Confidence Areas

British Geological Survey confidence rating in this result — Low

Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

8. Designated Environmentally Sensitive Sites Map



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Site Outline

100 / 250 Search Buffers (m)

AONB

National Park

SSSI

Special Protection Areas

Nitrate Vulnerable Zones

Green Belt

Environmentally Sensitive Areas

Special Areas of Conservation

World Heritage Sites

Nitrate Sensitive Areas

Ancient Woodland

National Nature Reserve

Local Nature Reserves

Ramsar Sites

8. Designated Environmentally Sensitive Sites

Designated Environmentally Sensitive Sites within 2000m of the study site | Identified

8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:

0

Database searched and no data found.

8.2 Records of National Nature Reserves (NNR) within 2000m of the study site:

0

Database searched and no data found.

8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site:

1

The following Special Area of Conservation (SAC) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SAC Name	Data Source
1	268	NE	Southern North Sea	Natural England

8.4 Records of Special Protection Areas (SPA) within 2000m of the study site:

1

The following Special Protection Area (SPA) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SPA Name	Data Source
2	116	W	Outer Thames Estuary	Natural England

8.5 Records of Ramsar sites within 2000m of the study site:

0

Database searched and no data found.

8.6 Records of Ancient Woodland within 2000m of the study site:

0

Database searched and no data found.

8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site:

0

Database searched and no data found.

8.8 Records of World Heritage Sites within 2000m of the study site:

0

Database searched and no data found.

8.9 Records of Environmentally Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site:

0

Database searched and no data found.

8.11 Records of National Parks (NP) within 2000m of the study site:

0

Database searched and no data found.

8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:

1

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
3	0	On Site	Existing	DEFRA

8.14 Records of Green Belt land within 2000m of the study site:

0

Database searched and no data found.

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a Groundsure Geo Insight, available from our website. The following information has been found:

9.1.1 Shrink Swell

Maximum Shrink-Swell* hazard rating identified on the study site — Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.

9.1.2 Landslides

Maximum Landslide* hazard rating identified on the study site — Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

9.1.3 Soluble Rocks

Maximum Soluble Rocks* hazard rating identified on the study site — Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

* This indicates an automatically generated 50m buffer and site.

9.1.4 Compressible Ground

Maximum Compressible Ground* hazard rating identified on the study site — Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Very low potential for compressible deposits to be present. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

9.1.5 Collapsible Rocks

Maximum Collapsible Rocks* hazard rating identified on the study site — Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
No indicators for collapsible deposits identified. No actions required to avoid problems due to collapsible deposits. No special ground investigation required, or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

9.1.6 Running Sand

Maximum Running Sand** hazard rating identified on the study site — Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property no significant increase in insurance risk due to running sand problems is likely.

* This indicates an automatically generated 50m buffer and site.

9.2 Radon

9.2.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

The radon data in this report is supplied by the BGS/Public Health England and is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland. The dataset was created using long-term radon measurements in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland, combined with geological data. The dataset is considered accurate to 50m to allow for the margin of error in geological lines, and the findings of this report supercede any answer given in the less accurate Indicative Atlas of Radon in Great Britain, which simplifies the data to give the highest risk within any given 1km grid square. As such, the radon atlas is considered indicative, whereas the data given in this report is considered definitive.

9.2.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing
ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

10. Mining

10.1 Coal Mining

Coal mining areas within 75m of the study site — None identified

Database searched and no data found.

10.2 Non-Coal Mining

Non-Coal Mining areas within 50m of the study site boundary — None identified

Database searched and no data found.

10.3 Brine Affected Areas

Brine affected areas within 75m of the study site — None identified
Guidance: No Guidance Required.

Contact Details

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info@groundsure.com

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enquiries@bgs.ac.uk

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https://www.groundsure.com/terms-and-conditions-feb11-2019

Groundsure
LOCATION INTELLIGENCE

TerraConsult South Limited

9 THE COURTYARDS, WYNCOLLS ROAD,
COLCHESTER, CO4 9PE

Groundsure Reference:	GS-6215233
Your Reference:	10444
Report Date	1 Aug 2019
Report Delivery Method:	Email - pdf

Geo Insight

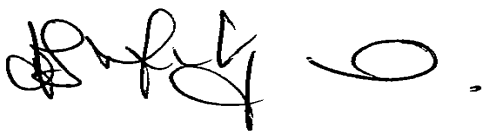
Address: GREAT YARMOUTH,

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Geo Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Geo Insight

Geo Insight

Address:	**GREAT YARMOUTH,**
Date:	**1 Aug 2019**
Reference:	**GS-6215233**
Client:	**TerraConsult South Limited**

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	28-Aug-2017
Grid Reference:	653146,304562
Site Size:	1.2448ha

Groundsure
LOCATION INTELLIGENCE

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Overview of Findings

The Groundsure Geo Insight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 and 1:10,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Non-coal mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Geology 1:10,000 Scale		
1.1 Artificial Ground	1.1 Is there any Artificial Ground/ Made Ground present beneath the study site at 1:10,000 scale?	Yes
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site at 1:10,000 scale?*	No
	1.2.2 Are there any records of landslip within 500m of the study site boundary at 1:10,000 scale?	No
1.3 Bedrock, Solid Geology and linear features	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records of linear features within 500m of the study site boundary at 1:10,000 scale?	No

Section 2: Geology 1:50,000 Scale		
2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	Yes
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	Yes
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	Yes
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	Yes
	2.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and linear features	2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	2.3.2 Are there any records relating to permeability of bedrock ground within the study site boundary?	Yes
	2.3.3 Are there any records of linear features within 500m of the study site boundary?	No

Section 3: Radon

3. Radon	3.1Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
	3.2Radon Protection	No radon protective measures are necessary.

Section 4: Ground Workings	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	0	2	34	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
4.3 Current Ground Workings	0	0	0	0	1

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	0
5.2 Coal Mining	0	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
5.4 Non-Coal Mining*	0	0	0	0	0
5.5 Non–Coal Mining Cavities	0	0	0	0	0
5.5 Natural Cavities	0	0	0	0	0

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Cornwall and Devon Metalliferous Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0

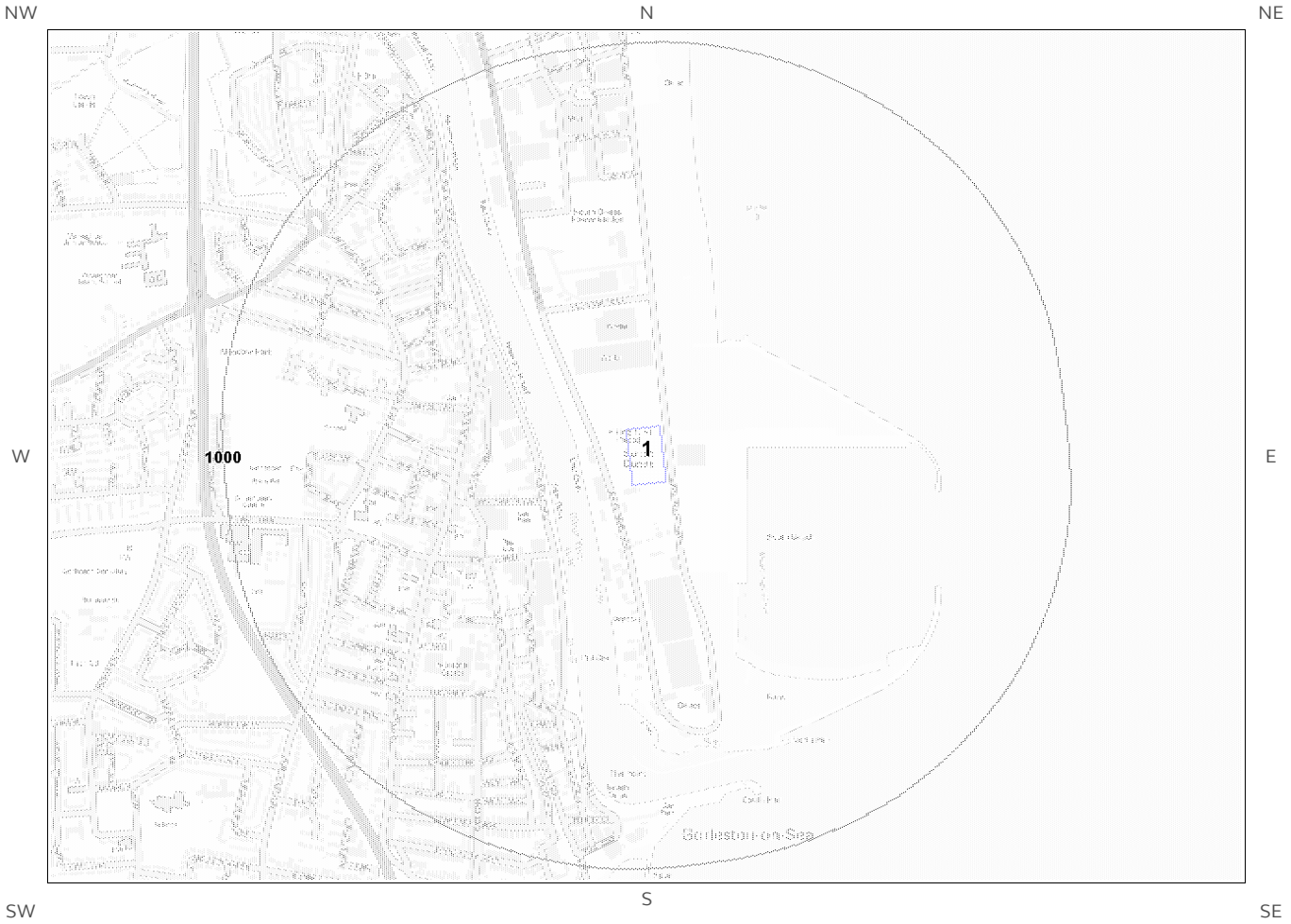
Section 6: Natural Ground Subsidence	On-site
6.1 Shrink-Swell Clay	Negligible
6.2 Landslides	Very Low
6.3 Ground Dissolution of Soluble Rocks	Negligible
6.4 Compressible Deposits	Very Low
6.5 Collapsible Deposits	Negligible
6.5 Running Sand	Low

Section 7: Borehole Records	On-site	0-50m	51-250
7 BGS Recorded Boreholes	0	0	16

Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250
8 Records of Background Soil Chemistry	2	0	0

Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500
9.1 Tunnels	0	0	0	Not Searched
9.2 Historical Railway and Tunnel Features	0	0	16	Not Searched
9.3 Historical Railways	0	0	0	Not Searched
9.4 Active Railways	0	0	0	Not Searched
9.5 Railway Projects	0	0	0	0

1:10,000 Scale Availability



1_10,000 Availability Legend

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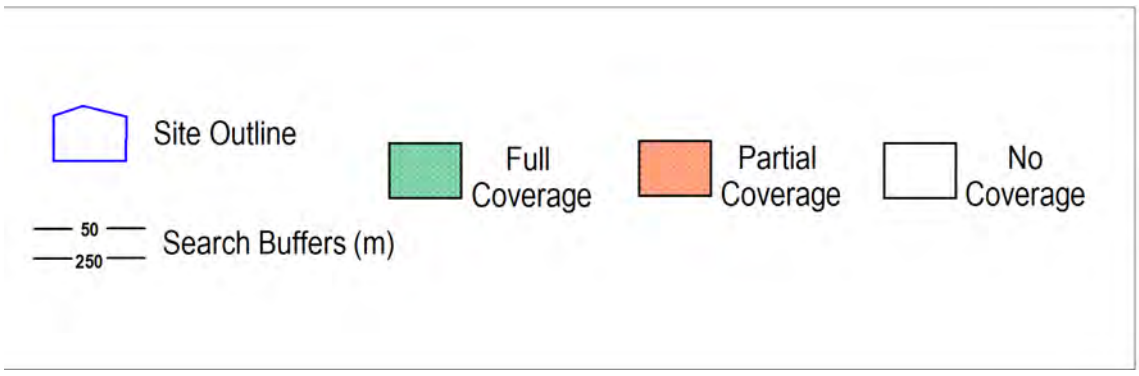


Availability of 1:10,000 Scale Geology Mapping

The following information represents the availability of the key components of the 1:10,000 scale geological data.

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	No deposits are mapped	No coverage	No coverage	No coverage

Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not all themes are mapped or available on every map sheet. Therefore a coverage layer showing the availability of the four themes is presented above.

The definitions of coverage are as follows:

Geology	Full Coverage	Partial Coverage	No Coverage
Bedrock	The whole tile has been mapped	Some but not all the tile has been mapped	No coverage
Superficial	The whole tile has been mapped	Some but not all of the tile has been mapped	No coverage
Artificial	Some deposits are mapped on this tile	-	No deposits are mapped
Mass Movement	Some deposits are mapped on this tile	-	No coverage

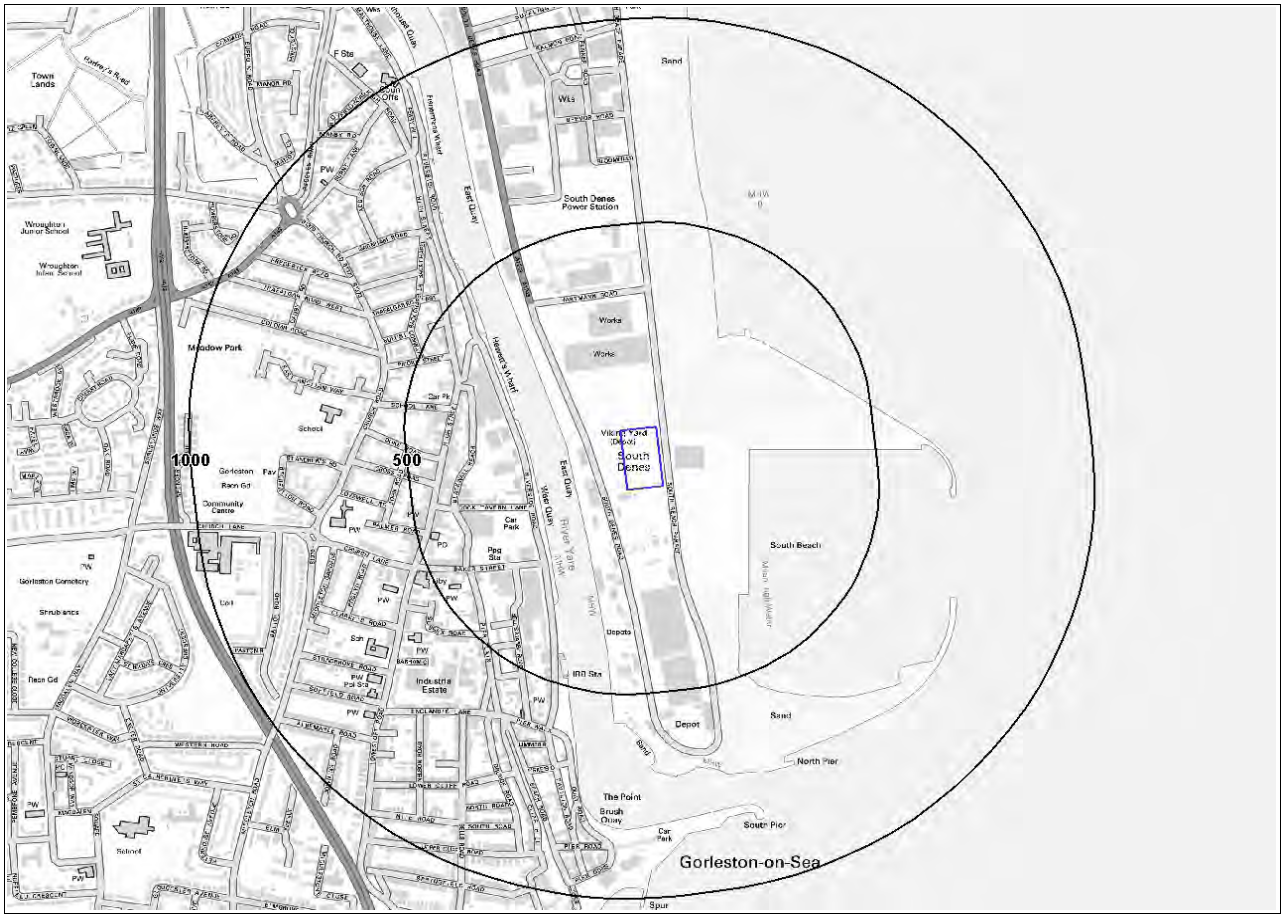
1 Geology (1:10,000 scale).

1.1 Artificial Ground map (1:10,000 scale)

NW N NE

W E

SW S SE



Artificial Ground Legend

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Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

1. Geology 1:10,000 scale

1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? No

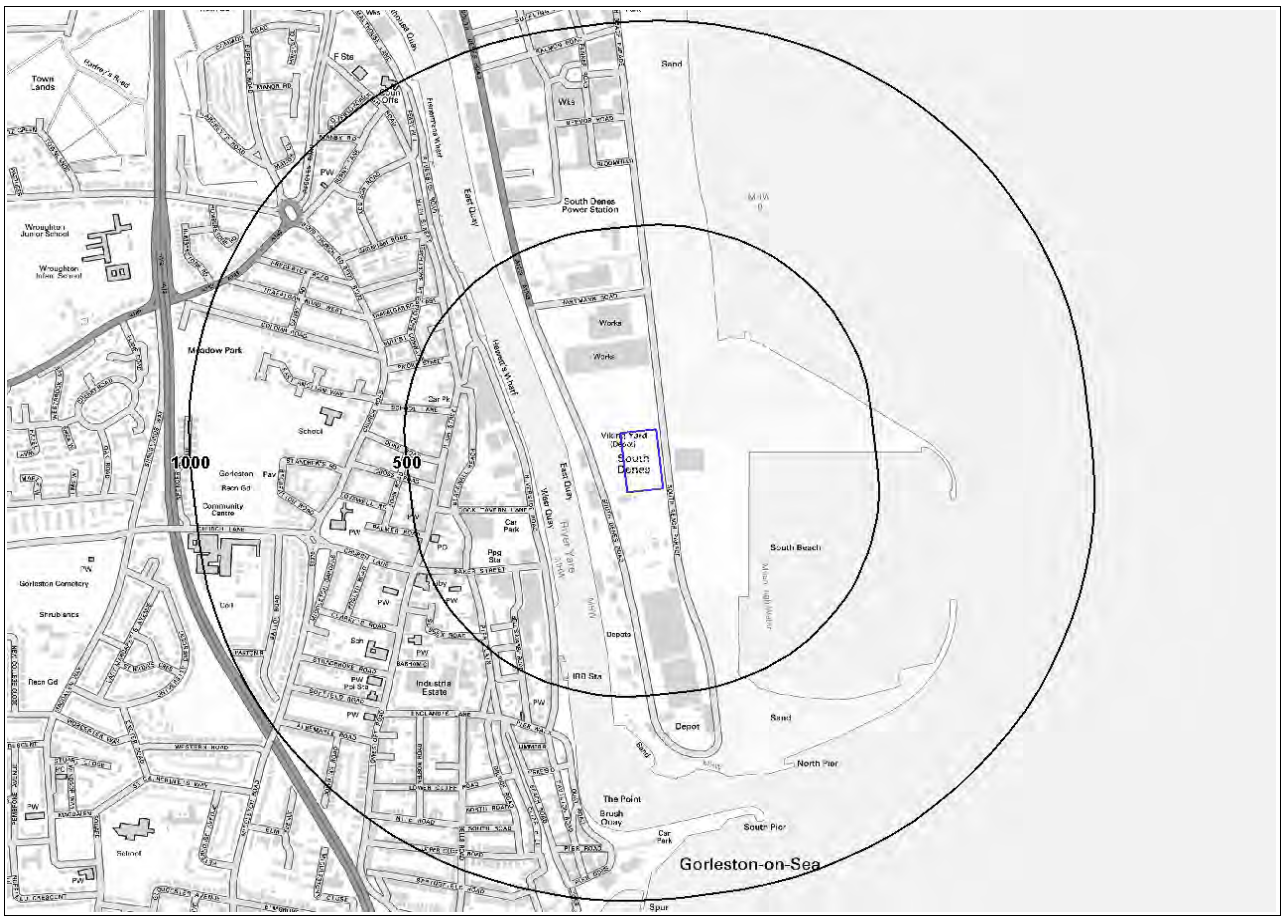
Database searched and no data found.

1.2 Superficial Deposits and Landslips map (1:10,000 scale)

NW N NE

W E

SW S SE



Artificial Ground Legend

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Site Outline

500
1000
Search Buffers (m)

1.2 Superficial Deposits and Landslips

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found.

1.2.2 Landslip

Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale?

