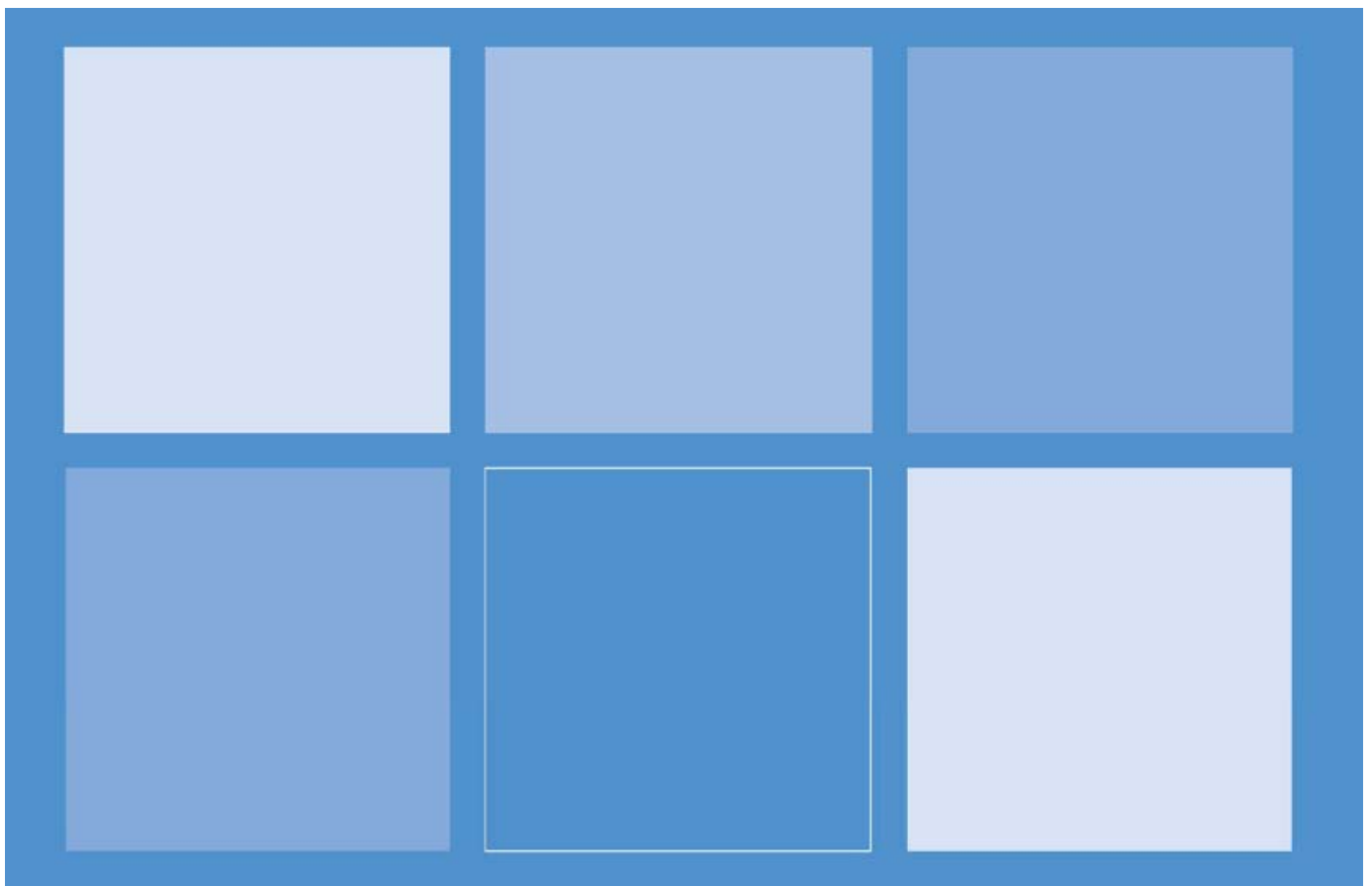





Addendum to Revised Remedial Methodology

Newhaven ERF

Hochtief Construction AG



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Quality Management

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Drawings

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JER3915-016	Conceptual Model
JER3915-012	Ballast Tank Location Plan
JER3915-013	Construction Detail: Ballast Tank 2
JER3915-014	Construction Detail: Ballast Tank 3
JER3915-015	Construction Detail: Ballast Tanks 1 and 4

