



BETTER SOLUTIONS, INTELLIGENTLY ENGINEERED

ENVIRONMENT

Galliford Try
Broadmarsh Car Park
Nottingham
Remediation Verification Report

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CONTENTS

1.	INTRODUCTION.....	1
	Instruction	1
	Objectives	1
	Previous Reports	1
	Scope of Works	2
2.	THE SITE	3
	Site Location.....	3
	Site Description	3
	Site History	4
	Ground Conditions	4
3.	CONCEPTUAL SITE MODEL	5
	Summary of Significant Pollutant Linkages	5
5.	REMEDIALATION WORKS.....	7
	Variations to Agreed Strategy	7
6.	MATERIAL MANAGEMENT RECORDS	8
	Soil for re-use	8
	Off-site Disposal.....	8
7.	SOIL VERIFICATION TESTING	9
	Hotspots	9
	Capping Layer	9
	Imported Materials	9
8.	COMPLETION STATEMENT	10
9.	REFERENCES	11

FIGURES

Figure 2.1: Site Location Plan

TABLES

Table 3.1: Summary of Significant Pollution Linkages

APPENDICES

APPENDIX 1: Development Masterplan

APPENDIX 2: Transfer Notes & Waste Licenses

APPENDIX 3: Galliford Try Correspondence

1. INTRODUCTION

Instruction

- 1.1 BWB Consulting Ltd (BWB) was instructed by Galliford Try (the Client) to prepare a Remediation Verification Report on the remediation works undertaken in relation to the project, which is entitled Broadmarsh Car Park, Nottingham.
- 1.2 The project comprises the development of a new facility to include a ground floor bus station, multi-storey car park, retail outlets and a library. The development plans are presented as **Appendix 1**.

Objectives

- 1.3 The report describes the remediation works undertaken across the site and presents the results of validation testing undertaken to demonstrate that the works have been completed in accordance with the approved remediation strategy.
- 1.4 The report has been completed in accordance with Environment Agency Report Contaminated Land Risk management and BS10175: 2011 Investigation of Potentially Contaminated Sites Code of Practice.

Previous Reports

- 1.5 Previous work has been carried out at this site by BWB, for which the following documents have been produced:
- BWB for Nottingham City Council; Phase 1 Geo-Environmental Report; Broadmarsh Centre Extension, Nottingham; reference: BMC-BWB-00-XX-SBW-EN-0001-(PhI); dated November 2015;
 - BWB for Faithful and Gould; Phase 2 Geo-Environmental Assessment; Broadmarsh Car Park, Broadmarsh Centre, Nottingham; reference: NTS2482-BWB-00-XX-EN-RP-0002_GI_P1; dated July 2016;
 - BWB for Nottingham City Council; Phase 2 Geo-Environmental Assessment; Broadmarsh Car Park, Nottingham, reference: BMCP-BWB-ZZ-XX-YE-RP-0001_GI_P1; dated September 2017;
 - BWB for Nottingham City Council; Addendum Groundwater Monitoring Letter Report; Broadmarsh Car Park Redevelopment; reference: IW/RTR/NTS2649/180524; dated May 2018;
 - BWB for Nottingham City Council; WAC Assessment and CBR Plate Load Testing Letter Report; Broadmarsh Car Park; reference: RTR/PT/NTS2649; dated June 2018; and
 - BWB for Galliford try; Remediation Strategy; Broadmarsh Car Park; reference BMCP-BWB-ZZ-XX-YE-RP-0004_RS-S02-P01; dates March 2019.
- 1.6 This report assumes familiarity and understanding of the contents of the aforementioned reports.