No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:10,000 scale

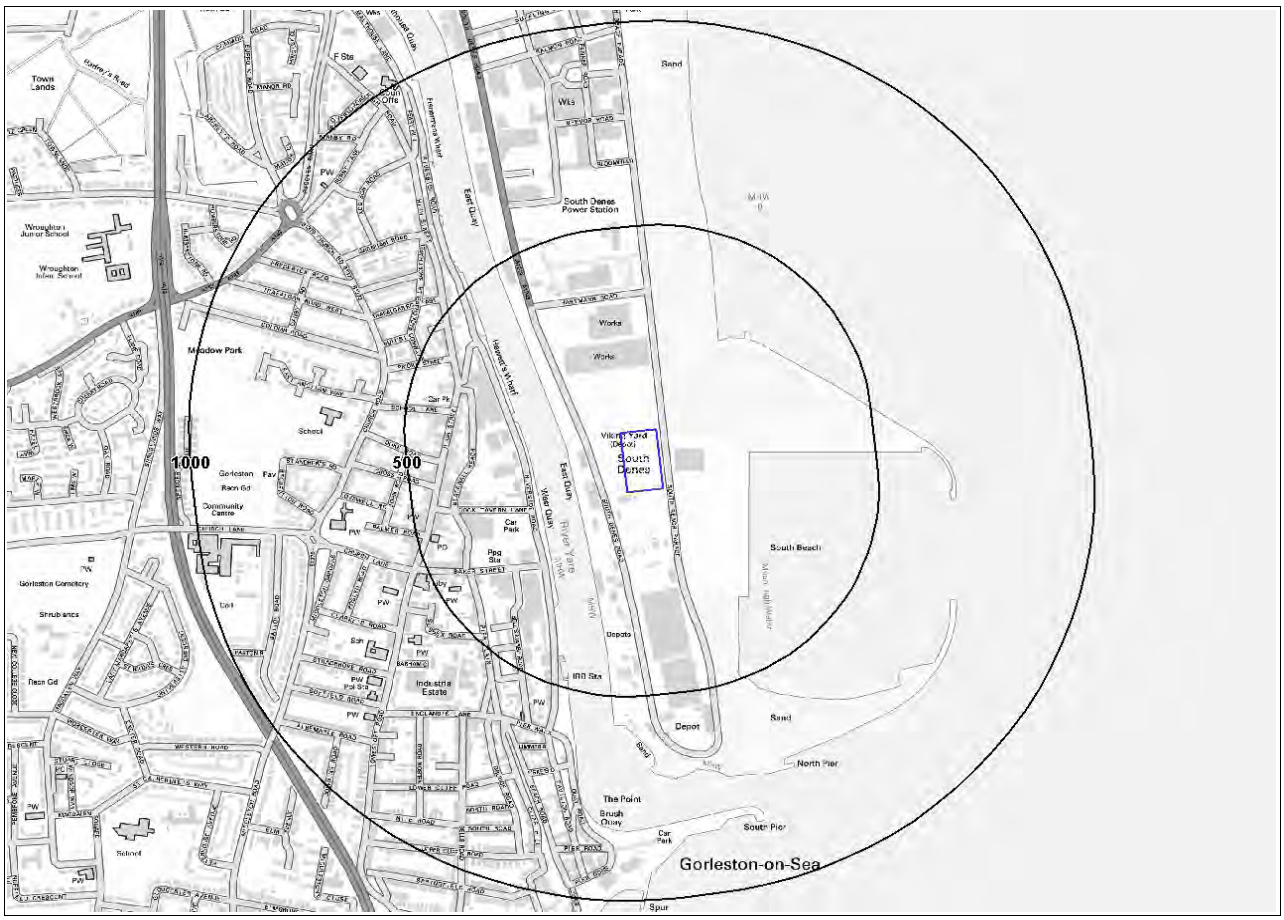
This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.3 Bedrock and linear features map (1:10,000 scale)

NW N NE

W E

SW S SE



Bedrock and linear features Legend

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Site Outline

500
1000
Search Buffers (m)

1.3 Bedrock and linear features

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary at 1:10,000 scale.

Database searched and no data found at this scale.

1.3.2 Linear features

Are there any records of linear features within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found at this scale.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of great Britain at 1:10,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

---

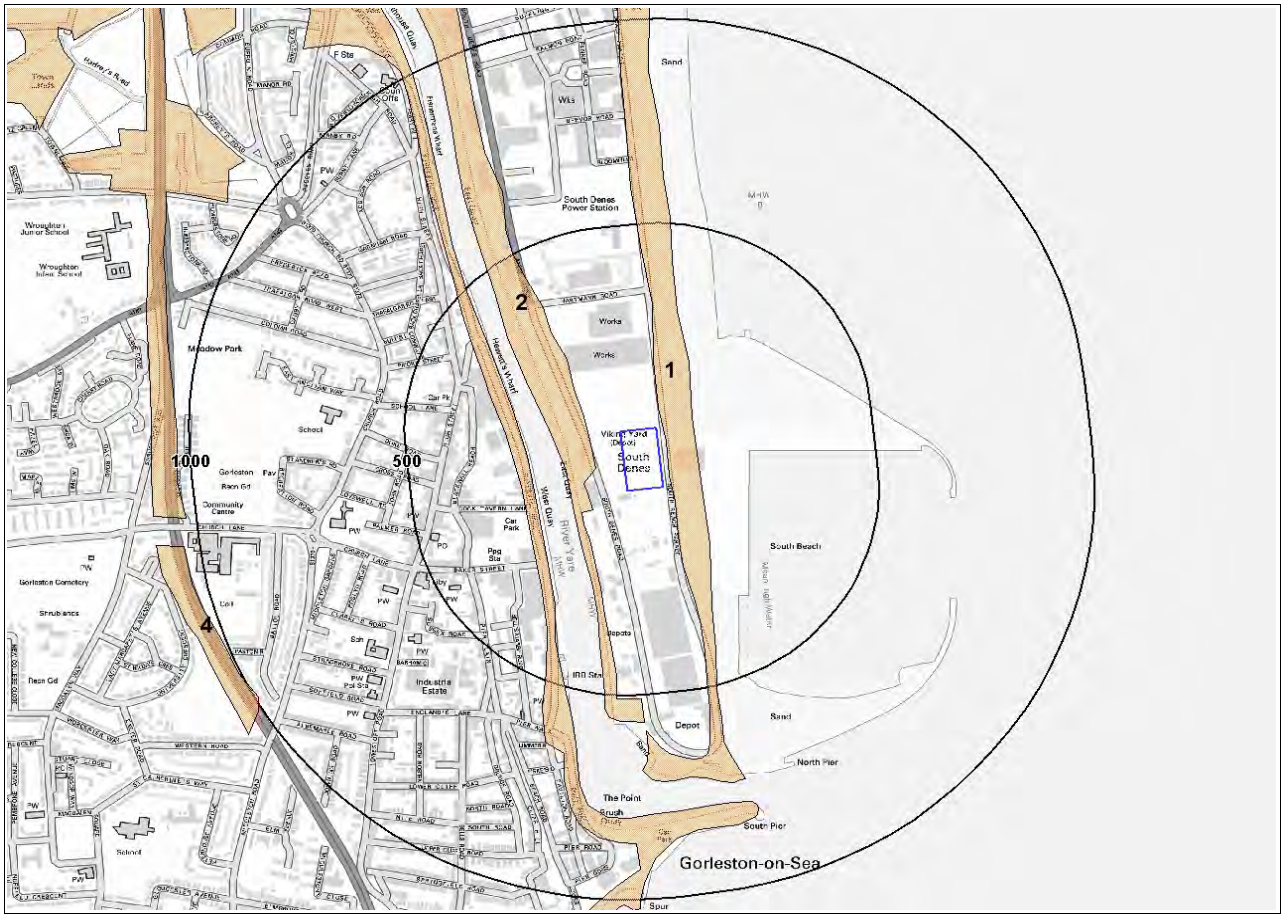
2 Geology 1:50,000 Scale

2.1 Artificial Ground map

NW N NE

W E

SW S SE



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Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 162

2.1.1 Artificial/ Made Ground

Are there any records of Artificial/ Made Ground within 500m of the study site boundary? Yes

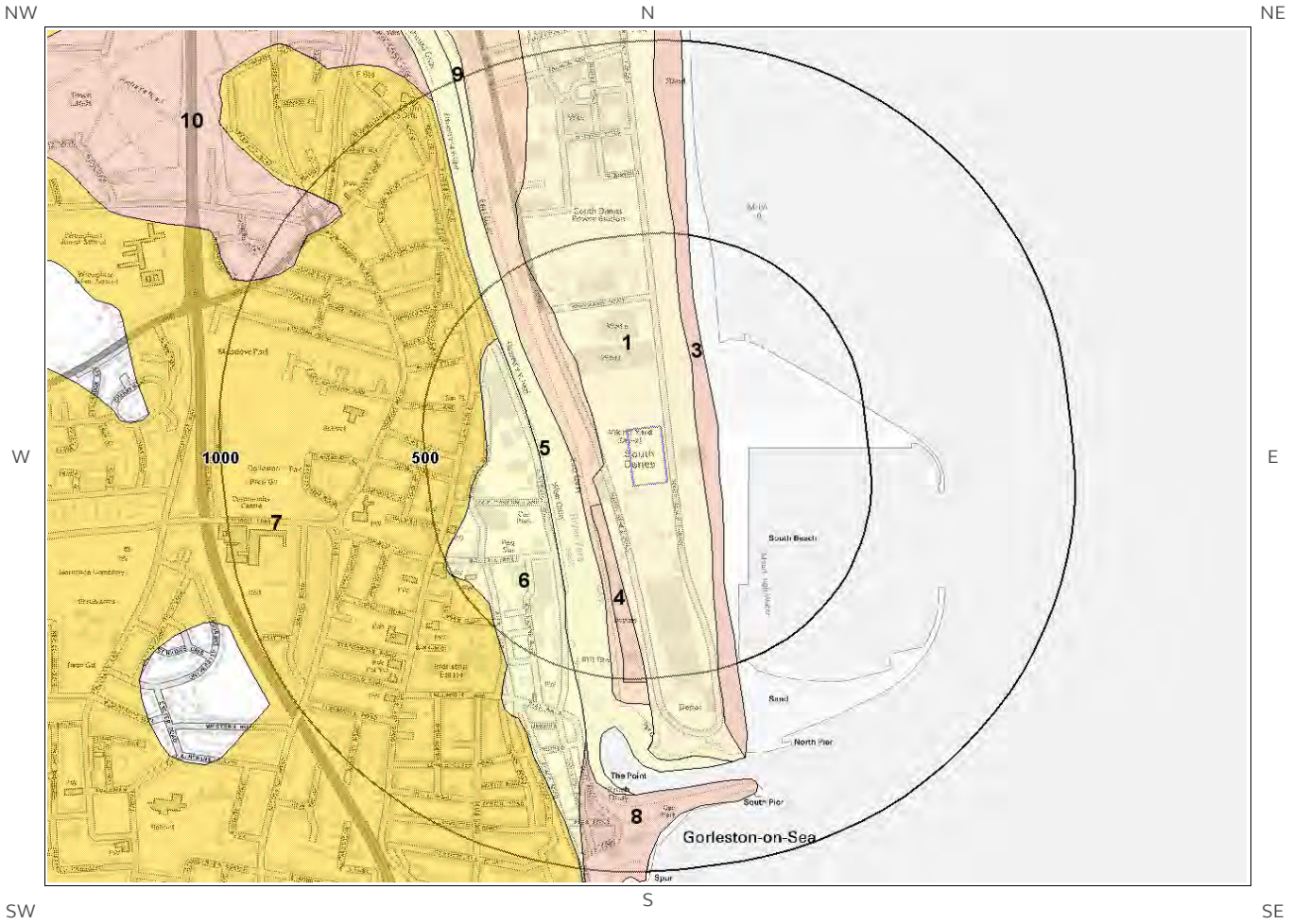
ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	14.0	E	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
2	66.0	W	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
3	212.0	W	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

2.1.2 Permeability of Artificial Ground

Are there any records relating to permeability of artificial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
14.0	E	Mixed	Very High	Low

2.2 Superficial Deposits and Landslips map (1:50,000 scale)



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Site Outline

500
1000
Search Buffers (m)

2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	BSA-S	BLOWN SAND	SAND
2	66.0	W	NRD-XSV	NORTH DENES FORMATION	SAND AND GRAVEL
3	84.0	E	MBD-XSV	MARINE BEACH DEPOSITS	SAND AND GRAVEL
4	92.0	SW	MBD-XSV	MARINE BEACH DEPOSITS	SAND AND GRAVEL
5	131.0	W	TRD-XCZ	TIDAL RIVER OR CREEK DEPOSITS	CLAY AND SILT
6	212.0	W	BRYD-XCZ	BREYDON FORMATION	CLAY AND SILT
7	347.0	W	HPGL-S	HAPPISBURGH GLACIGENIC FORMATION	SAND

2.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Intergranular	High	High

2.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, there are: Artificial/ Made Ground, Superficial/ Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site boundary? No

Database searched and no data found.

2.3 Bedrock and linear features map (1:50,000 scale)

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Site Outline

500
1000
Search Buffers (m)

2.3 Bedrock, Solid Geology & linear features

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 162

2.3.1 Bedrock/Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary:

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	CRAG-XSV	CRAG GROUP - SAND AND GRAVEL	-

2.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site boundary? Yes

Distance	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Intergranular	Very High	High

2.3.3 Linear features

Are there any records of linear features within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/Solid Geology and linear features such as faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nation wide coverage.

3 Radon Data

3.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

The radon data in this report is supplied by the BGS/Public Health England and is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland. The dataset was created using long-term radon measurements in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland, combined with geological data. The dataset is considered accurate to 50m to allow for the margin of error in geological lines, and the findings of this report supercede any answer given in the less accurate Indicative Atlas of Radon in Great Britain, which simplifies the data to give the highest risk within any given 1km grid square. As such, the radon atlas is considered indicative, whereas the data given in this report is considered definitive.

3.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

---

4 Ground Workings map

Ground Workings Legend

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Site Outline

125
250
Search Buffers (m)

Historic Surface Ground Workings

Historic Underground Workings

Current Ground Workings

4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on Groundsure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Use	Date
1A	47.0	W	652965 304656	Quay	1946
2A	47.0	W	652965 304656	Quay	1904
3B	64.0	W	652975 304520	Quay	1981
4B	64.0	W	652975 304520	Quay	1952
5B	64.0	W	652975 304520	Quay	1970
6	80.0	W	653032 304455	Unspecified Pit	1904
7A	99.0	W	652963 304647	Quay	1883
8A	109.0	W	652970 304662	Quay	1970
9	110.0	SW	653062 304369	Unspecified Heap	1904
10C	122.0	W	652949 304678	Quay	1938
11C	122.0	W	652949 304678	Quay	1938
12D	125.0	N	653038 304903	Sand Pit	1938
13D	128.0	N	653038 304905	Sand Pit	1946
14E	129.0	W	652927 304444	Quay	1970
15E	129.0	W	652927 304444	Quay	1981
16G	132.0	S	653056 304307	Quay	1904
17F	157.0	W	652925 304278	Quay	1904
18F	159.0	W	652923 304322	Quay	1946
19	176.0	SW	652950 304291	Quay	1952
20G	189.0	S	653048 304301	Quay	1883
21H	198.0	S	653052 304254	Quay	1938

ID	Distance (m)	Direction	NGR	Use	Date
22H	198.0	S	653052 304254	Quay	1938
23	213.0	W	652893 304512	Unspecified Wharf	1883
24F	214.0	SW	652929 304303	Quay	1938
25F	214.0	SW	652929 304303	Quay	1938
26I	217.0	W	652849 304650	Unspecified Wharf	1938
27I	217.0	W	652849 304650	Unspecified Wharf	1938
28I	218.0	W	652849 304647	Unspecified Wharf	1946
29I	218.0	W	652848 304648	Unspecified Wharf	1904
30	224.0	NW	652879 304859	Quay	1884
31J	225.0	NW	652841 304760	Unspecified Wharf	1952
32J	225.0	NW	652841 304760	Unspecified Wharf	1970
33	225.0	W	652823 304510	Graving Dock	1883
34	231.0	W	652829 304554	Graving Dock	1901
35	238.0	W	652854 304459	Unspecified Wharf	1901
36	239.0	W	652882 304408	Quay	1883

4.2 Historical Underground Working Features derived from Historical Mapping

This data is derived from the Groundsure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? No

Database searched and no data found.

4.3 Current Ground Workings

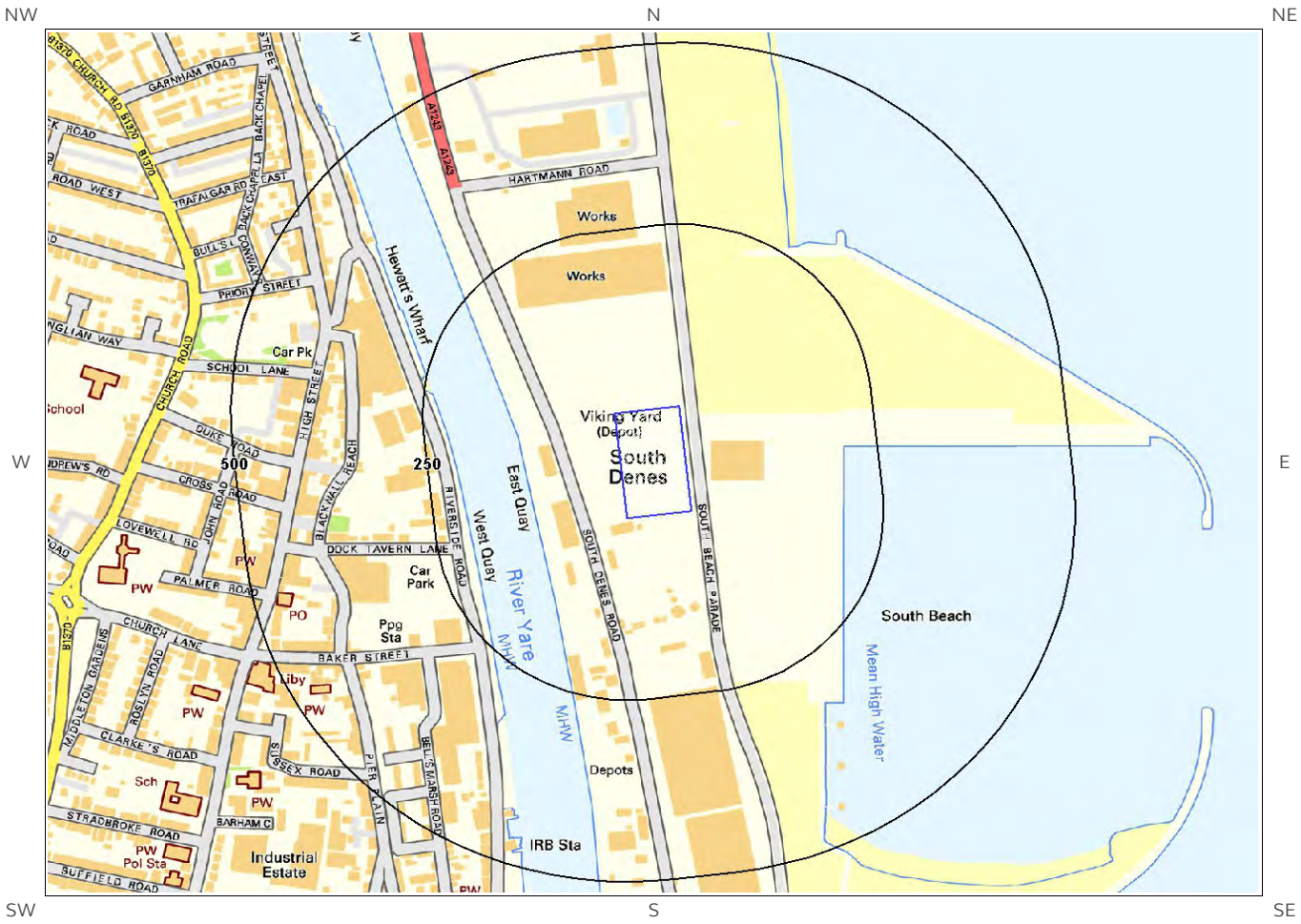
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? Yes

The following Current Ground Workings information is provided by British Geological Survey:

ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
Not shown	742.0	N	653026 305365	Sand	Nelson Sand Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

5 Mining, Extraction & Natural Cavities map



Mining, Extraction and Natural Cavities Legend

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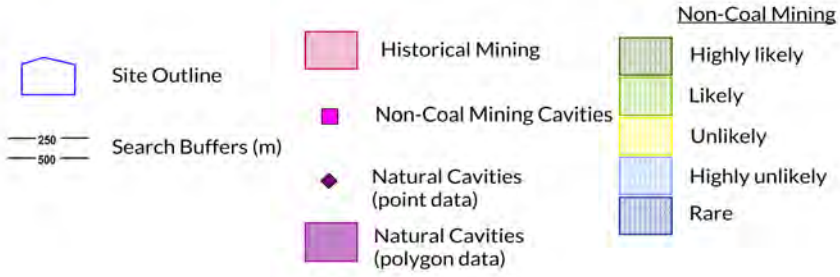


5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

This dataset is derived from Groundsure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

Are there any JPB Mining areas within 1000m of the study site boundary? No

The following information provided by JPB is not represented on mapping: Database searched and no data found.

5.4 Non-Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.5 Non-Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled "Review of mining instability in Great Britain, 1990" PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.6 Natural Cavities

This dataset provides information based on the Peter Brett Associates natural cavities database. The dataset is made up of points and polygons. Where polygons are used these represent an area in which it is expected the cavities could be found. It does not indicate that cavities are present everywhere within the polygon, and caution should be used in the interpretation of this data.

Are there any Natural Cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.7 Brine Extraction

This data provides information from the Cheshire Brine Subsidence Compensation Board.

Are there any Brine Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.9 Cornwall and Devon Metalliferous Mining

This dataset provides information on metalliferous mining areas in Cornwall/Devon and is derived from records held by Mining Searches UK.