Appendices

Appendix A	Regulator Correspondence
Appendix B	Description of Water Handling for Floating Caisson
Appendix C	Risk Assessment Screening Criteria

1 Introduction

1.1 Introduction

RPS has been commissioned by Hochtief Construction AG to provide an addendum to the previously agreed Remedial Methodology to formalise the reuse of materials with four ballast tanks associated with the deep basement. For full details of the previously agreed remedial strategy reference should be made to the RPS *Revised Remedial Methodology Report, issued in June 2008*.

Initial discussions have been undertaken with the Local Authority and the Environment Agency (EA) regarding the acceptability of the proposed works from a controlled waters/human health risk assessment perspective and to confirm that the material, once placed, would be considered a non waste. These correspondences are presented in *Appendix A*.

As identified this document forms an addendum to support the existing strategy relevant to the infilling of the ballast tanks only.

1.2 Background

Remedial works, in accordance with the previously agreed remedial methodology have been underway at the site for the previous 24 months. These works have included the bioremediation and/or stabilisation of materials to meet the agreed reuse criteria. The reuse criteria were derived from a quantitative assessment of risk to human health and controlled waters, based on use of materials within areas of landscaping, beneath buildings or areas of hardstanding.

In parallel with remediation construction works have progressed at the site including the construction of a deep basement. An integral part of the deep basement construction has comprised the construction of a number of ballast tanks attached to the outside of the basement structure to allow control of buoyancy during the floating of the basement into its required permanent location. Details of this process are presented in *Appendix B*. The design requires that these tanks are permanently backfilled to prevent collapse and potential damage to the structure in the long term. Whilst 4 number tanks have been backfilled with clean sands it is now proposed that the remaining 4 tanks are backfilled with remediated soils that have failed to fully meet the currently identified

reuses criteria, particularly with respect to Benzo(a)pyrene (BaP) and lead but remain suitable for use as permanent tank ballast.

1.3 Scope of Report

To enable the regulators to consider this proposal and as requested this document presents:

- The construction detail of the ballast tanks
- An assessment of risks to controlled waters and human health
- The methodology for placement of materials including measures to be implemented to protect human health, control nuisance and prevent cross contamination during the placement of material
- Details of how the placement of the material will be recorded and made available to future site users and demolition staff at the appropriate time.

1.4 Report Structure

Following this introductory Section the report is structured as follows:

Section 2; Environmental Setting: Outlines brief environmental setting of the site with respect to geology, hydrogeology and hydrology;

Section 3; Ballast Tank Construction Detail: Provides details of the ballast tank construction;

Section 4; Risk Assessment: Semi quantitative assessment of risk to controlled waters and human health;

Section 5; Remedial Methodology: Provides a detailed remedial methodology for the proposed additional tank infill works.

2 Environmental Setting

2.1 Site Location and Description

The site is located at the end of North Quay Road, on the eastern bank of the River Ouse Estuary to the north of the A259 Bridge in Newhaven, east Sussex. The national grid reference for the site is TQ 445 024. *Drawing JER3915-001* details the site location.

2.2 Geology

The geology identified at the site during the Soil Mechanics 2004 investigation is summarised in [Table 2.1](#)~~Table 2-1~~

Table 2.1 Geological Sequence

Stratigraphic Unit	Description	Thickness (m)
Made ground	Sandy Clayey Gravel	1-4
Alluvium	Silt/Clay	3-5
Alluvium	Clayey/Silty Sand	5-15
Gravels	Gravel	3-5
Upper Chalk	Fractured chalk with possible solution features	>20

The made ground is present across the entire site and is a heterogeneous dark brown to white material comprising sandy gravel, flint, stone aggregate, clay, occasional ash, chalk, clinker, wire, metal, wood and brick.