Are there any Cornwall and Devon Metalliferous Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.10 Clay Mining

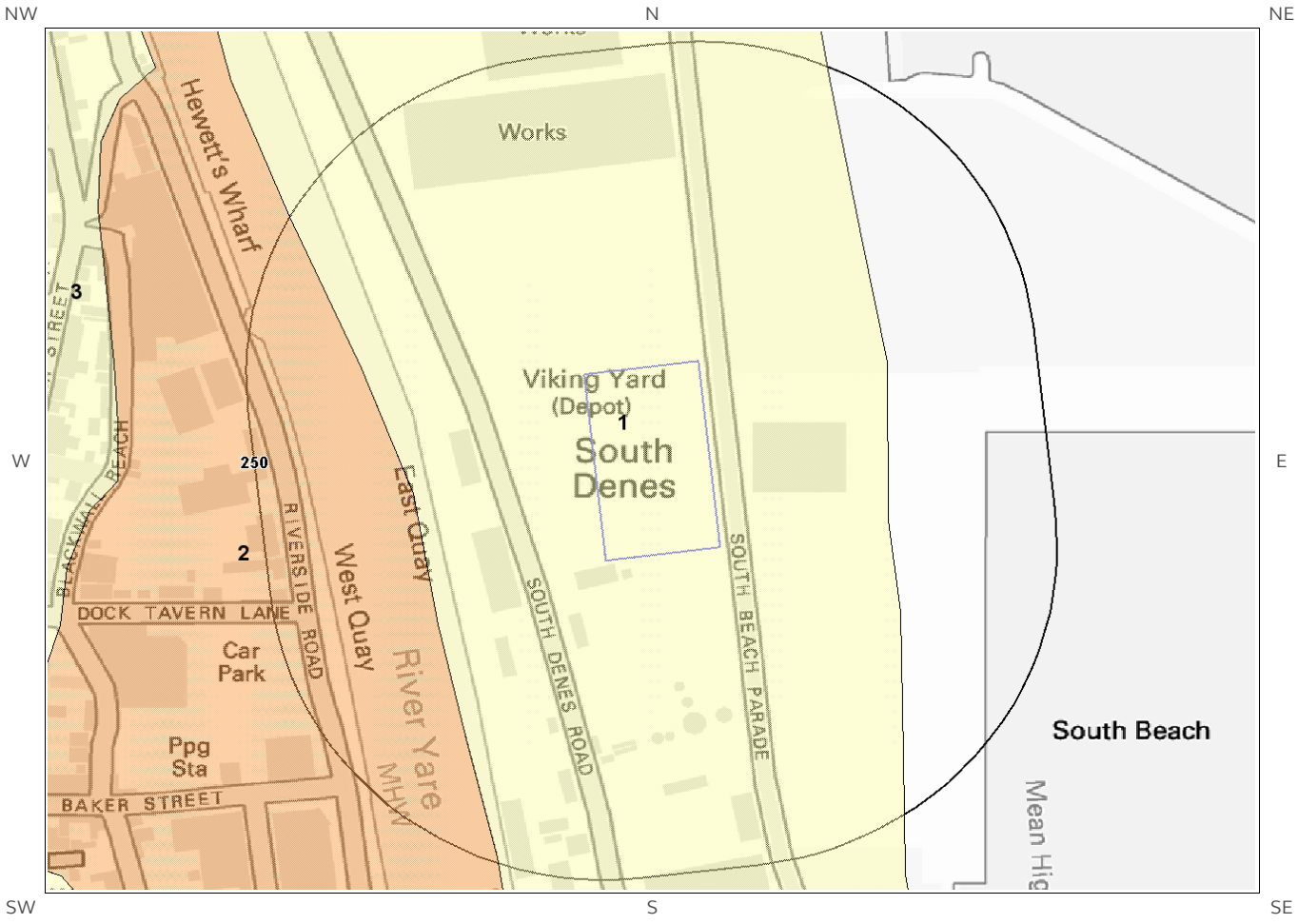
This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

Are there any Clay Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

6 Natural Ground Subsidence

6.1 Shrink-Swell Clay map



Shrink Swell Clay Legend

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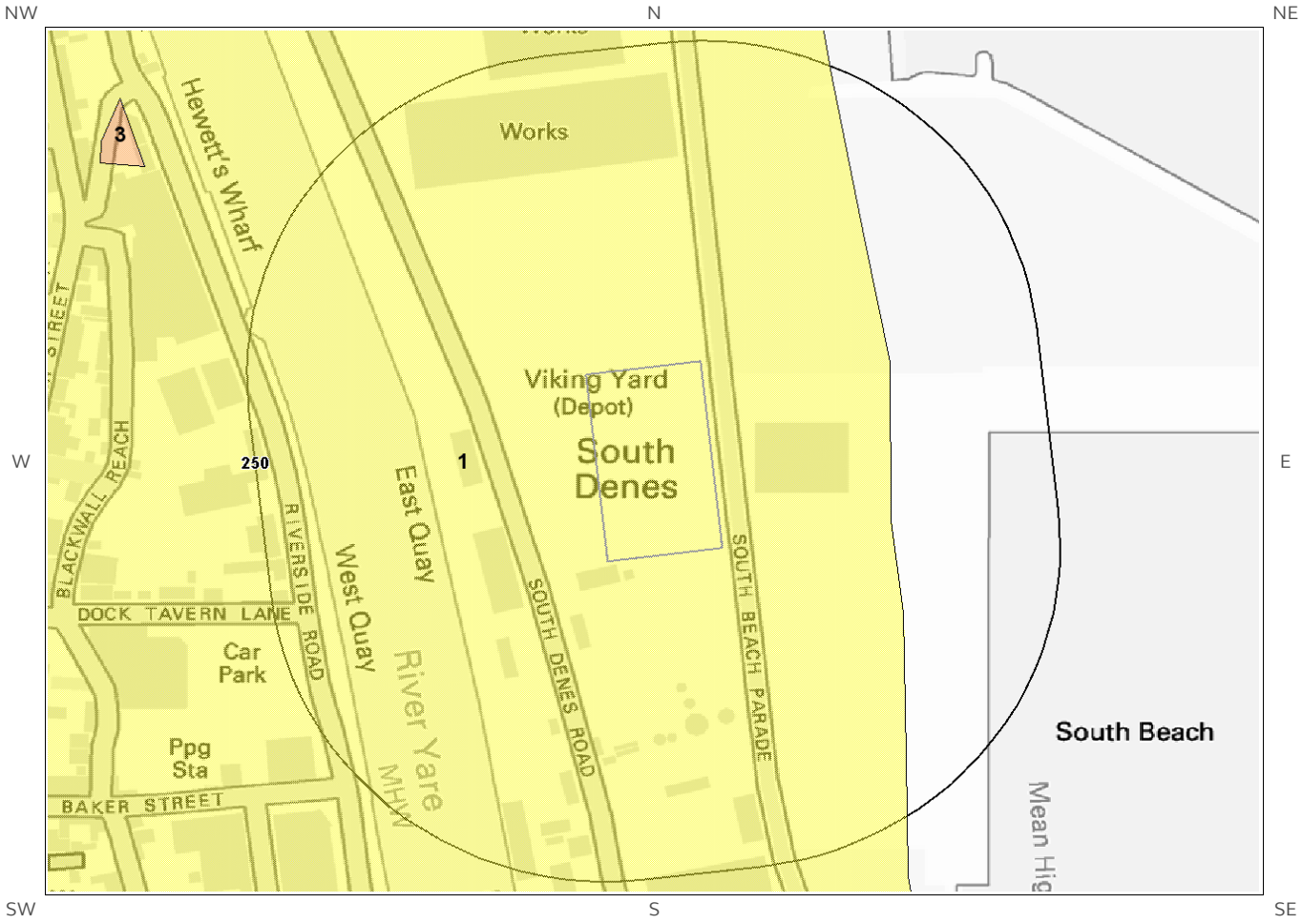
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.2 Landslides map



Landslides Legend

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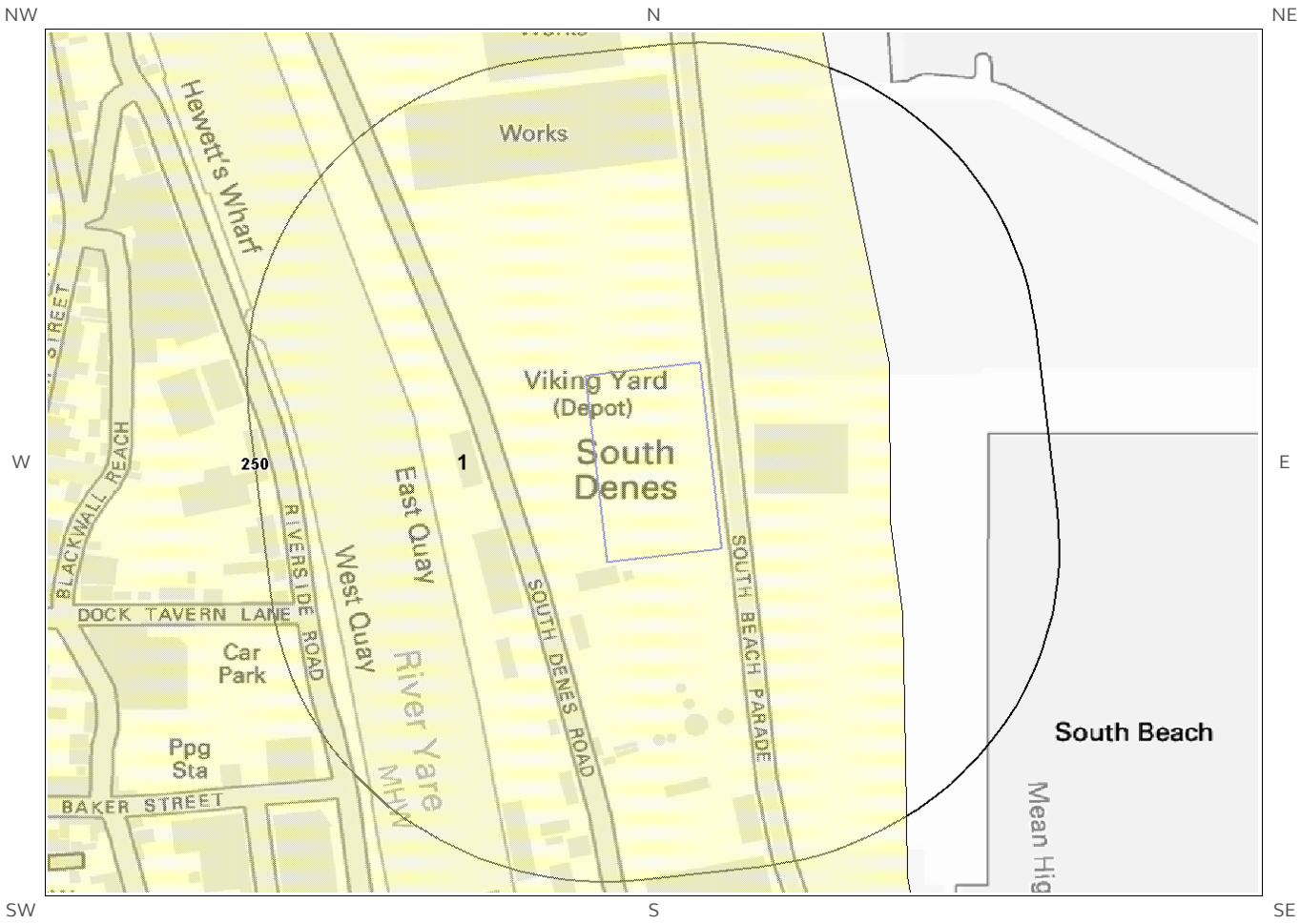
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.3 Ground Dissolution of Soluble Rocks map



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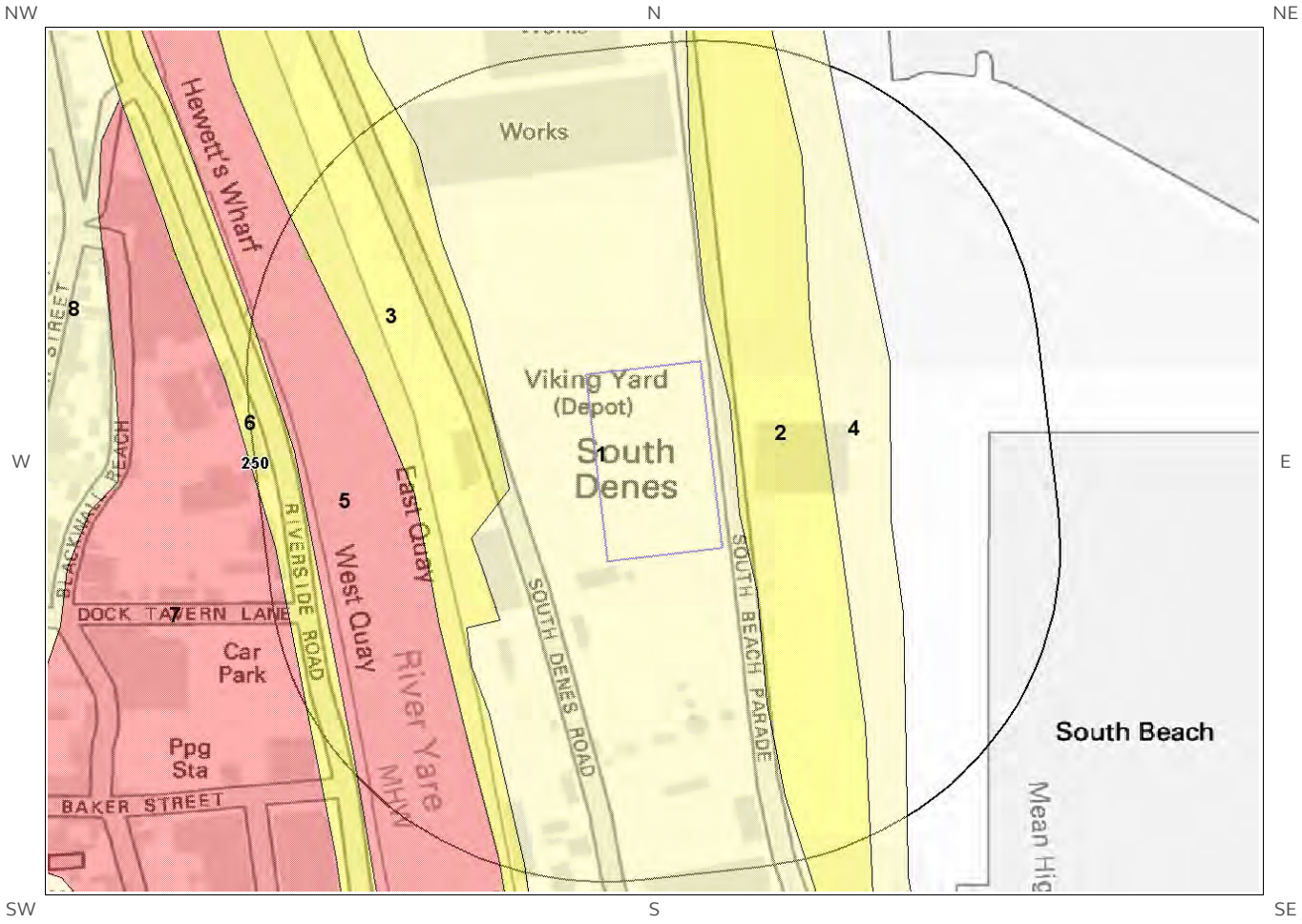
Ground Dissolution Soluble Rocks Legend

6.4 Compressible Deposits map



Compressible Deposits Legend

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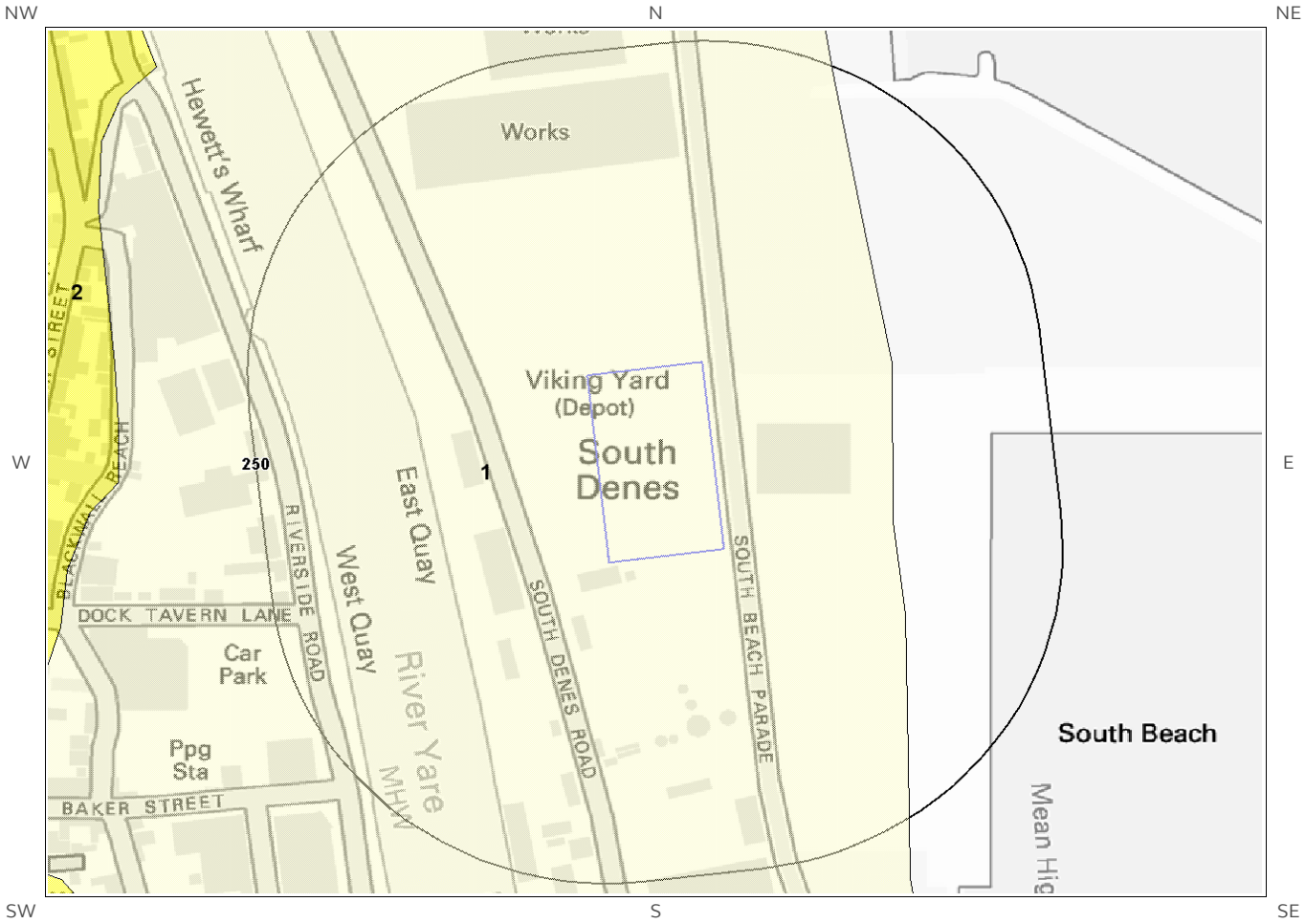
6.5 Collapsible Deposits map



Collapsible Deposits Legend

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Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.6 Running Sand map

Running Sand Legend

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6 Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site*[*] boundary? Low

6.1 Shrink-Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.

6.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

6.3 Ground Dissolution of Soluble Rocks

The following Ground Dissolution information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

* This includes an automatically generated 50m buffer zone around the site

6.4 Compressible Deposits

The following Compressible Deposits information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.
2	14.0	E	Very Low	Very low potential for compressible deposits to be present. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

6.5 Collapsible Deposits

The following Collapsible Rocks information provided by the British Geological Survey:

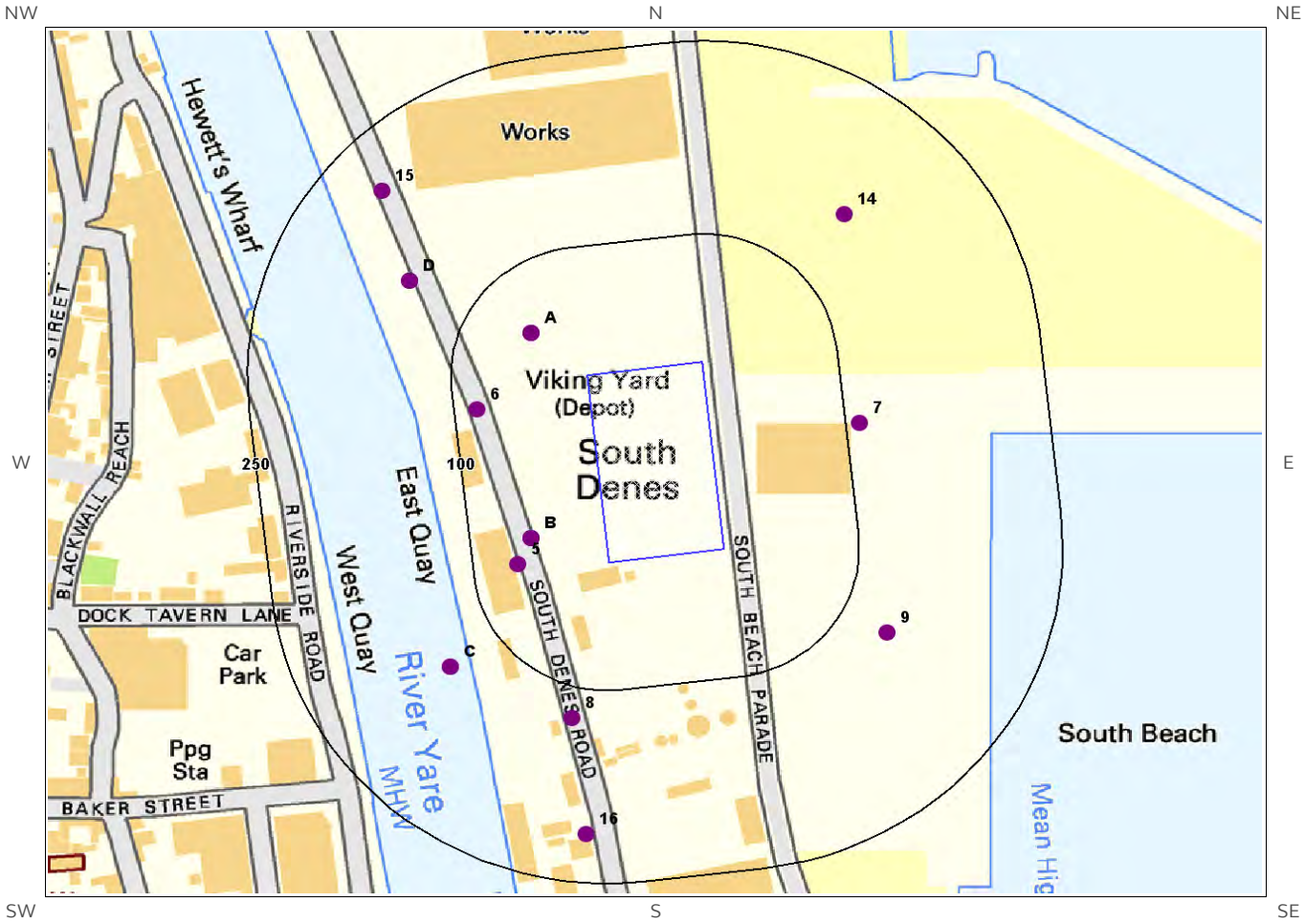
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for collapsible deposits identified. No actions required to avoid problems due to collapsible deposits. No special ground investigation required, or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

6.6 Running Sands

The following Running Sands information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Low	Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build - consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property - no significant increase in insurance risk due to running sand problems is likely.
2	14.0	E	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

7 Borehole Records map



Borehole Records Legend

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Site Outline

Borehole Locations

125
250
Search Buffers (m)

7 Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary: 16

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1A	53.0	NW	653060 304660	TG50SW199	14.3	GENERATING STATION SOUTH DENES GT YARMOUTH NO 6
2A	53.0	NW	653060 304660	TG50SW10	18.9	SOUTH DEANES
3B	55.0	W	653060 304500	TG50SW9	18.59	SOUTH DEANES
4B	55.0	W	653060 304500	TG50SW187	14	GENERATING STATION SOUTH DENES GT YARMOUTH NO 7
5	67.0	W	653050 304480	TG50SW136	-9999	EAST QUARRY TRIAL PIT PS8
6	84.0	W	653020 304600	TG50SW137	-9999	EAST QUARRY TRIAL PIT PS9
7	110.0	E	653302 304590	TG50SW28	-9999	GREAT YARMOUTH 3
8	125.0	S	653090 304360	TG50SW135	-9999	EAST QUARRY TRIAL PIT PS7
9	137.0	SE	653322 304427	TG50SW32	-9999	GREAT YARMOUTH TP4
10C	143.0	SW	653000 304400	TG50SW176	20	SOUTHDENES RD GT YARMOUTH 1
11C	143.0	SW	653000 304400	TG50SW177	11.5	SOUTHDENES RD GT YARMOUTH 2
12D	150.0	NW	652970 304700	TG50SW138	-9999	EAST QUARRY TRIAL PIT PS10
13D	150.0	NW	652970 304700	TG50SW188	18.3	GENERATING STATION SOUTH DENES GT YARMOUTH NO 5
14	156.0	NE	653291 304752	TG50SW31	-9999	GREAT YARMOUTH TP3
15	208.0	NW	652950 304770	TG50SW139	-9999	EAST QUARRY TRIAL PIT PS11
16	213.0	S	653100 304270	TG50SW134	-9999	EAST QUARRY TRIAL PIT PS6

The borehole records are available using the hyperlinks below: Please note that if the donor of the borehole record has requested the information be held as commercial-in-confidence, the additional data will be held separately by the BGS and a formal request must be made for its release.