The alluvial deposits consist of an upper silt/clay layer that extends across the entire site underlain by clayey sand, sand and gravel layer generally increasing with grain size with depth. Rather than presenting a classic 'layer cake' formation, the alluvial deposits are inter-fingered with laterally discontinuous layering.

The upper chalk extends across the entire site. The chalk is considered to be a dual porosity system containing fracture systems.

2.3 Hydrogeology

A Major Aquifer underlies the site within the Upper Chalk. This major aquifer is protected by significant thickness of low permeability deposits ($1.40\text{E-}6\text{m/s}$ – $9.00\text{E-}08\text{m/s}$) that support a perched water table within the made ground. During groundwater monitoring the perched groundwater table was identified at 1-2m bgl. Local to the South Heighton Sewer the groundwater was deeper, indicating that groundwater may be seeping into the sewer. The sewer is thought to act as a land drain for an offsite area and discharges into the River Ouse Estuary. Monitoring did not identify a definitive groundwater flow direction within the perched water table, however it is considered to be towards the River Ouse Estuary. The deeper groundwater within the chalk aquifer was found to have a variable flow direction away and towards the estuary, thought to be due to tidal influence. Groundwater salinities measured onsite indicate that the water within the aquifer is brackish and therefore of limited resource value.

2.4 Hydrology

The River Ouse Estuary is the main surface water feature in close proximity to the site. The sheet pile wall between the site and the estuary may reduce the continuity between the groundwater beneath the site and the adjacent surface water. The condition of the sheet pile wall is unknown and therefore, if it's potential to reduce migration is to be considered within any assessment, a survey would have to be undertaken and its permeability determined. There is also a water filled ditch on the north east boundary of the site; the ditch appears to contain stagnant water with no obvious outlet or inlet.

3 Ballast Tanks Location and Construction Detail

3.1 Location

The ballast tanks are located on the outer wall of the basement structure located at the southern end of the facility. The specific location of the four ballast tanks relative to the basement structure are detailed on *Drawing JER3915-012*. For ease of reference the four ballast tanks have been assigned the references 1 to 4 as detailed on the drawing.

Each tank extends from ground surface to a depth of approximately 19m Below Ground Level (m BGL).

3.2 Construction Detail

All four ballast tanks were constructed in the same manner. Each tank has been constructed by wet pouring of cement to form a continuous vertical column. Construction was completed in 2.5m lifts, a competent seal being created between each lift through the scabbling of the upper surface of the placed lift once set followed by wet pouring of next lift on top. Vertical Steel reinforcement has been inserted during this process to strengthen the columns. The base of the ballast tanks is formed by a 1000mm thick reinforced concrete slab that extends throughout the basement area. The top of each ballast tank is to be completed by placement of a 500-750mm thick concrete slab. The horizontal concrete slab overriding ballast tanks 1, 2 and 4 is designed to bridge the top of the ballast tanks and be load bearing. This will generate a high pressure joint that will act to seal the ballast tank. Ballast tank 3 is sealed in a slightly different manner, as the overriding slab dips at an approximate 45° angle. A competent seal is created as the concrete slab in this instance is 'keyed' at the joint. Reference to *Drawings JER3915-012 to JER3915-014* should be made for full details of the construction of each of the ballast tanks.

4 Human Health and Controlled Waters Risk Assessment

4.1 Introduction

The placement of the material within the ballast tanks has been considered from a risk perspective based on a source pathway receptor model. To assist with conceptualisation of the proposed scenario a schematic representation of the site conditions is presented in *Drawing JER3915-016*. The assessment is presented in the remainder of this section.