#1A: scans.bgs.ac.uk/sobi_scans/boreholes/520769
#2A: scans.bgs.ac.uk/sobi_scans/boreholes/520579
#3B: scans.bgs.ac.uk/sobi_scans/boreholes/520578
#4B: scans.bgs.ac.uk/sobi_scans/boreholes/520757
#10C: scans.bgs.ac.uk/sobi_scans/boreholes/520746
#11C: scans.bgs.ac.uk/sobi_scans/boreholes/520747
#13D: scans.bgs.ac.uk/sobi_scans/boreholes/520758

8 Estimated Background Soil Chemistry

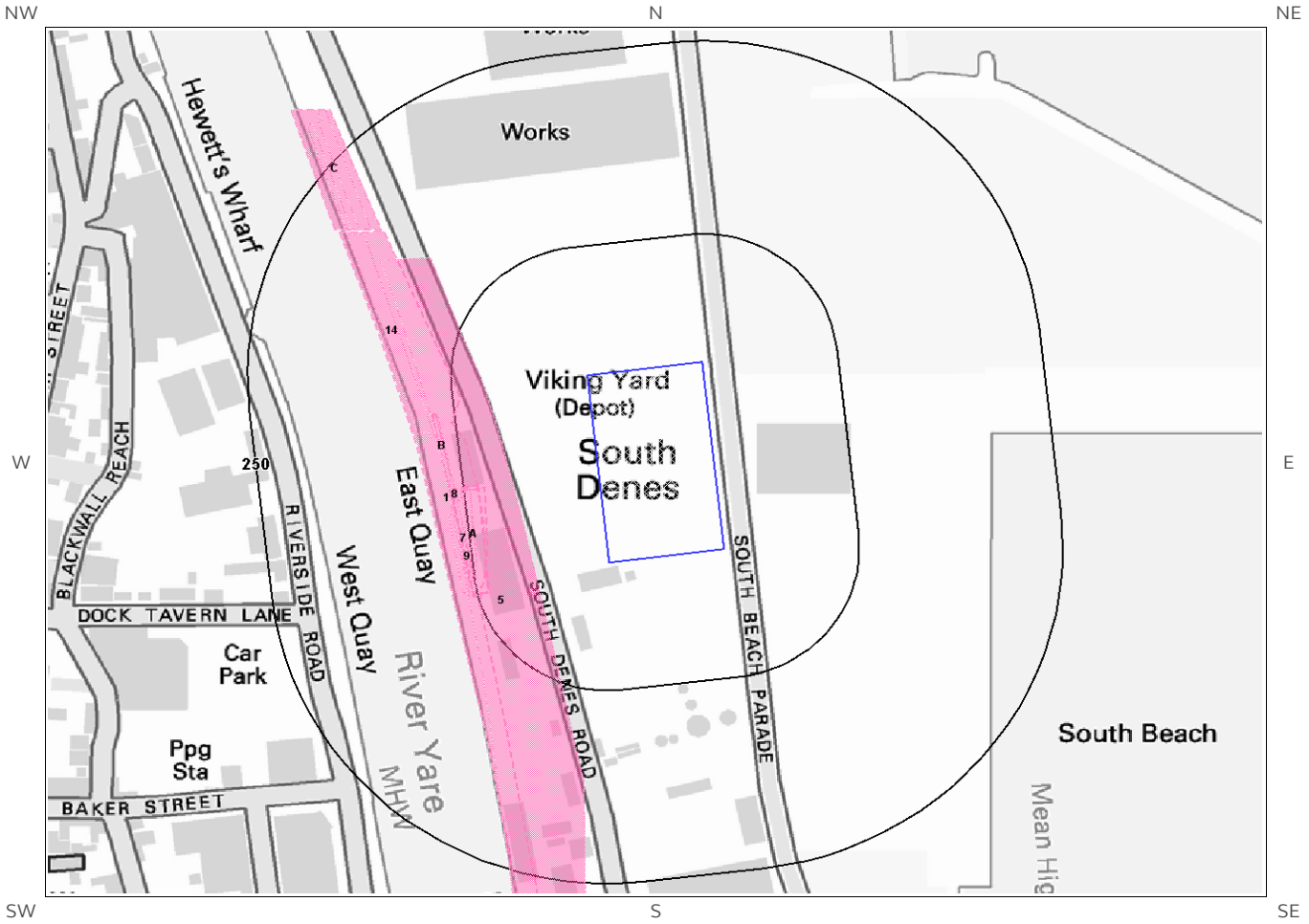
Records of background estimated soil chemistry within 250m of the study site boundary: 2

For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geo Insight User Guide, available on request.

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg

*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

9 Railways and Tunnels map



Railways and Tunnels Legend

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- Site Outline
- 250 / 500 Search Buffers (m)
- Underground or Partially Underground Railway / Subway System
- Railway Tunnel (OS Mapping)
- Abandoned or Dismantled Railway (OpenStreetMap)
- Railway Track (OS Mapping)
- Railway Track (OpenStreetMap)
- High Speed 2
- High Speed 2 Revised Proposed Route
- Crossrail 1
- Railway and/or Tunnel Feature from Historical Mapping

9 Railways and Tunnels

9.1 Tunnels

This data is derived from OpenStreetMap and provides information on the possible locations of underground railway systems in the UK - the London Underground, the Tyne & Wear Metro and the Glasgow Subway.

Have any underground railway lines been identified within the study site boundary? No

Have any underground railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels map.

This data is derived from Ordnance Survey mapping and provides information on the possible locations of railway tunnels forming part of the UK overground railway network.

Have any other railway tunnels been identified within the site boundary? No

Have any other railway tunnels been identified within 250m of the site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels map.

9.2 Historical Railway and Tunnel Features

This data is derived from Groundsure's unique Historical Land-use Database and contains features relating to tunnels, railway tracks or associated works that have been identified from historical Ordnance Survey mapping.

Have any historical railway or tunnel features been identified within the study site boundary? No

Have any historical railway or tunnel features been identified within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Details	Date
5	55	W	n/a	Railway	1906
1	85	W	653047 304275	Tramway Sidings	1904
2A	88	W	653015 304498	Railway Sidings	1938
3A	89	W	653016 304499	Railway Sidings	1946
6A	95	W	653009 304498	Railway Sidings	1927
7	96	W	653008 304499	Tramway Sidings	1905

ID	Distance (m)	Direction	NGR	Details	Date
8	100	W	653003 304532	Railway Sidings	1966
9	101	W	653012 304484	Railway Sidings	1989
10B	109	W	652994 304566	Railway Sidings	1974
11B	109	W	652994 304566	Railway Sidings	1957
12B	109	W	652994 304566	Railway Sidings	1965
13B	109	W	652993 304569	Railway Sidings	1990
14	117	W	652956 304658	Railway Sidings	1905
4C	189	NW	652916 304787	Railway Sidings	1904
15C	195	NW	652923 304787	Railway Sidings	1905
16C	207	NW	652912 304781	Railway Sidings	1905

Any records that have been identified are represented on the Railways and Tunnels map.

9.3 Historical Railways

This data is derived from OpenStreetMap and provides information on the possible alignments of abandoned or dismantled railway lines in proximity to the study site.

Have any historical railway lines been identified within the study site boundary? No

Have any historical railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels map.

9.4 Active Railways

These datasets are derived from Ordnance Survey mapping and OpenStreetMap and provide information on the possible locations of active railway lines in proximity to the study site.

Have any active railway lines been identified within the study site boundary? No

Have any active railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels map.

9.5 Railway Projects

These datasets provide information on the location of large scale railway projects High Speed 2 and Crossrail 1 .

Is the study site within 5km of the route of the High Speed 2 rail project?	No
Is the study site within 500m of the route of the Crossrail 1 rail project?	No

Further information on proximity to these routes, the project construction status and associated works can be obtained through the purchase of a ***Groundsure HS2 and Crossrail 1 Report****.*

The route data has been digitised from publicly available maps by Groundsure. The route as provided relates to the Crossrail 1 project only, and does not include any details of the Crossrail 2 project, as final details of the route for Crossrail 2 are still under consultation.

Please note that this assessment takes account of both the original Phase 2b proposed route and the amended route proposed in 2016. As the Phase 2b route is still under consultation, Groundsure are providing information on both options until the final route is formally confirmed. Practitioners should take account of this uncertainty when advising clients.

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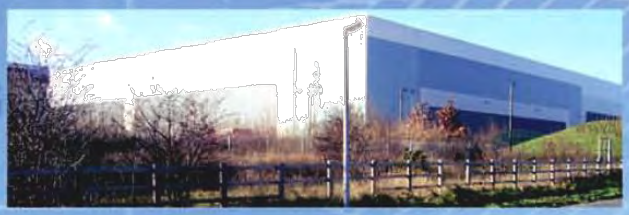

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23rd September 2019
Report No 10444/R02 Issue 1

Great Yarmouth

Phase 2 Site Investigation Report

Prepared for

Veolia ES (UK) Ltd

Great Yarmouth

Phase 2 Site Investigation Report

23rd September 2019

Carried Out For:

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DOCUMENT INFORMATION AND CONTROL SHEET

Document Status and Approval Schedule

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Issue	Status	Date		Signature	Date
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DISCLAIMER

This report should be read with the Service Constraints Report Limitations & Planning Requirements set out in Appendix A.

bsi. ISO 9001 Quality Management FS573193
bsi. ISO 14001 Environmental Management EMS573194

Executive Summary

The client, Veolia ES (UK) Ltd, commissioned TerraConsult Ltd to undertake a Phase 2 Site Investigation Report for a site at Great Yarmouth, which is being considered for development.

Development Proposals

Development proposals are understood to comprise construction of a decommissioning site.

Conclusions

Chrysotile asbestos was encountered within the Made Ground at a single location which poses an unacceptable risk to site workers and end users.

Recommendations

Recommendations are provided within the subsequent report.

Great Yarmouth

Phase 2 Site Investigation Report

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Appendix A Service Constraints and Report Limitations
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Appendix D Laboratory Analysis Results

1. Introduction

1.1 Background Information

TerraConsult Limited (TerraConsult) was commissioned by Veolia ES (UK) Ltd to undertake a Phase 2 Site Investigation for the site known as Great Yarmouth.

1.2 Development Proposals

It is understood that the development proposals comprise an open air decommissioning site.

1.3 Purpose of Investigation

The purpose of the report is to provide information on the condition of the site prior to application for an Environmental Permit, and to provide information to guide any changes to the current proposed land use. The specific activities carried out are as follows:

- Review existing reports, history of the site and geo-environmental data;
- Carry out a site walk over;
- Carry out an intrusive investigation comprising dynamic sampler boreholes with associated sampling;
- Ground gas and groundwater monitoring;
- Laboratory testing for potential contaminants and geotechnical purposes;
- Assess the general nature and extent of contamination at the site and carry out a contamination risk assessment to determine if the site poses a risk to potential receptors;
- To monitor the ground gas conditions at the site and undertake a ground gas risk assessment;
- Should the investigation indicate that remediation of contaminants be required, provide recommendations of feasible remedial measures to facilitate development of the site for residential end use;
- Provide preliminary geotechnical information on the ground conditions for foundation and floor slab design.

This report has been devised to comply with the relevant principles and requirements of a range of guidance with regards to potentially contaminated land, including (but not limited to):

- Part IIA of the Environment Protection Act, 1990;
- Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, April 2012);
- National Planning Policy Framework (HCA, March 2012);
- BS5930:2015: “Code of practice for site investigations”;
- BS10175: 2011 +A2:2017 “Investigation of Potentially Contaminated Sites - Code of Practice”;
- The Building Regulations 2010. Part C (HM Government 2013)

- DEFRA/Environment Agency (2004) Report CLR11 “Model Procedures for the Management of Land Contamination”;
- Environment Agency (2011) Report GPLC1 “Guiding Principles for Land Contamination”;
- Environment Agency (2017) “The Environment Agency’s Approach to Groundwater Protection” November 2017 Version 1.1

1.4 Previous Investigations

It is understood that the site has not been subject to any previous investigations; however an investigation of a similar scope has been carried out by TerraConsult at an adjacent site in 2018.

1.5 Limitations

TerraConsult’s service constraints and report limitations are presented in Appendix A and a description of environmental risk assessment methodology and terminology is presented in Appendix B.

In preparation of this report, it is assumed that any information provided to TerraConsult by the client in connection with the commission is accurate, complete and not misleading. TerraConsult cannot guarantee the accuracy or validity of this information.

2. Summary of Phase 1 Desk Study (August 2019)

2.1 Site Details

A summary of the site's location and a brief description is presented in Table 2.1.

Table 2.1 Summary of Description of the Site and its Environs

Location	The site is located off South Beach Parade, approximately 610m north of Great Yarmouth Outer Harbour.
Grid Reference	653146 304562
Site Area	1.24ha (approximately)
Topography	The site is relatively flat.

The site is accessed off South Beach Parade, approximately 50m north of Brineflow Properties and Handling. The site is bounded by depots to the north and south, South Beach Parade to the east and South Denes Road to the west. The site boundaries are demarcated by a brick wall to the east and south and open land to the north and west.

The site comprises concrete hardstanding with what appears to be shipping containers along the eastern boundary. A post or mast is present in the north-west and concrete posts are present along the western and northern boundaries.

2.1.1 Anticipated Ground Conditions

The site surface is anticipated to be mainly concrete hardstanding. The site is underlain by superficial deposits of Blown Sand, and the Crag Group solid geology, all with recorded high permeability with an intergranular flow type.

2.1.2 Geological Hazards and Radon

The site is not within a radon affected area, as less than 1% of properties are above the action level. No radon protective measures are considered necessary for new properties or extensions as described in Building Research Establishment (BRE) publication BR211.

There is a low hazard rating of running sands on site, and a very low hazard of landslides.

2.1.3 Hydrogeology and Hydrology

The superficial deposits underlying the site are designated a Secondary A Aquifer and the underlying geology is designated a Principal Aquifer.

The nearest surface water feature is approximately 116m west of site.

There are no recorded surface or ground water abstraction licences within 250m of the site.

An Environment Agency Zone 2 floodplain is 63m west of site, and a Zone 3 floodplain is 64m west. The highest risk of flooding from rivers and the sea (RoFRaS) recorded on site is considered to be very low.

2.1.4 Summary of Site History

From the earliest available mapping dated 1882, the site formed part of an open plot of land. Maps from 1965 showed the site as a seasonal camping site, before fencing or walls were constructed prior to 1970. The site was a depot in 1986 – 1990, and was described as ‘Viking Yard depot’ in 2002 maps onwards.

2.1.5 Environmental Sensitivity

There are 89 records of potentially contaminative industrial sites within a 250m radius of the site including; recycling services and waste treatment, including hazardous waste, sewage and trade discharges, electricity substations, fuel storage, and vehicle repair.

The site lies within a Nitrate Vulnerable Zone. The Outer Thames Estuary Special Protection Area lies 116m west.

2.2 Hazard Assessment and Preliminary Qualitative Risk Assessment

2.2.1 Hazards Identified with the Proposed Development

The hazard identification is based on the assumption that the site is to be developed to a commercial end-use, comprising a decommissioning site. It is assumed that drinking water will be supplied by underground pipes.

2.2.2 Potential Sources of Contamination

Potentially contaminative land uses identified from the Phase 1 desk study are summarised in Table 2.2.

Table 2.2 Potential Contaminative Sources

Item	Detail
Summary of Land Use and Potential Contaminative Sources	*Historical Site Uses* 'Viking Yard' depot. *Current Site Uses* Vehicle storage and/or shipping containers storage. Unspecified commercial/industrial use.
	Historical Land Use / Features Within Vicinity East Port UK (Coal and coke), handling of hazardous substances, waste treatment/disposal sites, electricity substations. *Current Land Use Within Vicinity* Tanks, fuels and lubricants storage, handling of hazardous waste, waste treatment/disposal sites, electricity substations, vehicle maintenance.

2.2.3 Identification of Pathways

The principal potential pathways for contaminant migration are presented in Table 2.3.

Table 2.3 Pathways

Source	Pathway
Soil / dust / fibres.	Dermal contact, ingestion and inhalation.
Liquid (including surface water / groundwater).	Dermal contact, ingestion, leaching, infiltration and migration.
Harmful ground gases / vapour.	Inhalation, accumulation within confined spaces with subsequent asphyxiation or explosion.

2.2.4 Potential Receptors of Contamination

Receptors identified through the desk study are described in Table 2.4.

Table 2.4 Receptors

Receptor	Detail
Site workers	Site workers are anticipated to include those involved with the construction works at the site, particularly ground workers.
End Users	Employees at the completed development and site visitors.
Controlled Waters	The site is underlain by superficial deposits designated a Secondary A Aquifer overlying solid geology designated a Principal Aquifer. The River Yare is approximately 163m west of the site.
Buildings	Any buildings to be constructed.
Buried services	Potable water pipes are anticipated as part of proposals.

2.2.5 Preliminary Qualitative Risk Assessment

A preliminary conceptual site model for the site was established using the desk study information, and was used as a basis for the preliminary risk assessment. The contaminant linkages were individually assessed and a summary of the potential geo-environmental risks associated with the site and in the context of the proposed commercial re-development is provided in **Table 2.5**.

Table 2.5 Summary of Preliminary Qualitative Risk Assessment

Issue	Risk Rating	Justification Comments
Contamination Potential		
Potential for significant on site contamination.	Moderate	Potentially contaminated and/or gas generating Made Ground may be present on site.
Potential for contaminants to migrate via soil/air/groundwater pathways to site.	Moderate	The anticipated ground conditions could provide a pathway for potential contaminants to migrate on site.
Potential for contaminants to migrate via soil/air/groundwater pathways off-site.	Moderate	The anticipated ground conditions could provide a pathway for potential contaminants to migrate off-site.
Geo-environmental Risk		
Risk of harm to human health based on anticipated conditions.	Low to moderate	Potential for contamination identified due to historic and current land use. Ground Investigation required to clarify risk.
Risk to site workers.	Low to moderate	Potential for contamination identified due to historic and current land use. Ground Investigation required to clarify risk.
Risk of pollution to controlled water.	Low to moderate	Underlying ground conditions are designated as a Secondary A Aquifer overlying a Principal Aquifer.
Hazards to building structures and services – excluding ground gas.	Low	Potential sources of contaminants (including pH, sulphates and organics).
Liabilities		
Likelihood of designation as Contaminated Land under Part 2A of EPA 1990.	Low	Potential for contamination identified but is likely to be addressed under the planning regime.
Liability issues for owner.	Low to moderate	Potential liability issues identified.
Development Implications		
Possible requirement for remediation of soil.	Low to moderate	Remediation may be required. Ground investigation required to clarify potential risks.
Possible requirement for remediation of groundwater.	Low	Potential sources of contamination identified and plausible pathway linkages to the underlying Secondary A Aquifer/Principal Aquifer.

Issue	Risk Rating	Justification Comments
Possible requirement for gas protection.	Low to moderate	Ground gas protection measures may be required as potential sources have been identified. Ground investigation required to clarify potential risks.
Special requirements for water supply pipes.	Low	Pipes may be directed through affected soil; however, specialist pipework may not be required.
Potential limitations on foundation design.	Low to moderate	Concrete selection may be affected by potential for chemical attack. Ground investigation required to clarify potential risks.
Risk of encountering materials classed as hazardous waste.	Low to moderate	Potential sources of contamination have been identified. Ground investigation required to clarify potential risks.

3. Fieldwork and Analysis (August 2019)

The works undertaken as part of the site investigation and subsequent analysis of selected samples is summarised below.

3.1 Site Investigation

The site work undertaken as part of this phase of investigation is detailed in the following section. The site investigation was undertaken in accordance with the scope of works agreed with the client and generally in accordance with industry guidance including BS10175: 2011 *Investigations into Potentially Contaminated Sites – Code of Practice* and BS5930: 2015 *Code of Practice for Site Investigations – Amendment 2*.

3.1.1 Site Work Rationale and Preparatory Works

The exploratory hole location plan and fieldwork records are presented in **Appendix C**. The investigative positions were selected based on the available access and to provide coverage of the proposed development plot.

Prior to boring a cable avoidance tool was used to confirm each location was clear of detectable services.

3.1.2 Dynamic Sampler Boreholes

A total of three dynamic sampler boreholes, WS2, WS3 and WS4, were undertaken on 29th August and were completed at depths between 3.45mbgl and 5.45mbgl. It was not possible to drill boreholes WS1 or WS5 due to access constraints. The arisings were logged and sampled on site by an Environmental Consultant. The recovered soil samples were taken at regular intervals throughout the depth of the boreholes and were placed in laboratory supplied sealed glass jars or plastic containers prior to being stored in cool boxes during transit to the laboratory.