4.1.1 Source

The concentrations that are present within the materials that may be placed in the ballast tanks have been assessed. The previously agreed risk assessment screening values, as presented within the *RPS Phase II interpretative Investigation Report (April 2008)* have been used as an initial screening assessment to identify where contaminant concentrations require further consideration. This process has identified that lead and BaP are present at concentrations that exceed the previously agreed reuse criteria. The screening assessment is presented in *Appendix C*. Both lead and BaP are considered non volatile contaminants and therefore direct contact with receptors is required for a risk to be realised. A number of volatile organic compounds (VOCs) and Semi Volatile Organic Compounds (SVOCs) have been identified at extremely low concentrations, the maximum being 0.036 ppm for Isopropylbenzene.

4.1.2 Receptors

The receptors at the site are considered to be:

- Construction/demolition workers.
- Site Users and visitors
- Controlled waters in the form of the River Ouse Estuary and the underlying Major Chalk Aquifer

As per the position agreed for the existing strategy the perched water is considered a pathway and not a receptor. It is considered that the risk to construction/demolition workers will be controlled through the use of appropriate Personal Protective Equipment (PPE) and therefore they are not considered further within the assessment. The potential for offsite human receptors to be impacted through the accidental transport of

materials off site will be restricted through the appropriate decontamination protocols as detailed within section 5.

4.1.3 Pathways to Humans

Due to the construction detail of the ballast tanks the only pathway to humans is considered to be restricted to inhalation of volatiles. As previously stated lead and BaP, whilst present at concentrations above the previously agreed screening criterion, are considered non-volatile and therefore are considered not to present a significant risk in this context. It is acknowledged that a number of Volatile Organic Compounds have been identified for which screening criteria have not previously been derived. These concentrations are however extremely low and not considered to present a significant risk.

4.1.4 Pathways to Controlled Waters

Based on the ballast tank construction detail presented in section 3 and the environmental setting set out in section 2 and summarised on *Drawing JER3915-018* it is considered that no pathways to controlled waters exist for the following reasons:

- The ballast tanks comprise a continuous concrete column that will prevent migration of groundwater into or out from the ballast tanks.
- The top of each ballast tank is closed and is positioned above the surrounding perched water table which is considered to be between 2 and 3m bgl.
- Groundwater flow adjacent to the tanks is restricted by the presence of the temporary works concrete walled 'coffer dam' and the relatively low permeability backfill materials.

4.1.5 Conclusion

Whilst elevated concentrations of lead and BaP are present, given the structure of the ballast tanks and the surrounding environmental conditions it is considered that the material will not generate an unacceptable risk to the identified receptors by being re used within the ballast tanks as permanent ballast.

5 Detailed Remedial Methodology

5.1 Introduction

A detailed remedial methodology relating to the tank infilling is presented in the remainder of this section. The methodology presents details of;

- How the loading, transport and placement of the materials will be controlled to prevent cross contamination.
- The control measures that will be put in place to control nuisance and environmental monitoring.
- The PPE to be worn by the construction/remedial workers.
- Records of material placement/validation.

5.2 Methodology

The detailed remedial methodology and validation works are described in sections 5.2.1 to 5.2.4. In all instances the remedial contractor will control noise, dust and odour resulting from the works to acceptable levels.

5.2.1 Loading, Transport and Placement of Materials.

The backfill materials will be transported from the current soil treatment area to the ballast tanks without intermediate storage or lay down. It is considered that this will minimise the potential for cross contamination of other materials onsite. The steps outlined below will be followed when placing the material within the ballast tanks:

- The material will be loaded into a 9 and 20 tonne dumper trucks using a 20 tonne 360° tracked on chains or similar.
- Loading of the materials will be undertaken in a controlled manner within the currently agreed soil treatment area.
- The dumper truck will be loaded to an appropriate level so as to prevent materials falling from the truck during transport.