3.1.3 Standpipe Installations and Monitoring

Single standpipe installations were placed in boreholes WS2, WS3 and WS4. Each standpipe comprised 63mm diameter HDPE piping, slotted below 1.00mbgl; installed to depths of 4.20mbgl (WS2), 4.40mbgl (WS3) and 3.00mbgl (WS4). Once installed, the slotted section was surrounded by suitable gravel pack, above which a sealing material (bentonite) was used. A rubber bung and gas tap were placed at the top of the pipework and a flush cover concreted at surface to protect the installation from damage. Flow was monitored for a period of up to two minutes, and the concentrations of ground gases including methane, carbon dioxide, oxygen, hydrogen sulphide and carbon monoxide were monitored for up to five minutes. The depth to groundwater was measured using a dip-meter. The monitoring results are presented in **Appendix C**.

3.2 Laboratory Analysis

The scheduled analysis and number of samples tested is summarised in **Table 3.1** and **Table 3.2**. The laboratory certificates are presented in **Appendix D**.

Table 3.1 Summary of Scheduled Chemical Testing

Analysis	No. of Soil Samples Tested
Metals	5
Speciated polycyclic aromatic hydrocarbons (PAHs)	5
Ammonium	5
Cyanide, Chloride, Fluoride, Nitrate, Sulphate	5
Phenols – Total (monohydric)	5
Speciated petroleum hydrocarbons	5
Mineral Oil	5
Benzene, toluene, ethylbenzene and xylenes (BTEX) and methyl tertiary butyl ether (MTBE)	5
Asbestos screen	5
pH	5
Total Organic Carbon (TOC)	5
Polychlorinated Biphenyls (PCBs)	5
Waste Acceptance Criteria (WAC)	2
NORM	2

Table 3.1 Summary of Scheduled Geotechnical Testing

Analysis	No. of Soil Samples Tested
Sieve Analysis	2
BRE Suite B	2

4. Ground Conditions

The encountered ground conditions, groundwater and other observations are summarised and discussed below.

4.1 Encountered Ground Conditions

The ground conditions encountered are summarised in **Table 4.1** and discussed below.

Table 4.1 Summary of Encountered Ground Conditions

Stratum	Location	Surface Depth (mbgl)	Proven Base Depth (mbgl)	Proven thickness (m)
Made Ground	All locations	0.00	0.47 to 0.97	0.47 to 0.97
Blown Sand	All locations	0.47 to 0.97	1.58 to 2.90	0.61 to 2.38
Crag Group	All locations	1.58 to 2.90	Base not proved	Thickness not proved

4.1.1 Made Ground

Made Ground was encountered at all locations from surface level to depths between 0.47mbgl and 0.97mbgl. The Made Ground comprised concrete and sandy gravel of brick, flint and concrete. Fragments of a clay pipe were returned with the dynamic sample at 1.00mbgl - thought to be from a redundant service pipe, encountered at approximately 0.97mbgl.

4.1.2 Blown Sand

Blown Sand was encountered underlying the Made Ground at depths between 0.47mbgl and 0.97mbgl in all locations, to depths between 1.58mbgl and 2.90mbgl. This stratum comprised medium dense and dense, fine to medium sand.

4.1.3 Crag Group

This stratum was encountered underlying the Blown Sand at depths between 1.58mbgl and 2.90mbgl. The stratum comprised primarily medium dense, gravelly sand. The base of the Crag Group was not proven, however it increased in density with depth. Boreholes WS2 and WS3 were completed at 5.45mbgl, and WS4 was completed at 3.45mbgl.

4.1.4 Groundwater

During the site investigation, groundwater was encountered in WS2 at approximately 4.20mbgl, and WS3 at approximately 4.40mbgl. WS2 and WS3 boreholes collapsed back to these depths following return of the final dynamic sample. During subsequent monitoring, groundwater was not encountered.

5. Summary of Laboratory Analysis

The results of the chemical laboratory testing and ground gas monitoring are detailed in the following section.

5.1 Soil Analysis

The samples were submitted to i2 Analytical, Socotec, and K4 Soils, who are UKAS accredited in accordance with ISO17025 and are also MCERTS accredited for soil analysis in accordance with the Environment Agency's scheme. The laboratory carries out Quality Assurance and Quality Control in accordance with BS ISO 17025 and participate in external laboratory comparison and quality control schemes. Details of the accreditation and the methods of analysis are provided on the relevant test reports.

5.2 Ground Gas Analysis

Where applicable, the results of ground gas monitoring have been compared to CIRIA 665: Assessing risks posed by hazardous ground gases to buildings and BS 8485:2015: Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.

Table 5.1 Results of Laboratory Analysis for Metals

Determinand *Metals*	**Determinand Concentration Range (mg/kg)**		**Screening Values for Respective Land Use (mg/kg)**		**No. of Samples with Elevated Concentrations**	**Samples with Elevated Concentrations**
	Minimum	*Maximum*	*S4ULs*	*C4SLs*		
Arsenic	3.8	30	640	-	0	None elevated
Cadmium	<0.2	<0.2	190	-	0	None elevated
Chromium (III)	9.2	21	8,600	-	0	None elevated
Copper	21	330	68,000	-	0	None elevated
Lead	12	190	-	6,000	0	None elevated
Mercury	<0.3	<0.3	1,100	-	0	None elevated
Nickel	11	34	980	-	0	None elevated
Selenium	<1	2.2	120,000	-	0	None elevated
Zinc	52	1,400	730,000	-	0	None elevated

Table 5.2 Results of Laboratory Analysis for Polycyclic Aromatic Hydrocarbons

Determinand *PAHs*	**Determinand Concentration Range (mg/kg)**		**Screening Values for Proposed Land Use (mg/kg)**			**No. of Samples with Elevated Concentrations**	**Samples with Elevated Concentrations**
	Minimum	*Maximum*	*S4ULs*				
			1% som	*2.5% som*	*6% som*		
Acenaphthene	<0.05	<0.05	84,000	97,000	100,000	0	None elevated
Acenaphthylene	<0.05	<0.05	83,000	97,000	100,000	0	None elevated
Anthracene	<0.05	0.31	520,000	540,000	540,000	0	None elevated
Benzo[a]anthracene	<0.05	1.6	170	170	180	0	None elevated
Benzo[a]pyrene	<0.05	1.6	76	76	76	0	None elevated

Determinand *PAHs*	**Determinand Concentration Range (mg/kg)**		**Screening Values for Proposed Land Use (mg/kg)**			**No. of Samples with Elevated Concentrations**	**Samples with Elevated Concentrations**
	Minimum	*Maximum*	*S4ULs*				
			1% som	*2.5% som*	*6% som*		
Benzo[b]fluoranthene	<0.05	1.9	44	44	45	0	None elevated
Benzo[ghi]perylene	<0.05	1.4	3,900	4,000	4,000	0	None elevated
Benzo[k]fluoranthene	<0.05	1	1,200	1,200	1,200	0	None elevated
Chrysene	<0.05	1.8	350	350	350	0	None elevated
Dibenzo[ah]anthracene	<0.05	0.31	3.5	3.6	3.6	0	None elevated
Fluoranthene	<0.05	3.5	23,000	23,000	23,000	0	None elevated
Fluorene	<0.05	0.05	63,000	68,000	71,000	0	None elevated
Indeno[123-cd]pyrene	<0.05	1.1	500	510	510	0	None elevated
Naphthalene	<0.05	0.05	190	460	1,100	0	None elevated
Phenanthrene	<0.05	1.7	22,000	22,000	23,000	0	None elevated
Pyrene	<0.05	3.6	54,000	54,000	54,000	0	None elevated
Total PAH	<0.8	20	-	-	-	-	-

Table 5.3 Results of Laboratory Analysis for Speciated Petroleum Hydrocarbons

Determinand *Petroleum Hydrocarbons*	**Determinand Concentration Range (mg/kg)**		**Screening Values for Proposed Land Use (mg/kg)**			**No. of Samples with Elevated Concentrations**	**Location of Samples with Elevated Concentrations**
Speciated - Aliphatic	*Minimum*	*Maximum*	*S4ULs*				
			1% som	*2.5% som*	*6% som*		
>C5-C6	<0.001	<0.001	42	78	160	0	None elevated

Determinand *Petroleum Hydrocarbons*	**Determinand Concentration Range (mg/kg)**		**Screening Values for Proposed Land Use (mg/kg)**			**No. of Samples with Elevated Concentrations**	**Location of Samples with Elevated Concentrations**
Speciated - Aliphatic	*Minimum*	*Maximum*	*S4ULs*				
			1% som	*2.5% som*	*6% som*		
>C6-C8	<0.001	<0.001	3,200	5,900	12,000	0	None elevated
>C8-C10	<0.001	<0.001	7,800	17,000	40,000	0	None elevated
>C10-C12	<1	<1	2,000	4,800	11,000	0	None elevated
>C12-C16	<2	<2	9,700	23,000	47,000	0	None elevated
>C16-C35	<10	<10	59,000	82,000	90,000	0	None elevated
>C35-C40	<10	<10	1,600,000	1,700,000	1,800,000	0	None elevated
Speciated - Aromatic	*Minimum*	*Maximum*	*S4ULs*			**No. of Samples with Elevated Concentrations**	**Location of Samples with Elevated Concentrations**
			1% som	*2.5% som*	*6% som*		
>C5-C7	<0.001	<0.001	26,000	46,000	86,000	0	None elevated
>C7-C8	<0.001	<0.001	56,000	110,000	180,000	0	None elevated
>C8-C10	<0.001	<0.001	3,500	8,100	17,000	0	None elevated
>C10-C12	<1	<1	16,000	28,000	34,000	0	None elevated
>C12-C16	<2	<2	36,000	37,000	38,000	0	None elevated
>C16-C21	<10	<10	28,000	28,000	28,000	0	None elevated
>C21-C35	<10	17	28,000	28,000	28,000	0	None elevated
>C35-C40	<10	<10	28,000	28,000	28,000	0	None elevated

Table 5.4 Results of Laboratory Analysis for BTEX and MTBE

Determinand *BTEX and MTBE*	**Determinand Concentration Range (mg/kg)**		**Screening Values for Proposed Land Use (mg/kg)**			**No. of Samples with Elevated Concentration**	**Location of Samples with Elevated Concentrations**
	Minimum	*Maximum*	*S4ULs*				
			1% som	*2.5% som*	*6% som*		
Benzene	<0.001	<0.001	27	47	90	0	None elevated
Toluene	<0.001	<0.001	869	1920	4360	0	None elevated
Ethylbenzene	<0.001	<0.001	518	1220	2840	0	None elevated
o-xylene	<0.001	<0.001	478	1120	2620	0	None elevated
m-xylene	<0.001	<0.001	625	1470	3460	0	None elevated
p-xylene	<0.001	<0.001	576	1350	3170	0	None elevated
Determinand	*Minimum*	*Maximum*	*GACs*			**No. of Samples with Elevated Concentration**	**Location of Samples with Elevated Concentrations**
			1% som	*2.5% som*	*6% som*		
MTBE	<0.001	<0.001	7,900	13,000	24,000	0	None elevated

Table 5.5 Asbestos Screening

Determinand	**Screening Result**	**Asbestos Matrix**	**Asbestos Type**	**No. of Samples with Asbestos**	**Location of Samples with Detected Asbestos**
Asbestos	Detected	Loose fibres in soil	Chrysotile and amosite	1	WS03 at 0.40m

5.3 Summary of Analysis and Monitoring Results

The results of the chemical laboratory analysis of selected soil samples is discussed in the following section.

5.3.1 Summary of Soil Sample Analysis and Screening Results

Analysis of selected soil samples did not indicate any elevated concentrations of contaminants when compared against their respective criteria for commercial end use.

Asbestos was detected at WS03 in a sample of the Made Ground. Loose fibres of amosite and chrysotile asbestos were detected.

Analysis for Waste Acceptance Criteria has determined soils can be taken to an inert waste landfill.

5.3.2 Analysis for NORM

The definition of radioactive material (for the identification of NORM as a result of oil rig structures brought ashore during demolition works) is taken from Scope Of And Exemptions From The Radioactive Substances Legislation In England, Wales And Northern Ireland, Defra, August 2018, Paragraph 2.7i. This refers to an exceedence of Becquerel readings (Bq/gram) in Column 2 (for solids) of Table 2.2. This indicates that for NORM to be present, readings would have to exceed between 1,000 and 10,000 Bq/kg.

Referring to the laboratory results, no reading approaches the threshold of 1000 Bq/kg. Therefore, based on the two samples taken, there is no indication of NORM present in the shallow soils of the areas tested which are immediately adjacent to where the former oil and gas industry structures are brought ashore.

5.4 Discussion of Ground Gas Results and Gas Screening Value

The results of ground gas monitoring are summarised below.

5.4.1 Summary of Ground Gas Results

The recorded carbon dioxide, methane, carbon monoxide and hydrogen sulphide (H_2S) concentrations were below detection levels.

5.4.2 Recorded Flow Rate

No flow was detected at any of the monitoring points.

5.4.3 Gas Screening Value and Classification

The Gas Screening Value (GSV) for the site based on the recorded maximum concentrations of methane and carbon dioxide is provided in Table 5.8.

Table 5.6 Gas Screening Values for Methane and Carbon Dioxide

Peak Flow Rate (l/hr)	Worst Case CO_2 (%)	CO_2 GSV	Worst Case CH_4 (%)	CH_4 GSV
<0.1	<0.1	<0.0001 l/hr CO_2	<0.1	<0.0001 l/hr CH_4

Characteristic Situation 1 is considered applicable to the site based on the gas screening value of <0.0001 l/hr and the recorded maximum concentrations of carbon dioxide and methane.

6. Conceptual Site Model

In accordance with BS 10175, a general schematic section has been developed for the site based on the previously presented data and contaminant linkage assessment. This is shown in **Figure 1**.

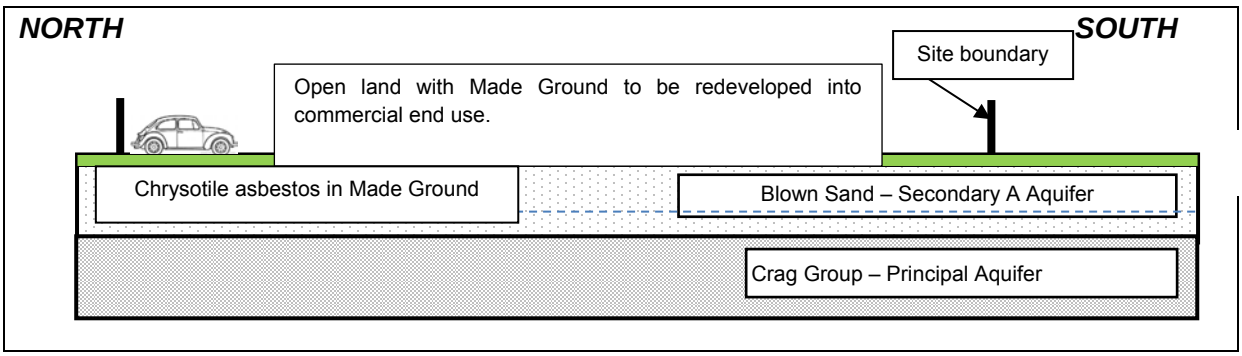

Figure 1 Updated Conceptual Site Model based on the proposed development (not to scale).

The model for the site shows the anticipated geology, former site usage and vulnerable receptors. The information presented above represents the updated conceptual ground model that may need to be revised based on data obtained during any future investigation, either desk-based or intrusive. The conceptual site model and proposed end use described above should be considered very broadly representative of a commercial land use, as a worst case scenario, as defined in SR3 "Updated Technical Model to the CLEA Model" (SC050021/SR3, 2011) for the purpose of this report.

6.1 Updated Qualitative Risk Assessment

The contaminant linkages have been individually assessed and an updated summary of the potential geo-environmental risks associated with the site and in the context of the proposed development is provided in **Table 6.1**.

Table 6.1 Summary of Updated Qualitative Risk Assessment

Issue	Risk Rating	Justification Comments
Contamination Potential		
Potential for significant on site contamination.	Low to moderate	Chrysotile asbestos fibres were detected in a sample of Made Ground. There is potential for this to be present in the near surface Made Ground across this part of the site.
Potential for contaminants to migrate via soil/air/groundwater pathways to site.	Low to moderate	Secondary A Aquifer within the River Terrace Deposits stratum.
Potential for contaminants to migrate via soil/air/groundwater pathways off-site.	Low to moderate	Contaminants on site could migrate off site due to the ground conditions and water features present.
Geo-environmental Risk		
Risk of harm to human health (end users) based on anticipated conditions.	Low to moderate	Chrysotile asbestos fibres were detected in a sample of Made Ground.
Risk to site workers.	Low to moderate	Chrysotile asbestos fibres were detected in a sample of Made Ground.
Risk of pollution to controlled water.	Low	Groundwater was not encountered during monitoring.
Hazards to building structures and services – excluding ground gas.	Low	Contamination has not been identified that could affect building structures or services.

Issue	Risk Rating	Justification Comments
Liabilities		
Likelihood of designation as Contaminated Land under Part 2A of EPA 1990.	Low	Chrysotile asbestos fibres detected in Made Ground but will likely be addressed under the planning regime.
Liability issues for owner.	Low to moderate	Potential liability issues identified.
Development Implications		
Possible requirement for remediation of soil.	Low to moderate	Chrysotile asbestos fibres detected in Made Ground. Remediation will be required.
Possible requirement for remediation of groundwater.	Low	Groundwater was not encountered during monitoring.
Possible requirement for gas protection.	Negligible	Based on the results of monitoring.
Special requirements for water supply pipes.	Low	Pipes may be directed through affected soil and specialist pipework may not be required. The water provider, however, may require additional soil analysis.
Potential limitations on foundation design.	Low	Laboratory analysis has classed the ground on site as DS-2 and AC-1.
Risk of encountering materials classed as hazardous waste.	Low	Chrysotile asbestos fibres detected in Made Ground, however there is low risk of encountering materials classed as hazardous waste.

7. Geoenvironmental Conclusion and Recommendation

The following recommendations are based on the results of the conceptual site model and risk assessment.

7.1 Summary of Development Proposals and Ground Investigation Results

The proposals, encountered ground conditions and analysis results are summarised below.

7.1.1 Development Proposals

Proposals comprise the use of the site for open air demolition of North Sea oil and gas structures.

7.1.2 Summary of Encountered Ground Conditions and Groundwater

The encountered ground conditions comprised Made Ground to depths between 0.47mbgl and 0.97mbgl, overlying Blown Sand to depths between 1.58mbgl and 2.90mbgl. The Crag Group solid geology was encountered underlying the Blown Sand at all locations to the final depths of the boreholes - 5.45mbgl in WS2 and WS3, and 3.45mbgl at WS4.

Groundwater was encountered in WS2 and WS3 at approximately 4.20mbgl and 4.40mbgl. During subsequent monitoring, groundwater was not encountered at any location.

7.1.3 Summary of Laboratory Test Results and Monitoring

When compared to the screening criteria for commercial end use, the chemical laboratory testing indicated no elevated concentrations of contaminants within the samples analysed. Chrysotile asbestos was detected in borehole WS03 at 0.40m within a sample of Made Ground.

Analysis for Waste Acceptance Criteria has determined soils can be taken to an inert waste landfill.

The ground gas monitoring results indicated that the gassing regime falls into CIRIA C665 Characteristic Situation 1.

7.2 Conclusion

Based on the conceptual site model and risk assessment, low risk to end users and moderate risk to site workers has been identified.

7.3 Recommendations

Recommendations are provided below.

7.3.1 Further Investigation

Once development proposals have been finalised, it is recommended that further investigation is undertaken across the site due to the presence of asbestos. The investigation will provide full coverage of the site and determine if the contaminant impacted soils are limited to the areas already sampled. This could enable the extent of remediation

required to be reduced. This should be undertaken once the final development layout is known so specific areas such as soft landscaping can be targeted.

Geotechnical investigation to aid foundation and hardstanding design could also be undertaken as part of these works once design loads are known.

7.3.2 Remediation – End Users

Based on the existing data chrysotile asbestos was detected within a sample of Made Ground from the location of WS03 which would pose a potential unacceptable risk to end users in areas of soft landscaping and site workers during the construction phase.

Following confirmation of the extent of contaminant impacted soil a Remediation Strategy (RS) should be produced to give clear guidance to contractors, specifically ground workers, regarding the soil remediation measures to be completed, and specify the requirements for validation of the works.

The outline soil remediation options are likely to entail the placement of a 0.60m barrier of imported, certified clean soil between impacted Made Ground and ground level. Remediation, however, is considered unnecessary where buildings and hardstanding are proposed as these will break the source-pathway-receptor linkage, mitigating potential risk in these areas.

Excavated soil would be stored in a manner as to prevent contamination of the underlying soil or contamination of surrounding areas from water run-off or dust production. This would involve placing a suitable plastic membrane below and above the stockpiled material. Different soil types would be stored in separate stockpiles prior to possible future re-use or disposal. The stockpiling of soils would be recorded, and would include the location and date of excavation, the material type, and quantity.

7.3.3 Watching Brief

It is recommended that a watching brief is maintained on site, particularly during the groundwork stage. During any ground works an appraisal of the exposed soils should be made by a competent person, this as an example could be the site manager. If any material is noted to show visual and/or olfactory signs of contamination it should be stockpiled separately and tested prior to its appropriate removal off-site or re-use. If soils suspected of being contaminated are encountered, it is recommended that a contaminated land specialist is consulted.

7.3.4 Buried Services

Potable water pipework shall comply with the Water Supply Regulations, the agreement of the water provider and Local Authority should also be sought regarding the potable water pipework and fittings selected prior to commencement.

7.3.5 Importing and Re-Use of Soil and Materials Management Plan

Excavated soil that is to remain and be re-used on site, assuming it is suitable for the proposed use, may not be determined as waste and its re-use therefore may not require an Environmental Permit. It may be necessary to consult the Environment Agency or other

statutory bodies regarding re-use of soils as part of the proposals and whether a Materials Management Plan or Environmental Permit is required. In any case, a site waste management plan or materials management plan may assist the design and cost assessment of the proposed development. This should be devised within the design phase of the scheme.

7.3.6 Soil Disposal

The client and contractors are advised to follow the process outlined in the Environment Agency's Technical Guidance Document WM3 '*Waste Classification – Guidance on the Classification and Assessment of Waste*', 1st edition 2015. Background information and the results of chemical laboratory analysis within this assessment may be used as part of an initial characterisation to determine the likely waste classification of waste soils.

7.3.7 Statutory Authority Consultation

It is recommended that this report is sent to the statutory authorities including the Local Authority Environmental Health and Planning Departments prior to remediation or development of the site commencing to seek their comments. Where necessary, they will consult the Environment Agency or other relevant statutory authorities. If applicable to this project, this report should also be provided to the relevant building warranty provider. Where remediation works are required, a verification report should be submitted to the relevant authorities for approval in accordance with relevant Planning Conditions.

7.3.8 Health and Safety

As outlined within the HSE publication "Successful Health and Safety Management – HSG65" this report should inform your development of safe systems of work and the information used as an input to the safety management system. The contents of this report may be used to supplement the contents of the Health and Safety File as required under the Construction Design and Management (CDM) Regulations 2015.

In accordance with the Construction Design and Management (CDM) Regulations 2015, TerraConsult has acted in the role of Principal Contractor and as Principal Designer for the works as described in this report. With issue of this report, TerraConsult has discharged and completed all contractual and legal requirements for these positions and has no further involvement with the project. It is the developer's duty, as required by the CDM Regulations, to appoint others to fill these roles for the further development of the site.

8. Geotechnical Assessment and Recommendation

8.1 Fieldwork and Laboratory Data Review

Made Ground was identified within all boreholes. The thickest layer of Made Ground was found to be 0.97m in WS4.

The natural geology was identified in all of the intrusive locations and was found to comprise Blown Sand overlying Crag Group. Groundwater was encountered within the Crag Group at WS2 and WS3.

SPT N-values were recorded throughout each borehole and are summarised below for the two main strata encountered. The listed N-values are reported below:

Table 8.1 Summary of SPT N-Values

Hole No	Depth (m)	Blown Sand	Crag Group
WS2	1.00	31	-
	2.00	-	33
	3.00	-	20
	4.00	-	24
	5.00	-	64
WS3	1.00	31	-
	2.00	16	-
	3.00	-	22
	4.00	-	21
	5.00	-	38
WS4	1.00	28	-
	3.00	-	37
No of Tests		4	8
Range of Values		16 - 31	20 - 64
Mean		27	32

The average results indicate that the Blown Sand generally medium dense with the underlying Crag Group being dense.

8.2 Foundation Recommendations

8.2.1 Shallow Foundations

It is understood that the site is to be used as a decommissioning site although exact proposals are currently unknown. At the time of writing the report there was no detail for any proposed construction on the site or any loads relating to any proposed construction.

The investigation has revealed thin layers of Made Ground overlying natural granular deposits. The drilling on site did not reveal the presence of any groundwater and the natural soils were found to be medium dense to dense. It is not recommended that any foundations are placed within the Made Ground deposits and any shallow foundations are taken below

this level into the natural granular soils. For strip foundations up to 1m wide a safe allowable bearing pressure of 300kN/m2 would ensure that any overall settlements should be no more than 25mm. Due to the granular nature of the material, the majority of this settlement should be short term and occur mainly during the construction phase.

Should any pad foundation be placed below the groundwater table then the safe allowable bearing pressure discussed above should be halved.

8.2.2 Deep Foundations

Where shallow foundations prove not to be appropriate due to engineering or technical considerations, piles could be considered. Piles should be designed to penetrate through any Made Ground, and to a suitable depth to allow an appropriate design load.

A specialist piling contractor should be contacted with regards to the selection of appropriate pile design and construction method. Geotechnical information within this report should be provided to give design parameters although further, deeper information will likely be required.

Bored and cast in situ CFA (continuous flight auger) piles would be considered suitable for the ground conditions at the site although the advice of a specialist contractor should be sought. Care should be taken for bored and cast in situ piles taken through any Made Ground where collapse of the pile shaft or running sand conditions could lead to 'necking' of the pile.

Whilst TerraConsult considers the risks to be low for piling, a risk assessment is likely to be necessary to show that the piling will not create additional risks to Controlled Water.

Any piling works undertaken from existing ground levels will require a suitable piling mat/platform constructed in accordance with BRE Report 470 (2004). A geotextile may be incorporated into the platform to reduce the required thickness and the platform could be designed as part of the engineering fill required for any earthworks to alter final site levels. TerraConsult can assist in the design if required once the piling rig type is known.

8.3 Ground Floor Slab and Hardstanding Recommendations

Ground bearing floor slabs would not be recommended on Made Ground deposits. However, placement of slabs onto the underlying natural medium dense and dense granular strata would be suitable.

Any Made Ground or soft or loose spots should be locally removed and replaced with an inert engineered granular fill. Reengineering of the Made Ground could be appropriate provided the material is demonstrated to meet any specific requirements as set out in the Specification for Highway Works.

No CBR testing was undertaken as part of the site investigation works. However, with regards to the natural strata for initial design purposes, we would recommend that a CBR value of 2.5% can be used across the site. However, we would recommend that some in-situ testing is undertaken in areas of proposed hardstanding and this along with ground conditions are reviewed in line with the layout to provide more detailed information for design purposes.

8.4 Groundwater and Excavations

It is not expected that groundwater will be encountered in any shallow excavations at this site. It is anticipated that any groundwater in excavations can be controlled by sump pumping. If inflows are relatively localised, this may cause loosening of the ground and require localised excavation support in order to prevent instability of the sides of excavations.

Excavations through the soils to a depth of about 2.0m should be stable in the short term (up to 3 to 4 hours). All excavations should be carried out in accordance with CIRIA Report 97 "Trenching Practice" and BS6031: 2009: Code of Practice for Earthworks. Further guidance on this aspect of site works is given in the British Standards for "Workmanship on Building Sites", BS 8000, Parts 1 and 14, and in the Construction Industry Training Board's Site Safety Note 10.

Excavation depths should generally be readily achieved using conventional hydraulic plant (e.g. wheeled JCB or similar) although larger plant (tracked 360° or similar) will have higher excavation rates.

8.5 Buried Concrete and Pipework

The results of laboratory pH and sulphate content indicate that a Design Sulphate Class of DS-1 and ACEC Class AC-1 conditions prevail in accordance with BRE Special Digest 1, 2005 (the Design Concrete Class).

Two samples were also tested for Total Sulphur and when using the Total Potential Sulphate these results returned a Design Sulphate Class of DS-1 and an ACEC Class of AC-1.

Therefore, the classification of any subsurface concrete in future development will depend on the depth of any underground structures such as foundations. Those which are taken either into the Made Ground or the shallow soils will not require any significant measures to prevent any attack on the concrete with the highest identified rating of DS-1 and AC-1.

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APPENDICES

Appendix A	Service Constraints, Report Limitations and Planning Requirements
Appendix B	Environmental Risk Assessment Methodology and Terminology
Appendix C	Fieldwork Records
Appendix D	Laboratory Analysis Results

Appendix A

Service Constraints, Report Limitations

and Planning Requirements

Service Constraints, Report Limitations and Planning Requirements

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The report has been prepared at the date shown on the front page and should be read in light of any subsequent changes in legislation, statutory requirements and industry practices. Ground conditions can also change over time and further investigations or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of TCL. In the absence of such written advice of TCL, reliance on the report in the future shall be at the client's own and sole risk. Should TCL be requested to review the report in the future, TCL shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between TCL and the client.

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The Services are based upon TCL's observations of existing physical conditions at the site gained from existing documents, together with TCL's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst TerraConsult Limited has no reason to doubt the accuracy and that it has been provided in full from those it was requested from, the items relied on have not been verified. No responsibility can be accepted for errors within third party items presented in this report. Further, TCL was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. TCL is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to TCL and including the doing of any independent investigation of the information provided to TCL save as otherwise provided in the terms of the contract between the client and TCL.

Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and TCL] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.

Throughout the report the term 'geotechnical' is used to describe aspects relating to the physical nature of the site (such as foundation requirements) and the term 'geoenvironmental' is used to describe aspects relating to ground-related environmental issues (such as potential contamination). However, it should be appreciated that this is an integrated investigation and these two main aspects are inter-related. The geoenvironmental sections are written in broad agreement with BS 10175:2011+A1 2013. For the geotechnical aspects of the report, the general requirements of Eurocode 7 (BS EN 1997-2:2007) providing a desk study assessment. This report shall not be considered as being a Ground Investigation Report (GIR).

Planning Requirements

The National Planning Policy Framework (NPPF, 2012) has twelve core land-use planning principles, two of which directly relate to the potential for pollution and contaminated land:

- Requirement to *"contribute to conserving and enhancing the natural environment and reducing pollution"* and setting out of a preference for developments to be on land of "*lesser environmental value*"; and
- *"encourage the effective use of land by re-using land that has been previously developed (brownfield land), providing that it is not of high environmental value.".*

In accordance with the core principles of NPPF, Paragraph 109 clarifies that enhancing the natural environment includes:

- *"preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and*
- *remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.".*

Paragraph 121 of NPPF states that planning policies and decisions for developments should also ensure that:

- *"the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;*
- *after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and*
- *adequate site investigation information, prepared by a competent person, is presented.".*

This report has been prepared and authorised by staff that are competent as defined in the NPPF.

Unexploded Ordnance

Clients have a legal duty under the CDM 2015 Regulations to provide designers and contractors with project-specific health and safety information needed to identify hazards and risks. This includes the possibility of unexploded ordnance (UXO) being encountered on the site. Further details are given in CIRIA Report C681 (Stone et al 2009). A non-UXO specialist screening exercise has been carried out for the site by considering any evidence of UK defence activities on or near the site evident from the gathered desk study information and the unexploded aerial delivered bomb (UXB) regional risk maps produced by Zetica. Other data sources are available, but as a first stage screening exercise the freely available Zetica maps have been used. The level of risk stated is that determined by Zetica, a company experienced in the desk study, field investigation and clearance of UXO/UXB.

Appendix B

Environmental Risk Assessment

Methodology & Terminology

ENVIRONMENTAL RISK ASSESSMENT

METHODOLOGY & TERMINOLOGY

Legislation Overview

This report includes hazard identification and environmental risk assessment in line with the risk-based methods referred to in relevant UK legislation and guidance. Government environmental policy is based upon a "suitable for use approach," which is relevant to both the current use of land and also to any proposed future use. The contaminated land regime is the statutory regime for remediation of contaminated land that causes an unacceptable level of risk and is set out in Part 2A of the Environmental Protection Act 1990 ("EPA 1990"). The main objective of introducing the Part IIA regime is to provide an improved system for the identification and remediation of land where contamination is causing unacceptable risks to human health or the wider environment given the current use and circumstances of the land. Part IIA provides a statutory definition of contaminated land under Section 78A(2) as:

> *"any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on, or under the land, that:*
>
> *(a) Significant harm is being caused or there is a significant possibility of such harm being caused;*
>
> *or*
>
> *(b) Pollution of controlled waters is being, or is likely to be, caused."*

In order to assist in establishing if there is a "*significant possibility of significant harm*" there must be a "*contaminant linkage"* for potential harm to exist. That means there must be a source(s) of contamination, sensitive receptors present and a connection or pathway between the two. This combination of contaminant-pathway-receptor is termed a "contaminant linkage or CPR linkage."

Part IIA of The Environmental Protection Act 1990 is supported by a substantial quantity of guidance and other Regulations. Key implementing legislation of the Part 2A regime includes the Contaminated Land (England) Regulations 2006 (SI 2006/1380) as recently amended by the overarching legislation for the contaminated land regime, which implements the provisions of Part IIA of the Environmental Protection Act 1990 (as inserted by section 57 of the Environment Act 1995), came into force on 14th July 2000 together with recent amended regulations: Contaminated Land (England) (Amendment) Regulations 2012 (SI 2012/263). Revised and Contaminated Land Statutory Guidance was published by Defra in (Defra, April 2012). Part IIA defines the duties of Local Authorities in dealing with it. Part IIA places contaminated land responsibility as a part of planning and redevelopment process rather than Local Authority direct action except in situations of very high pollution risk.

In the planning process guidance is provided by National Planning Policy Framework (NPPF) of March 2012 which requires that a site which has been developed shall not be capable of being determined "contaminated land" under Part IIA. In practice, Planning Authorities require sites being developed to have a lower level of risk post development than the higher level of risk that is required in order to determine a site as being contaminated in accordance with Part IIA. This is to ensure that there is a suitable zone of safety below the level for Part IIA determination and prevent recently developed sites becoming reclassified as contaminated land if there are future legislative or technical changes (e.g. a substance is subsequently found to be more toxic than previously assessed this increases its hazard)..

The criteria for assessing levels of contaminants and hence determining whether a site represents a hazard are based on a range of techniques, models and guidance. Within this context it is relevant to note that Government objectives are:

(a) to identify and remove unacceptable risks to human health and the environment;

(b) to seek to bring damaged land back into beneficial use;

(c) to seek to ensure that the cost burdens faced by individuals, companies and society as a whole are proportionate, manageable and economically sustainable.

These three objectives underlie the "suitable for use" approach to remediation of contaminated land. The "suitable for use" approach focuses on the risks caused by land contamination. The approach recognises that the risks presented by any given level of contamination will vary greatly according to the use of the land and a wide range of other factors, such as the underlying geology of the site. Risks therefore should be assessed on a site-by-site basis.

The "suitable for use" approach then consists of three elements:

(a) *ensuring that land is suitable for its current use* - in other words, identifying any land where contamination is causing unacceptable risks to human health and the environment, assessed on the basis of the current use and circumstances of the land, and returning such land to a condition where such risks no longer arise ("remediating" the land); the contaminated land regime provides the regulatory mechanisms to achieve this;

(b) *ensuring that land is made suitable for any new use, as planning permission is given for that new use* - in other words, assessing the potential risks from contamination, on the basis of the proposed future use and circumstances, before official permission is given for the development and, where necessary to avoid unacceptable risks to human health and the environment, remediating the land before the new use commences; this is the role of the town and country planning and building control regimes; and

(c) *limiting requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to the current use or future use of the land for which planning permission is being sought* - in other words, recognising that the risks from contaminated land can be satisfactory assessed only in the context of specific uses of the land (whether current or proposed), and that any attempt to guess what might be needed at some time in the future for other uses is likely to result either in premature work (thereby running the risk of distorting social, economic and environmental priorities) or in unnecessary work (thereby wasting resources).

The mere presence of contaminants does not therefore necessarily warrant action, and consideration must be given to the scale of risk involved for the use that the site has, and will have in the future.

OVERALL METHODOLOGY

The work presented in this report has been carried out in general accordance with recognised best practice as detailed in guidance documents such as in the CLR 11 Model Procedures for the Management of Land Contamination (Environment Agency, 2004), and BS10175:2011+A2 20173. Important aspects of the risk assessment process are transparency and justification. The particular rationale behind the risk assessments presented is given in this appendix.

The first stage of a two-staged investigation and assessment of a site is the Preliminary Investigation (BS 10175:2011), often referred to as the Phase 1 Study, comprising desk study and walk-over survey, which culminates in the Preliminary Risk Assessment. A preliminary conceptual site model (CSM) is developed which identifies potential geotechnical and geo-environmental hazards and the qualitative degree of risk associated with them. From the geo-environmental perspective, the Hazard Identification process uses professional judgement to evaluate all the hazards in terms of potential contaminant linkages (of contaminant source-pathway-receptor). Potential contaminant linkages are potentially unacceptable risks in terms of the current contaminated land regime legal framework and require either remediation or further assessment. These are normally addressed via intrusive ground investigation and generic risk assessment.

The second stage is the Ground Investigation, Generic Risk Assessment and Geotechnical Interpretation. This represents the further assessment mentioned above. The scope of the Ground Investigation is based on the findings of the Preliminary Risk Assessment and is designed to reduce uncertainty in the geotechnical and geoenvironmental hazard identification. The Ground Investigation comprises fieldwork, laboratory testing and usually also on site monitoring. The Ground Investigation may include the Exploratory, Main and Supplementary Investigations described in BS 10175:2011+A1

2013. The result of the Ground Investigation reduces uncertainty in the geotechnical and geoenvironmental risks. Depending on the findings more detailed investigations or assessments may be required.

Preliminary Risk Assessment

Current practice recommends that the determination of potential liabilities that could arise from land contamination be carried out using the process of risk assessment, whereby "risk" is defined as:

"(a) The probability, or frequency, or occurrence of a defined hazard; and

(b) The magnitude (including the seriousness) of the consequences."

The UK's approach to the assessment of environmental risk is set out in by the Department of the Environment Transport and the Regions (2000) publication "A Guide to Risk Assessment and Risk Management for Environmental Protection" (also called Greenleaves II). This established an iterative, systematic staged process which comprises:

(a) Hazard identification;

(b) Hazard assessment;

(c) Risk estimation;

(d) Risk evaluation;

(e) Risk assessment;

At each stage during the development process the above steps are repeated as more detailed information becomes available for the site.

For an environmental risk to be present, all three of the following elements must be present:

- Source/Contaminant: hazardous substance that has the potential to cause adverse impacts;
- Receptor: target that may be affected by contamination: examples include human occupants/users of site, water resources (rivers or groundwater), or structures;
- Pathway: a viable route whereby a hazardous substance may come into contact with the receptor.

The absence of one or more of each component (contaminant, pathway, receptor) would prevent a contaminant linkage being established and there would be no significant environmental risk.

The identification of potential contaminant linkages is based on a Conceptual Model of the site, which is subject to continual refinement as additional data becomes available. As part of a Phase I Investigation (Desk Study and site walk over) a Preliminary Conceptual Site Model (PCSM) is formed. Based on the PCSM, potential contaminant linkages can be assessed. If the PCSM and hazard assessment indicate that a pollution linkage is not of significance then no further assessment or action is required due to this linkage. For each significant and possible linkage a risk assessment is carried out. The linkages which potentially pose significant risks may require a variety of responses ranging from immediate remedial action or risk management or, more commonly, further investigation and risk assessment. This next stage is termed a Phase II Main Site Investigation and should provide additional data to allow refinement of the Conceptual Site Model and assess the level of risk from each contaminant linkage.

Definition of Risk Assessment Terminology

The criteria used for risk assessment are broadly based on those presented in DETR's "A Guide to Risk Assessment and Risk Management for Environmental Protection" (2000). The Severity of the risk is classified according to the criteria in Table B.1 below:

Table B.1 Severity/Consequence of Risk

Severe	Acute risks to human health. Catastrophic damage to buildings/property (e.g. by explosion). Direct pollution of sensitive water receptors or serious pollution of other controlled water (watercourses or groundwater) bodies.
Medium	Harm to human health from long-term exposure. Slight pollution of sensitive controlled waters (surface waters or aquifers) or pollution of other water bodies. Significant effects on sensitive ecosystems or species.
Mild	No significant harm to human health in either short or long term. No pollution of sensitive controlled waters, no more than slight pollution of non-sensitive waters. Significant damage to buildings or structures. Requirement for protective equipment during site works to mitigate health effects.
Negligible	Damage to non-sensitive ecosystems or species. Minor damage to buildings or structures. No harm or pollution of water.

The probability of the risk occurring is classified according to criteria given in Table B.2 below:

Table B.2: Probability of Risk Occurring	
High likelihood	Contaminant linkage may be present, and risk is almost certain to occur in the long term, or there is evidence of harm to the receptor.
Medium/Reasonably Foreseeable	Contaminant linkage may be present, and it is probable that the risk will occur over the long term.
Low/Unlikely	Contaminant linkage may be present and there is a possibility of the risk occurring, although there is no certainty that it will do so.
Negligible/ Not credible	Contaminant linkage may be present but the circumstances under which harm would occur are improbable.

An overall evaluation of the level of risk is gained from a comparison of the severity and probability, as shown in Table B.3 below:

Table B.3: Comparison of Severity and Probability					
		Severity			
		Severe	**Medium**	**Mild**	**Negligible**
Probability	**High likelihood**	Very High Risk	High Risk	Medium/Low Risk	Low Risk
	Medium/Reasonably Foreseeable	High Risk	Medium Risk	Low Risk	Near Zero
	Low/Unlikely	High/Medium Risk	Medium/Low Risk	Low Risk	Near Zero
	Negligible/ Not credible	Medium/Low Risk	Low Risk	Low Risk	Near Zero

The various risk rankings provide guidance for recommended actions, whether this is:

AR - Action Required, Remediation or mitigation or site investigation works required

SIR - Site Investigation Required, further assessment is required.

NAR - No Action Required.

A description of the evaluated risk is as follows:

Table B.4 – Description of the Classified Risks and Likely Action Required	
Evaluated Risk	**Recommended Actions**
Very High Risk	AR: There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High Risk	AR: Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the long term.
Moderate Risk	SIR: It is possible that harm could arise to a designated receptor from an identified hazard. However, it is relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Low Risk	NAR: It is possible that harm could arise to a designated receptor from an identified hazard, but there is a low likelihood of this hazard occurring and if realised, harm would at worst normally be mild.
Near Zero	NAR: There is a negligible possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

Definition of Controlled Waters

The term 'controlled waters' is defined in Section 104 of the Water Resources Act 1991 as:

> *"Territorial Waters…which extend seawards for three miles…, coastal waters…, inland freshwaters, waters in any relevant lake or pond or of so much of any relevant river or watercourse as is above the freshwater limit, and ground waters, that is to say, any waters contained in underground strata."*

Note that the definition of groundwater under the Water Resources Act 1991 includes all water within underground strata (including soil / pore water in the unsaturated zone). The definition of groundwater under the Groundwater Directive however is limited to water in the saturated zone. For the purposes of Part IIA of the Environmental Protection Act 1990, the Environment Agency recommends that the groundwater within the saturated zone only is considered as the receptor (rather than soil / pore water).

Environment Agency's Aquifer Designations

The Environment Agency have classified different types of aquifer from which groundwater can be extracted. The aquifer designations reflect the importance of aquifers in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetland ecosystems. The aquifer designation data is based on geological mapping provided by the British Geological Survey.

The maps are split into two different types of aquifer designation:

- **Superficial (Drift)** – permeable unconsolidated (loose) deposits.
- **Bedrock (Solid)**– solid permeable formations e.g. sandstone, chalk, limestone.

The aquifer designations displayed on the Environment Agency maps are as follows:

- **Principal Aquifers (formerly termed Major Aquifers) –** These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as a major aquifer.
- **Secondary Aquifers (formerly termed Minor Aquifers) –** These include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary aquifers are subdivided into two types:
    - **Secondary A** - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers;
    - **Secondary B** - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.
    - - **Secondary Undifferentiated** - has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.
- **Unproductive Strata (formerly termed Non-Aquifer) –** These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

MANAGEMENT OF CONTAMINATED LAND

When risk assessment of the site has been completed and this indicates that remedial works are required, the main guidance in managing this process is set out in the Defra/EA publication CLR11 (2004) “Model Procedures for the Management of Land Contamination.” The stages of managing remediation are as follows:

(a) Options Appraisal and develop Remediation Strategy;

(b) Develop Implementation Plan and Verification Plan;

(c) Remediation, Verification and Monitoring.