- The dumper truck will transport the material to the top of the ballast tank where the material will be loaded directly into the ballast tank using an excavator with a grab bucket.
- A 5m area around each ballast tanks will be covered in plastic sheeting to prevent cross contamination should spills occur during backfilling of the tanks.
- The dumper truck will take the most direct route between the soil treatment area and the ballast tanks whilst maximising its distance from the site boundary and potential offsite receptors.
- The loading, transport and placement of materials will be observed by an appropriately experienced and qualified person in order to:
 - Identify any visual or olfactory evidence that suggests that the material is more contaminated than the current laboratory data suggests. Where identified these materials will be stored within the soil treatment area for further testing or offsite disposal.
 - Detect spillage of materials. Where materials are accidentally spilt during transport, or placement the materials will be recovered immediately using hand tools and bagged for placement with the ballast tanks. Where the underlying materials are contaminated these materials will also be excavated by hand for placement within the ballast tanks.
- A record of any spillages and the resulting 'clean up' works will be maintained onsite for inclusion within the validation report.
- During periods of precipitation the ballast tanks that have received material will be covered with a waterproof sheet to prevent ingress of water.
- Once backfilling of each ballast tank is complete and before placement of the overlying concrete slab the ballast tanks will be covered with a waterproof sheet to prevent ingress of water.
- It is anticipated that the bulk of loading and/or placement of materials will be undertaken by machine.
- Where man handling of materials is required appropriate PPE will be donned.

5.2.2 Control Measures and Environmental Monitoring

The steps outlined below will be followed to control nuisance:

- Where the material to be placed in the ballast tanks is dry it will be damped down prior to removal from the soil treatment area to prevent generation of dust.
- The drainage within the soil treatment area will contain any runoff for appropriate treatment prior to disposal in line with the current consents.
- Monitoring for VOCs will be undertaken using a photo ionisation Detector (PID). Screening will be undertaken in the areas of loading and placement of the materials. Where the screening criteria of 1ppm is exceeded (the work place exposure limit for benzene) appropriate respirators will be worn as stated within section 5.2.3.
- Where the VOC limit is exceeded in the working areas, screening will be undertaken at the site boundary. Where VOC concentrations exceed 1 ppm at the site boundary this will be documented and works will be halted until conditions are more favourable.
- Lewis District Council And East Sussex District Council will be notified of exceedances of the 1ppm limit where they occur at the site boundary.

5.2.3 Personal Protective Equipment

Hardhats, high visibility vests and/or jackets, boots with protective mid-sole and toe protection, disposable overalls and gloves will be worn at all times.

Where PID screening concentrations exceed 1ppm an organic vapour mask with type AX cartridge (BP <65 oC) will also be worn

5.2.4 Decontamination Procedures

The vehicles and personnel undertaking the remedial works will follow the procedures detailed below to prevent the transport of contaminated materials across and off site:

- Cleaning of wheels/tracks immediately prior to exiting the soil treatment and prior to leaving site. The specific methodology for cleaning wheels/tracks will be dependant on site condition and will form a combination of dry brushing to remove dirt or pressure washing. Where pressure washing is used it will be undertaken within the soil treatment area to ensure that the resulting runoff is adequately contained.
- Boots will be cleaned immediately prior to exiting the soil treatment area and prior to leaving site. Boots will be cleaned at a designated boot cleaning station

located at the entrance/exit from the soil treatment area using a stiff brush and water.

- Disposable overalls will be removed prior to leaving site and disposed of as contaminated PPE for later disposal offsite.

5.2.5 Records of material placement/validation.

Following completion of the works a validation report will be issued that provides details of the volume and chemical composition of the materials placed within each ballast tank together with confirmation of the as built construction details. The validation report will, together with the remedial methodology, be included within the site health and safety file for future reference.

Drawings

Appendices

Appendix A

Regulator Correspondence

Appendix B

Description of Water Handling for Floating Caisson

Appendix C

Screening Assessment