The Remediation Strategy sets out the remediation targets, identifies technically feasible remedial solutions and presents an evaluation of the options so that these can be assessed enabling that the most suitable solution is adopted. An outline of the proposed remedial method should be presented. Agreement should be sought of the appropriate statutory bodies for the Remediation Strategy before proceeding to the next stage.

The Implementation Plan is a detailed method statement setting out how the remediation is to be carried out including stating how the site will be managed, welfare procedures, health and safety considerations together with practical measures such as details of temporary works, programme of works, waste management licences and regulatory consents required. Agreement should again be sought of the appropriate statutory bodies for this Plan.

The Verification Plan sets out the requirements for gathering data to demonstrate that the remediation has met the required remediation objectives and criteria. The Verification Plan presents the requirements for a wide range of issues including the level of supervision, sampling and testing regimes for treated materials, waste and imported materials, required monitoring works during and post remediation, how compliance with all licenses and consents will be checked etc. Agreement should again be sought of the appropriate statutory bodies for the Verification Plan. On completion of the remediation a Verification Report should be produced to provide a complete record of all remediation activities on site and the data collected as required in the Verification Plan. The Verification Report should demonstrate that the remediation has met the remedial targets to show that the site is suitable for the proposed use.

GLOSSARY

TERMS		UNITS	
AST	Above Ground Storage Tank	m	Metres
BGS	British Geological Survey	km	Kilometres
BSI	British Standards Institute	%	Percent
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes	%v/v	Percent volume in air
CIEH	Chartered Institute of Environmental Health	mb	Milli Bars (atmospheric pressure)
CIRIA	Construction Industry Research Association		
CLEA	Contaminated Land Exposure Assessment	l/hr	Litres per hour
CSM	Conceptual Site Model	ha	Hectare (10,000 m^2)
DNAPL	Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB)	µg/l	Micrograms per Litre (parts per billion)
DWS	Drinking Water Standard	ppb	Parts Per Billion
EA	Environment Agency	mg/kg	Milligrams per kilogram (parts per million)
EQS	Environmental Quality Standard		
GAC	General Assessment Criteria	ppm	Parts Per Million
GL	Ground Level	mg/m^3	Milligram per metre cubed
GSV	Gas Screening Value	Mg/m^3	Megagram per metre cubed
HCV	Health Criteria Value	$µg/m^3$	Microgram per metre cubed
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel)	m bgl	Metres Below Ground Level
ND	Not Detected	m bcl	Metre Below Cover Level
LMRL	Lower Method Reporting Limit	mOD	Metres Above Ordnance Datum (sea level)
NR	Not Recorded		
OD	Ordnance Datum	kN/m^2	Kilo Newtons per metre squared
PAH	Poly Aromatic Hydrocarbon		
PCB	Poly-Chlorinated Biphenyl	kPa	Kilo Pascal – same as kN/m^2
PID	Photo Ionisation Detector	µm	Micro metre
PCSM	Preliminary Conceptual Site Model		
SGV	Soil Guideline Value		
TPH (CWG)	Total Petroleum Hydrocarbon (Criteria Working Group)		
SPT	Standard Penetration Test		
SVOC	Semi Volatile Organic Compound		
UST	Underground Storage Tank		
VCCs	Vibro Concrete Columns		
VSCs	Vibro Stone Columns		
VOC	Volatile Organic Compound		

Appendix C

Fieldwork Records

Key:

Window Sample

Notes

TerraConsult

9 The Courtyard, Phoenix Square,
Wyncolls Road, Colchester, CO4 9PE

Client

Veolia (ES) UK Ltd.

Site

Great Yarmouth Decommissioning Site

Title

Provisional Borehole Location Plan

Scale	1:1,000	@ A3
Drawing No.	0000/1/000	
Rev	Date	Description
File	.dwg	
Date	23/09/19	Engineer TM
Drawn	DF	Checked

Key:

Window Sample

Notes

TerraConsult

9 The Courtyard, Phoenix Square,
Wyncolls Road, Colchester, CO4 9PE

Client
Veolia (ES) UK Ltd.

Site
Great Yarmouth Decommissioning Site

Title
Exploratory Borehole Location Plan

Scale	1:1,000	@ A3
Drawing No.	0000/1/000	
Rev	Date	Description
File	.dwg	
Date	23/09/19	Engineer TM
Drawn	DF	Checked

Exploratory Hole Key Sheet

TerraConsult

SAMPLES:

Undisturbed:	
U	Driven tube sample
UT	Thin wall driven tube sample
TW	Pushed thin wall tube sample
P	Pushed piston sample
L	Liner sample (from windowless or similar sampler), full recovery unless otherwise stated
CBR	CBR mould sample
BLK	Block sample
C	Core sample (from rotary core) taken for laboratory testing
Disturbed:	
D	Small sample
B	Bulk sample
AMAL	Amalgamated sample
Environmental:	
ES	Environmental soil sample
EW	Environmental water sample

Comments: Sample reference numbers are assigned to every sample taken. A sample reference of 'NR' indicates that an attempt was made to take a tube sample; however, there was no recovery. Sample recovery is given as a percentage.

TESTS:

SPT S or SPT C	Standard Penetration Test, open shoe (S) or solid cone (C)
	The Standard Penetration Test is defined in BS EN ISO 22476-3 (2005). The incremental blow counts are given in the Field Records column; each increment is 75mm unless stated otherwise and any penetration under self weight in mm (SW) is noted. Where the full 300mm test drive is achieved the total number of blows for the test drive is presented as N = ** in the Test column. Where the test drive blows reach 50 (either in total or for a single increment) the total blow count beyond the seating drive is given (without the N = prefix).
ICBR	In situ CBR
IV	In situ vane shear strength, peak (p) and remoulded (r), kPa
HV	Hand vane shear strength, peak (p) and remoulded (r), kPa
PP	Pocket penetrometer test, converted to shear strength, kPa
KFH, KRH, KPI	Variable head permeability tests (KFH = falling head test, KRH = rising head test, KPI = packer test), permeability value
PID/FID	Photo-ionisation detector/Flame-ionisation detector
	Test results provided in Field Records column

DRILLING RECORDS:

The mechanical indices (TCR/SCR/RQD & If) are defined in BS 5930: 2015 and BS EN ISO 22575-1 (2006)

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
If	Fracture spacing, mm. Minimum, typical and maximum spacings are presented.
NI	Non intact is used where the core is fragmented.
CRF	Core recovered (length in m) in the following run
AZCL	Assessed zone of core loss
NR	Not recovered

GROUNDWATER:

▽ Groundwater strike

▼ Groundwater level after standing period

DEPTH REMARKS:

EoS	End of Shift
SoS	Start of Shift
EoBH	End of Borehole

INSTRUMENTATION:

Details of installations are given on the Record. Legend column shows installed instrument depths including slotted pipe section or tip depth, response zone filter material type and layers of backfill. The type of instrument installed is indicated by a code adjacent to the Legend column at the base of the instrument.

SP	Standpipe
SPIE	Standpipe piezometer
PPIE	Pneumatic piezometer
EPIE	Electronic piezometer
AP	Access pipe
GMP	Gas monitoring standpipe
(xx)	Internal diameter (mm)
ICE	Biaxial inclinometer
ICM	Inclinometer tubing for use with probe
SLIP	Slip indicator
ESET	Electronic settlement cell/gauge
ETM	Magnetic extensometer settlement point
ETR	Rod extensometer

EXPLORATORY HOLE TYPE:

CP	Cable percussion
DP	Dynamic probe
DCP	Dynamic cone penetrometer
HA	Hand auger
IP	Inspection pit
OP	Observation pit/trench
PC	Pavement core
RC	Rotary core
RO	Rotary open hole
SH	Shaft
SNC	Sonic (resonance)
TP	Trial pit/trench
TRAV	Traverse
WLS	Windowless (dynamic) sample
WS	Window (dynamic) sample

AGS

Project: **Great Yarmouth Decommissioning Site**

Project No: **10444**

Client: **Veolia**

Reference

KEY SHEET

Dynamic Sample Log

TerraConsult

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Logger:	Logged:	Remarks:
PC	0.00	0.26	29-08-19	29-08-19	IC	Diamond core drill	TM	29-08-19	Coordinates are approximate
WLS	0.26	5.45	29-08-19	29-08-19	BC	Dando Terrier	TM	29-08-19	SPT seating blows over 150 mm

Location details:

mE: 653180.99
mN: 304515.42
Grid:

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Water	Casing	Depth	Type & No	Results
				0.26	Reinforced CONCRETE.					
				0.40	(MADE GROUND)			0.30	D1	
					0.06 m: 7 mm diameter rebar			0.45	ES1	
				0.47	*0.12 m: 7 mm diameter rebar*			0.50 - 1.50	B1	
					Brown sandy slightly clayey GRAVEL of subangular flint and rare fine brick fragments. (MADE GROUND)					
	(60)			(1.53)	Black sandy slightly gravelly CLAY. (MADE GROUND)	Dry	1.00	1.00 - 1.45	C	N=31 (11,/6,8,8,9)
					Light greyish brown occasionally mottled orangish brown fine to medium SAND. (BLOWN SAND)					
				2.00	Light greyish brown occasionally mottled orangish brown gravelly SAND. Gravel is subangular to subrounded medium to coarse flint. (CRAG GROUP)	Dry	1.00	2.00 - 2.45	C	N=33 (14,/7,8,8,10)
						Dry	1.00	3.00 - 3.45	C	N=20 (7,/5,4,5,6)
	SP (60)			(3.45)		Dry	1.00	4.00 - 4.45	C	N=24 (9,/6,6,5,7)
						Dry	1.00	5.00 - 5.45	C	N=64 (10,/10,13,15,26)
				5.45	Dynamic sample ends at 5.45 m (Target depth)					
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:
4.50	4.50		

Casing:

Cased to:	Diameter (mm):
1.00	116

Depth related remarks:

From	to:	Remarks

Run details:

From:	to:	Duration:	Recovery:
0.20	1.00		90
1.00	2.00		90
2.00	3.00		90
3.00	4.00		80
4.00	5.00		70

AGS

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: DRAFT
Scale: 1:50

Project: Great Yarmouth Decommissioning Site
Project No: 10444
Client: Veolia

Exploratory position reference:

WS2

Dynamic Sample Log

TerraConsult

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Logger:	Logged:	Remarks:
PC	0.00	0.26	29-08-19	29-08-19	IC	Diamond core drill	TM	29-08-19	Coordinates are approximate
WLS	0.26	5.45	29-08-19	29-08-19	BC	Dando Terrier	TM	29-08-19	SPT seating blows over 150 mm

Location details:

mE: 653154.95
mN: 304550.41
Grid:

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Water	Casing	Depth	Type & No	Results
				0.26	CONCRETE					
				0.37	(MADE GROUND)			0.30	ES1	
				0.52	Reddish brown and grey sandy GRAVEL of subangular to subrounded brick, flint and concrete.			0.40	ES2	
					(MADE GROUND)			0.45 - 0.52	D1	
				0.78	Black sandy slightly gravelly CLAY. Abundant rootlets.					
	(60)				(MADE GROUND)	Dry	1.00	1.00 - 1.45	C	N=31 (10,/8,8,7,8)
					0.37 m: Wood			1.00 - 3.00	B1	
					Greyish brown fine to medium SAND.					
					(BLOWN SAND)					
					Light greyish brown fine to medium SAND.					
					(BLOWN SAND)					
				(2.12)		Dry	1.00	2.00 - 2.45	C	N=16 (6,/4,4,4,4)
				2.90						
					Light greyish brown gravelly SAND. Gravel is subangular to subrounded flint.	Dry	1.00	3.00 - 3.45	C	N=22 (6,/5,6,5,6)
					(CRAG GROUP)	Dry	1.00	4.00 - 4.45	C	N=21 (8,/6,6,5,4)
				(2.55)						
	SP (60)					Dry	1.00	5.00 - 5.45	C	N=38 (8,/6,10,11,11)
				5.45	Dynamic sample ends at 5.45 m (Target depth)					
	Inst (Ø)					Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:
4.60	4.60		

Casing:

Cased to:	Diameter (mm):
1.00	116

Depth related remarks:

From	to:	Remarks

Run details:

From:	to:	Duration:	Recovery:
0.30	1.00		90
1.00	2.00		80
2.00	3.00		80
3.00	4.00		70
4.00	5.00		70

AGS

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: DRAFT
Scale: 1:50

Project: Great Yarmouth Decommissioning Site
Project No: 10444
Client: Veolia

Exploratory position reference:

WS3

Dynamic Sample Log

TerraConsult

Borehole formation details:

Type:	From:	To:	Start date:	End date:	Crew:	Plant:	Logger:	Logged:	Remarks:
PC	0.00	0.21	29-08-19	29-08-19	IC	Diamond core drill	TM	29-08-19	Coordinates are approximate
WLS	0.21	3.00	29-08-19	29-08-19	BC	Dando Terrier	TM	29-08-19	SPT seating blows over 150 mm

Location details:

mE: 653113.67
mN: 304615.85
Grid:

Backfill/ Instal'n	Water-strike	Legend	Level	Depth (thick-ness)	Stratum Description	Samples & In Situ Testing: Water	Casing	Depth	Type & No	Results
				0.21	Reinforced CONCRETE.					
				0.35	(MADE GROUND)			0.20	D1	
					0.07 m: 7 mm diameter rebar			0.30	ES1	
				0.45	Grey very sandy GRAVEL of subangular to subrounded flint.			0.40	ES2	
				0.50	(MADE GROUND)			0.50 - 0.55	D2	
				0.55	Orangish brown very sandy GRAVEL of subangular to subrounded flint.					
				(0.39)	(MADE GROUND)					
	(60)			0.94	Grey SAND.	Dry	1.00	1.00 - 1.45	C	N=28 (12,/7,7,7,7)
				0.97	(MADE GROUND)					
				(0.61)	Dark grey slightly clayey SAND.					
				1.58	(MADE GROUND)					
					Grey SAND.					
					(MADE GROUND)					
					Dark grey slightly clayey SAND.					
					(MADE GROUND)					
				(1.42)	Light greyish brown fine to medium SAND.					
					(BLOWN SAND)					
					1.00 m: Clay pipe returned at base of sampler					
					Light greyish brown fine to medium gravelly SAND. Gravel is subangular to subrounded flint.					
	SP (60)			3.00	(CRAG GROUP)	Dry	1.00	3.00 - 3.45	C	N=37 (13,/7,9,10,11)
					Dynamic sample ends at 3.00 m (Target depth)					

	Inst (Ø)	Water	Casing	Depth	Type & No	Results

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:

Casing:

Cased to:	Diameter (mm):
1.00	116

Depth related remarks:

From	to:	Remarks

Run details:

From:	to:	Duration:	Recovery:
0.25	1.00		90
1.00	2.00		80
2.00	3.00		80

Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in metres.

Log issue: DRAFT
Scale: 1:50

Project: Great Yarmouth Decommissioning Site
Project No: 10444
Client: Veolia

Exploratory position reference:

WS4

Appendix D

Laboratory Analysis Results

SOCOTEC

Analysis of Soil Samples

Client:	Terraconsult 9 The Courtyard Phoenix Square Wyncolls Road Colchester Essex CO4 9PE
Testing Facility:	SOCOTEC UK Unit 12 Moorbrook Southmead Industrial Park Didcot Oxfordshire OX11 7HP
Laboratory Reference:	19-0791
Customer Reference:	10444 Great Yarmouth
Quote Number:	ENR-ANU-9638
PO Number:	PO-005652
Samples Received:	03 September 2019
Sample Condition:	Satisfactory, Ambient
Analysis Completed:	19 September 2019
Report Author:	K. Bala
Author's Name:	Kiran Bala
Job Title:	Analyst
Approved By:	C Hunston
Approver's Name:	Charlene Hunston
Job Title:	Team Leader
Report Date:	19 September 2019

UKAS TESTING
1252

SOCOTEC

Sample Summary

Customer Reference	Laboratory Reference	Matrix	Sampling Date
WS2 0.3m	RX4720	Soil	29/08/2019 12:00
WS4 0.2m	RX4721	Soil	29/08/2019 12:00

Experimental

Gamma Spectrometry

ANU/SOP/2029 – The measurement technique is based on the use of high purity germanium (HPGe) detectors coupled to an Ortec gamma ray spectroscopy system. The gamma ray spectra are stored on a computer and analysed using the software programme Fitzpeaks for photopeak identification and quantification. The detectors are calibrated for efficiency using a mixed radionuclide standard, which covers an energy range of approximately 60-2000 keV. The efficiency of gamma rays between 30 keV and 120 keV are determined on an individual basis.

Application of decay corrections for the naturally occurring daughter radionuclides of uranium and thorium assumes that the series daughter radionuclides are all in secular equilibrium and therefore decay with the half-life of the first radionuclide in the series.

Results

Results are presented in the following table.

Any opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

The results in this test report relate only to the items tested, and test portions taken thereof. This test report must not be reproduced except in full, without written approval of the laboratory.

SOCOTEC

Results Summary – Gamma Spectrometry

Customer Reference	Laboratory Reference	Be-7	K-40	Tl-208	Pb-210	Bi-212	Pb-212
WS2 0.3m	RX4720	< 7.4	146 ± 23	4.31 ± 0.90	< 21	< 14	10.3 ± 1.6
WS4 0.2m	RX4721	< 7.2	52 ± 14	2.70 ± 0.74	< 20	< 14	4.8 ± 1.2

Customer Reference	Laboratory Reference	Bi-214	Pb-214	Ra-226 *	Ac-228	Th-234	U-235
WS2 0.3m	RX4720	10.8 ± 2.1	13.6 ± 1.7	< 16	12.5 ± 2.4	< 14	< 0.95
WS4 0.2m	RX4721	8.6 ± 2.0	9.0 ± 1.4	< 15	7.5 ± 2.9	< 13	< 0.91

Notes:

1. Results and/or samples marked with an asterisk are not UKAS accredited.
2. Results are presented as $Bq.kg^{-1}$ of dried and homogenised samples and are decay corrected to the sampling date.
3. Uncertainties are rounded to 2 significant figures; results are rounded to the same precision.
4. For results below the Limit of Detection, the LoD is rounded up to 2 significant figures.
5. Detector calibrations are based upon homogeneous standard solutions. For quantification purposes the samples are assumed to be homogeneous.
6. ^{226}Ra has only one gamma ray at 186 keV and the major gamma ray from ^{235}U also occurs at 186 keV. ^{235}U can be measured by the lower abundance gamma ray at 144 keV and if a positive result for ^{235}U is reported, the ^{226}Ra result will be unreliable and overestimated. However even if ^{235}U is below the LoD there may still be a contribution to the ^{226}Ra from ^{235}U and the ^{226}Ra result may be unreliable and overestimated. If an accurate result for ^{226}Ra is required this is better obtained by radiochemical analysis.

-End of Report-

UKAS TESTING
1252

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UKAS TESTING 2683

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	19-24683
Issue:	1
Date of Issue:	06/09/2019
Contact:	James Phaure
Customer Details:	K4 Soils Laboratory Ltd Unit 8 Watford HertfordshireWD18 9RU
Quotation No:	Q16-00568
Order No:	Not Supplied
Customer Reference:	27070
Date Received:	04/09/2019
Date Approved:	06/09/2019
Details:	Great Yarmouth
Approved by:	

Mike Varley, Technical Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683

This report may only be reproduced in full

Sample Summary

Report No.: 19-24683, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
182977	WS2 0.50	Not Provided	04/09/2019	Sand	a
182978	WS3 1 1.00	Not Provided	04/09/2019	Sand	a

Results Summary

Report No.: 19-24683, issue number 1

ELAB Reference	182977	182978
Customer Reference		1
Sample ID		
Sample Type	BULK	BULK
Sample Location	WS2	WS3
Sample Depth (m)	0.50	1.00
Sampling Date	Not Provided	Not Provided

Determinand	Codes	Units	LOD		
Soil sample preparation parameters					
Material removed	N	%	0.1	< 0.1	< 0.1
Description of Inert material removed	N		0	None	None
Anions					
Water Soluble Sulphate	M	g/l	0.02	< 0.02	< 0.02
Inorganics					
Total Sulphur	N	%	0.01	0.01	< 0.01
Acid Soluble Sulphate (SO4)	U	%	0.02	0.02	0.02
Miscellaneous					
pH	M	pH units	0.1	7.3	7.5

Tests marked N are not UKAS accredited.

Method Summary

Report No.: 19-24683, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
pH	M	Air dried sample	05/09/2019	113	Electromeric
Acid Soluble Sulphate	U	Air dried sample	06/09/2019	115	Ion Chromatography
Water soluble anions	M	Air dried sample	05/09/2019	172	Ion Chromatography
Total organic carbon/Total sulphur	N	Air dried sample	05/09/2019	216	IR

Tests marked N are not UKAS accredited

Report Information

Report No.: 19-24683, issue number 1

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.
ELAB are unable to provide an interpretation or opinion on the content of this report.
The results relate only to the sample received.
PCB congener results may include any coeluting PCBs
Uncertainty of measurement for the determinands tested are available upon request
Unless otherwise stated, sample information has been provided by the client

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

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e: theresemcdaid@terraconsult.co.uk

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Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 19-57389

Project / Site name:	Great Yarmouth	**Samples received on:**	02/09/2019
Your job number:	10444	**Samples instructed on:**	02/09/2019
Your order number:	PO-005649	**Analysis completed by:**	06/09/2019
Report Issue Number:	1	**Report issued on:**	06/09/2019
Samples Analysed:	5 soil samples		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 19-57389

Project / Site name: Great Yarmouth
Your Order No: PO-005649

Lab Sample Number				1305520	1305521	1305522	1305523	1305524
Sample Reference				WS2	WS3	WS3	WS4	WS4
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.45	0.30	0.40	0.30	0.40
Date Sampled				29/08/2019	29/08/2019	29/08/2019	29/08/2019	29/08/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	15	9.5	10	6.9	3.4
Total mass of sample received	kg	0.001	NONE	1.0	1.1	1.1	1.2	0.88
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile, Amosite- Loose Fibres	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected	Not-detected	Not-detected	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.9	10.1	7.9	11.5	8.8
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	74	620	430	100	150
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.037	0.31	0.21	0.050	0.076
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	36.9	309	214	49.8	75.8
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	7.3	15	39	67	13
Water Soluble Fluoride (2:1)	mg/kg	1	NONE	4300	2000	3100	960	2200
Ammonium as NH_4	mg/kg	0.5	MCERTS	< 0.5	< 0.5	< 0.5	1.9	< 0.5
Total Organic Carbon (TOC)	%	0.1	MCERTS	2.6	0.2	1.0	0.4	0.3
Water Soluble Nitrate (2:1) as N	mg/kg	2	NONE	8.5	< 2.0	< 2.0	< 2.0	4.8
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	1.7	0.36	< 0.05	< 0.05	0.42
Anthracene	mg/kg	0.05	MCERTS	0.31	0.11	< 0.05	< 0.05	0.22
Fluoranthene	mg/kg	0.05	MCERTS	3.5	0.79	0.31	< 0.05	1.6
Pyrene	mg/kg	0.05	MCERTS	3.6	0.70	0.33	< 0.05	1.8
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.6	0.53	< 0.05	< 0.05	0.65
Chrysene	mg/kg	0.05	MCERTS	1.8	0.48	< 0.05	< 0.05	0.77
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.9	0.51	< 0.05	< 0.05	0.54
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.0	0.31	< 0.05	< 0.05	0.56
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.6	0.43	< 0.05	< 0.05	0.61
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.1	< 0.05	< 0.05	< 0.05	0.34
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.31	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.4	< 0.05	< 0.05	< 0.05	0.41
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	20.0	4.22	< 0.80	< 0.80	7.95

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 19-57389

Project / Site name: Great Yarmouth
Your Order No: PO-005649

Lab Sample Number				1305520	1305521	1305522	1305523	1305524
Sample Reference				WS2	WS3	WS3	WS4	WS4
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.45	0.30	0.40	0.30	0.40
Date Sampled				29/08/2019	29/08/2019	29/08/2019	29/08/2019	29/08/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	3.8	5.2	11	30
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	9.2	11	21	16
Copper (aqua regia extractable)	mg/kg	1	MCERTS	48	43	330	59	21
Lead (aqua regia extractable)	mg/kg	1	MCERTS	97	120	190	12	17
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16	11	34	18	22
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	2.2	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	88	150	1400	67	52
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
Mineral Oil (C10 - C40)	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	17	16	< 10	< 10	15
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	23	26	< 10	< 10	21
TPH C8-C35	mg/kg	10	NONE	23	26	< 10	< 10	21

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Analytical Report Number : 19-57389

Project / Site name: Great Yarmouth

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1305520	WS2	None Supplied	0.45	Grey loam and clay with gravel.
1305521	WS3	None Supplied	0.30	Red gravelly loam.
1305522	WS3	None Supplied	0.40	Grey sandy loam with gravel and rubble.
1305523	WS4	None Supplied	0.30	Light grey clay and gravel.
1305524	WS4	None Supplied	0.40	Brown gravelly loam.

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Analytical Report Number : 19-57389

Project / Site name: Great Yarmouth

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-PL	D	MCERTS
Fluoride, water soluble, in soil	Determination of fluoride in soil by water extraction followed by 1:1 ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033-PL	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

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Analytical Report Number : 19-57389

Project / Site name: Great Yarmouth

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	D	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-57391

Project / Site name:	Great Yarmouth	**Samples received on:**	02/09/2019
Your job number:	10444	**Samples instructed on:**	02/09/2019
Your order number:	PO-005649	**Analysis completed by:**	06/09/2019
Report Issue Number:	1	**Report issued on:**	06/09/2019
Samples Analysed:	2 WAC 10:1 samples		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

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Waste Acceptance Criteria Analytical Results

Report No:	**19-57391**						
					Client:	**TERRACONSULT**	
Location	**Great Yarmouth**						
Lab Reference (Sample Number)	1305529 / 1305530				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	29/08/2019				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS2						
Depth (m)	0.45						
Solid Waste Analysis							
TOC (%)**	2.7				3%	5%	6%
Loss on Ignition (%) **	6.1				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg)	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	20				100	--	--
pH (units)**	8.2				--	>6	--
Acid Neutralisation Capacity (mol / kg)	11				--	To be evaluated	To be evaluated
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1 mg/l			10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.0038			0.0320	0.5	2	25
Barium *	0.0120			0.0997	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0017			0.015	0.5	10	70
Copper *	0.011			0.090	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0062			0.0516	0.5	10	30
Nickel *	0.0027			0.023	0.4	10	40
Lead *	0.026			0.21	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.010			0.084	4	50	200
Chloride *	1.6			14	800	4000	25000
Fluoride	0.72			6.0	10	150	500
Sulphate *	5.7			47	1000	20000	50000
TDS*	49			410	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	11.1			92.2	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.0						
Dry Matter (%)	85						
Moisture (%)	15						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.
*= UKAS accredited (liquid eluate analysis only)
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation
** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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Waste Acceptance Criteria Analytical Results

Report No:	**19-57391**						
					Client:	**TERRACONSULT**	
Location	**Great Yarmouth**						
Lab Reference (Sample Number)	1305531 / 1305532				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	29/08/2019				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS3						
Depth (m)	0.30						
Solid Waste Analysis							
TOC (%)**	0.3				3%	5%	6%
Loss on Ignition (%) **	1.1				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg)	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	4.2				100	--	--
pH (units)**	9.9				--	>6	--
Acid Neutralisation Capacity (mol / kg)	52				--	To be evaluated	To be evaluated
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1 mg/l			10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.0021			0.0182	0.5	2	25
Barium *	0.0203			0.177	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0039			0.034	0.5	10	70
Copper *	0.015			0.13	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0030			0.0262	0.5	10	30
Nickel *	0.0007			0.0062	0.4	10	40
Lead *	0.0033			0.029	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0033			0.028	4	50	200
Chloride *	1.9			17	800	4000	25000
Fluoride	0.18			1.6	10	150	500
Sulphate *	38			330	1000	20000	50000
TDS*	170			1500	4000	60000	100000
Phenol Index (Monhydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	6.17			53.6	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.1						
Dry Matter (%)	91						
Moisture (%)	9.5						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation

** = MCERTS accrediited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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Analytical Report Number : 19-57391

Project / Site name: Great Yarmouth

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Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1305529	WS2	None Supplied	0.45	Grey loam and clay with gravel.
1305531	WS3	None Supplied	0.30	Red gravelly loam.

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Analytical Report Number : 19-57391

Project / Site name: Great Yarmouth

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance""	L046-PL	W	NONE
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L047-PL	D	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	MCERTS
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	NONE

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Analytical Report Number : 19-57391

Project / Site name: Great Yarmouth

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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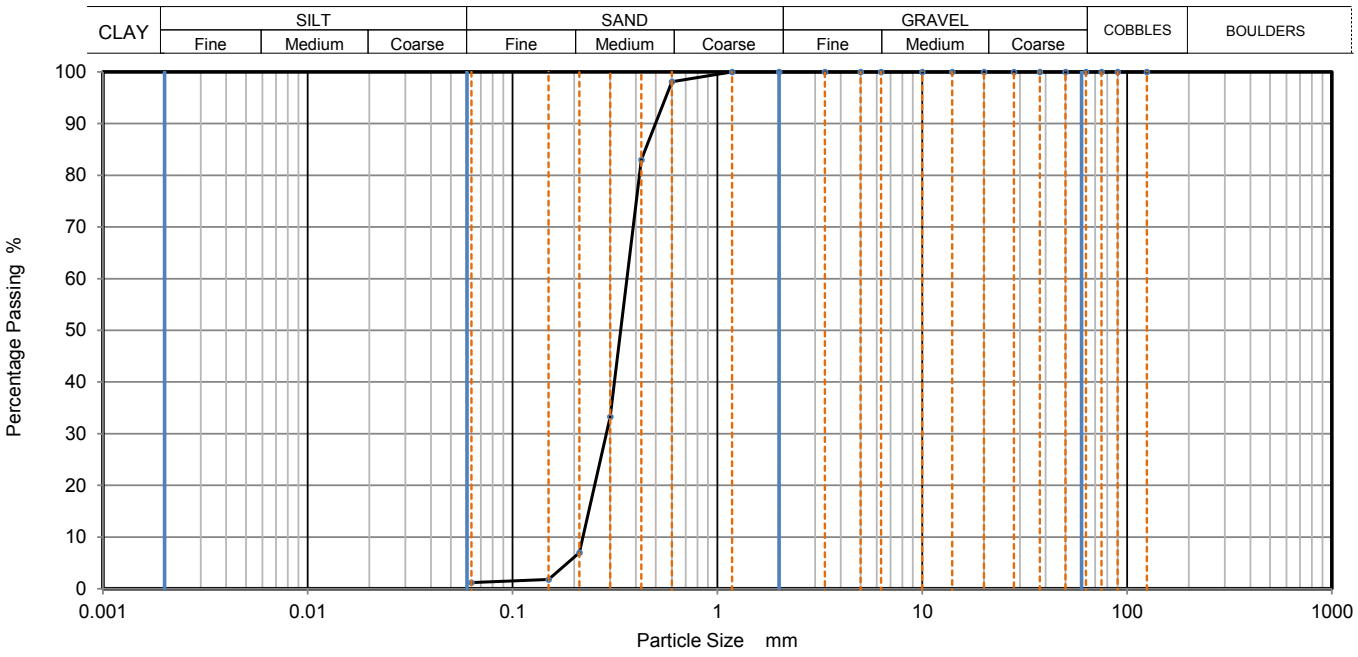
PARTICLE SIZE DISTRIBUTION

Site Name	Great Yarmouth			Job Ref	27070
				Borehole/Pit No.	WS2
Project No.	10444	Client	TerraConsult South	Sample No.	-
				Depth Top	0.50 m
Soil Description	Yellowish brown SAND			Depth Base	1.50 m
				Sample Type	B
				Samples received	02/09/2019
				Schedules received	02/09/2019
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	03/09/2019
				Date tested	05/09/2019



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	98		
0.425	83		
0.3	33		
0.212	7		
0.15	2		
0.063	1		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.0
Sand	98.8
Fines <0.063mm	1.2

Grading Analysis		
D100	mm	
D60	mm	0.362
D30	mm	0.287
D10	mm	0.22
Uniformity Coefficient		1.6
Curvature Coefficient		1

Remarks

Preparation and testing in accordance with BS1377 unless noted below

K4 Soils Laboratory

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Email: james@k4soils.com

Tel: 01923 711288

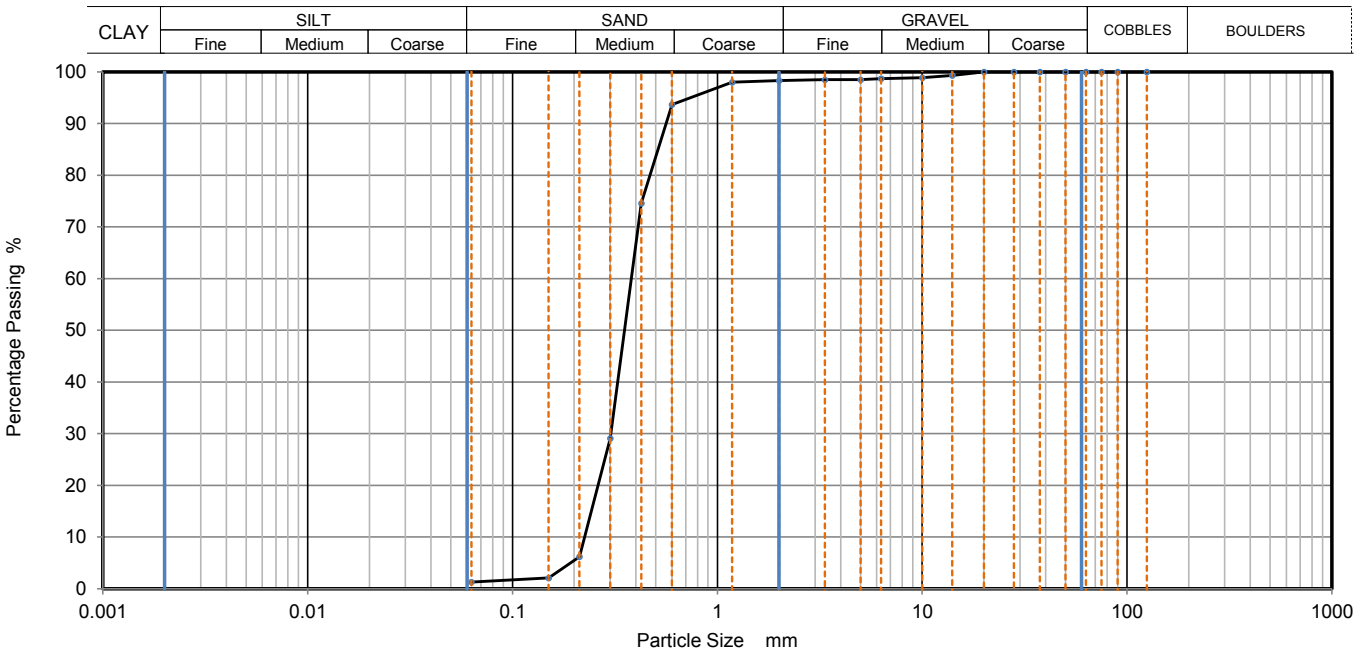
Checked and Approved

Initials: **J.P**

Date: 06/09/2019

PARTICLE SIZE DISTRIBUTION

Site Name	Great Yarmouth			Job Ref	27070
				Borehole/Pit No.	WS3
Project No.	10444	Client	TerraConsult South	Sample No.	-
				Depth Top	1.00 m
Soil Description	Yellowish brown SAND with rare fm sub-angular gravel			Depth Base	3.00 m
				Sample Type	B
				Samples received	02/09/2019
				Schedules received	02/09/2019
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	03/09/2019
				Date tested	05/09/2019



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	99		
6.3	99		
5	99		
3.35	99		
2	98		
1.18	98		
0.6	94		
0.425	75		
0.3	29		
0.212	6		
0.15	2		
0.063	1		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	1.7
Sand	97.0
Fines <0.063mm	1.3

Grading Analysis		
D100	mm	
D60	mm	0.38
D30	mm	0.302
D10	mm	0.225
Uniformity Coefficient		1.7
Curvature Coefficient		1.1

Remarks

Preparation and testing in accordance with BS1377 unless noted below

K4 Soils Laboratory

Unit 8, Olds Close, Watford, Herts, WD18 9RU

Email: james@k4soils.com

Tel: 01923 711288

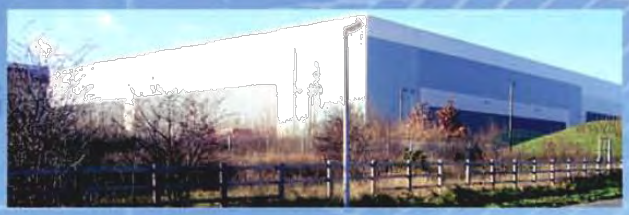
Checked and Approved

Initials: **J.P**

Date: 06/09/2019

UKAS TESTING 2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)



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APPENDIX M

SITE CONDITION REPORT

SITE CONDITION REPORT for Great Yarmouth Decommissioning Facility (Inner)

Veolia ES (UK) Limited
South Beach Parade
Great Yarmouth
Norfolk
NR30 3GY

Permit Number EPR/HP3806PG

Version 1 - September 2019

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1.0 SITE DETAILS	
Name of the applicant	Veolia ES (UK) Limited
Activity address	Great Yarmouth Decommissioning Facility (Inner) South Beach Parade Great Yarmouth Norfolk NR30 3GY
National grid reference	TG 53147 04575

Document reference and dates for Site Condition Report at permit application and surrender	Great Yarmouth Phase 1 Desk Study and Preliminary Risk Assessment Report: Report No 10444/R01, dated 7th August 2019 Great Yarmouth Phase 2 Site Investigation Report: Report No 10444/R02, dated 23rd September 2019 Permit Application Supporting Statement: September 2019

Document references for site plans (including location and boundaries)	Permit Application Supporting Statement: September 2019 – Appendix A

2.0 CONDITION OF THE LAND AT PERMIT ISSUE	
Environmental setting including: • geology • hydrogeology • surface waters	The site is accessed off South Beach Parade, approximately 50m north of Brineflow Properties and Handling. The site is bounded by depots to the north and south, South Beach Parade to the east and South Denes Road to the west. The site boundaries are demarcated by a brick wall to the east and south and open land to the north and west. The site comprises concrete hard standing with what appears to be shipping containers along the eastern boundary. A post of mast is present in the north-west and concrete posts are present along the western and northern boundaries. The site surface is anticipated to be mainly concrete hardstanding. The site is underlain by superficial deposits of Blown Sand, and the Crag Group solid geology, all with recorded high permeability with an intergranular flow type The superficial deposits underlying the site are designated a Secondary A Aquifer and the underlying geology is designated a Principal Aquifer. The nearest surface water feature is approximately 116m west of site. There are no recorded surface or ground water abstraction licenses within 250m of the site. An Environment Agency Zone 2 floodplain is 63m west of site, and a Zone 3 floodplain is 64m west. The highest risk of flooding from rivers and the sea (RoFRaS) recorded on site is considered to be very low. The site is not within a radon affected area, as less than 1% of properties are above the action level. No radon protective measures are considered necessary for new properties or extensions as described in Building Research Establishment (BRE) publication BR211. There is a low hazard rating of running sands on site, and a very low hazard of landslides.
Pollution history including: • pollution incidents that may have affected land	From the earliest available mapping dated 1882, the site formed part of an open plot of land. Maps from 1965 showed the site as a seasonal camping site, before fencing or walls were constructed

• historical land-uses and associated contaminants • any visual/olfactory evidence of existing contamination • evidence of damage to pollution prevention measures	prior to 1970. The site was a depot in 1986 – 1990, and was described as 'Viking Yard depot' in 2002 maps onwards There are 89 records of potentially contaminative industrial sites within a 250m radius of the site including; recycling services and waste treatment, including hazardous waste, sewage and trade discharges, electricity substations, fuel storage, and vehicle repair. No evidence of visual contamination during the preliminary site walkover in August 2019. No evidence of damage to the surface water drainage network during the preliminary site walkover in August 2019.
Evidence of historic contamination, for example, historical site investigation, assessment, remediation and verification reports (where available)	Refer to Great Yarmouth Phase 2 Site Investigation Report: Report No 10444/R02, dated 23rd September 2019. As summary of the site investigation is detailed below: • Analysis of selected soil samples did not indicate any elevated concentrations of contaminants when compared against their respective criteria for commercial end use. • Asbestos was detected at WS03 in a sample of the Made Ground. Loose fibres of amosite and chrysotile asbestos were detected. • Analysis for Waste Acceptance Criteria has determined soils can be taken to an inert waste landfill. • There is no indication of NORM present in the shallow soils of the areas tested which are immediately adjacent to where the former oil and gas industry structures are brought ashore. • The recorded carbon dioxide, methane, carbon monoxide and hydrogen sulphide (H2S) concentrations were below detection levels.
Baseline soil and groundwater reference data	Refer to Great Yarmouth Phase 2 Site Investigation Report: Report No 10444/R02, dated 23rd September 2019

3.0 PERMITTED ACTIVITIES	
Permitted activities	The application seeks to include the following listed activities: • 5.3 Part A (1) a (iv) - Disposal or Recovery of Hazardous waste >10t/day involving repackaging: covering the removal of oils and other hazardous materials from the structures and repackaging into barrels, IBCs and other suitable containers prior to temporary storage on site. • 5.6 Part A (1) a - Temporary storage of Hazardous waste >50t/day: covering the hazardous materials that will have to be removed off the structures and temporarily stored in the dedicated Hazardous Waste Storage Area prior to removal off site.
Associated activities undertaken	As DAAs to the installation: • Cleaning of tanks and pipework from the 5.3 Activity: covering the removal of residues from tanks and pipework removed from the structures. • Temporary storage of hazardous and non-hazardous WEEE, pending recovery at an off site facility. Waste Operation • Physical Treatment of non-hazardous waste covering the manual dismantling of offshore and onshore structures, ELVs and wind turbines. • Mixed Metal Recycling Site including the temporary storage of non-hazardous waste pending recovery or disposal off site: covering the storage of waste metal and separate fractions of plastics, wood, textiles, insulation materials etc.
Document references for: • plan showing activity layout; and • environmental risk assessment.	Permit Application Supporting Statement: September 2019 – Appendix A (Site Plans) Permit Application Supporting Statement: September 2019 – Appendix G (Environmental Risk Assessment)

4.0 CHANGES TO THE ACTIVITY	
Have there been any changes to the activity boundary?	Yes/No
Have there been any changes to the permitted activities?	Yes/No
Have any 'dangerous substances' not identified in the Application Site Condition Report been used or produced as a result of the permitted activities?	Yes/No

5.0 MEASURES TAKEN TO PROTECT LAND

6.0 POLLUTION INCIDENTS THAT MAY HAVE HAD AN IMPACT ON LAND, AND THEIR REMEDIATION

7.0 SOIL GAS AND WATER QUALITY MONITORING (WHERE UNDERTAKEN)

8.0 DECOMMISSIONING AND REMOVAL OF POLLUTION RISK

9.0 REFERENCE DATA AND REMEDIATION (WHERE RELEVANT)

10.0 STATEMENT OF SITE CONDITION

This Site Condition Report has been prepared to accompany the partial surrender application of permit number EPR/XP3139BM. The application seeks to remove Black 104 from the Permit as this operation will cease in November 2016 and the area subsequently decommissioned and developed as part of a wider housing development project.

Area 104 was developed on a Green Belt site and thus has no history of industrial contamination. The site was managed in such a way as to minimise the risk of pollution, as set out in Section 5.0 above, thereby returning the land back to its original condition.

An isolated incident in November 2003 (prior to Operation by the current Operator) led to an oil spill, albeit localised adjacent to the oil storage tank. This was dealt with promptly and a subsequent investigation identified that a buried pipeline was the source of the incident. This was replaced.

Soil samples were taken and the contamination quantified. This monitoring was used as the basis for the on-going Site Protection and Monitoring Programme (SPMP) which has been used (and updated) since 2004.

The final set of analysis (both groundwater and soil) were undertaken in July 2016. This data was compared to all previous analysis and fed into the CLEA model. This concluded the following:

“From the work undertaken from 2008 to 2016 it can be stated that the contamination that resulted from the spill in 2004 no longer poses a risk to human health.”

“It is recommended that no further action is required and that the site is suitable for development…”

Annex 1

Annex 2