Scope of Works

1.7 The scope of work undertaken and presented herein, comprised:

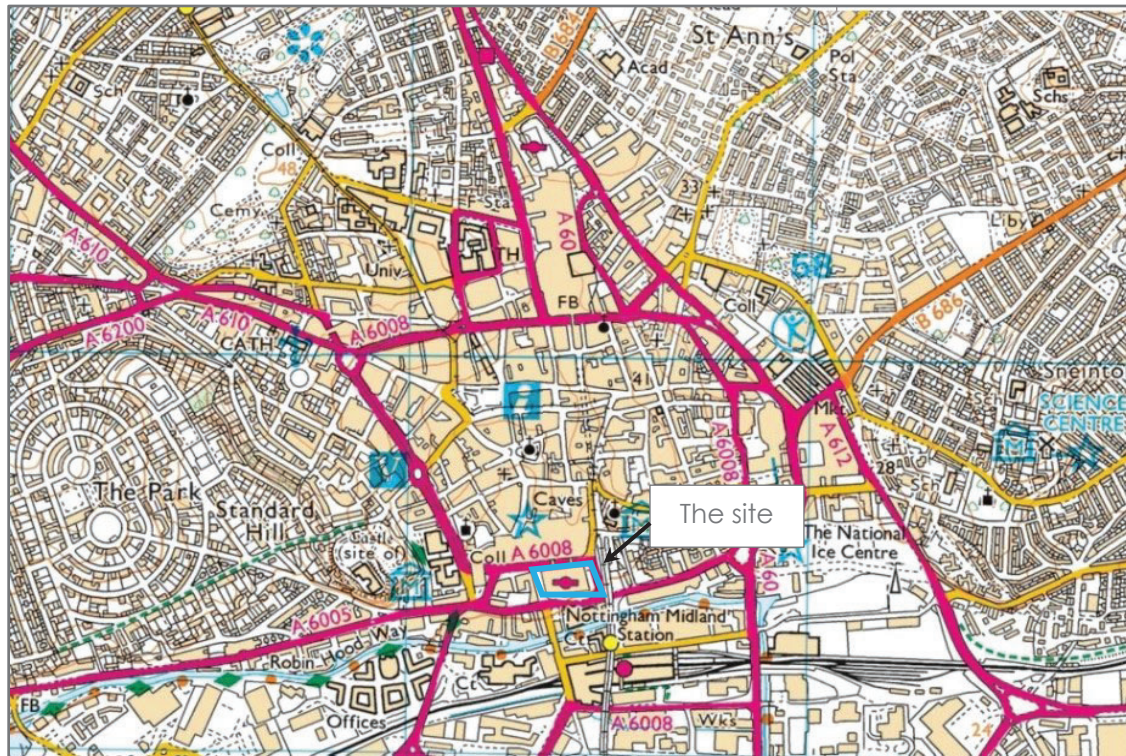
- Review of the following information:
 - Waste disposal records;
 - Material tracking records;
- Residual risk assessment; and
- Production of a verification report.

2. THE SITE

Site Location

- 2.1 The site is located at the former Broadmarsh Car Park, Nottingham centred at approximate National Grid reference 457402, 339440. The approximate location of the site is shown in **Figure 2.1**.

Figure 2.1: Site Location Plan



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Site Description

- 2.2 The site occupies an area of approximately 1.1 hectares and is roughly rectangular. The site is generally flat and level, with the northern and eastern boundaries significantly lower than the surrounding area. The site is currently nearing development completion with the majority of remaining works comprising internal fit-out. A description of the site from a previous visit is provided below.

March 2019

- 2.3 The site comprised a surfacing of rough hardstanding with stockpiles of crushed concrete following demolition of the car park and bus station.
- 2.4 The site is bounded by highways on all sides; Collin Street to the north, Middle Hill to the east, Canal Street to the south and Carrington Street to the west. Surrounding land uses

comprises retail, commercial and light industrial uses, with the Broadmarsh Shopping Centre located immediately to the north.

Site History

- 2.5 A full review of the site's history is provided in the Phase 1 Report. The site was occupied by residential properties from pre-1880s until the 1930s. In the early 1950s an engineering works was developed in the south-east of the site, with a bus station and car park in the north. The previous multi-storey car park and bus station development occurred in the early 1970s, with demolition undertaken in 2018.

Ground Conditions

- 2.6 Prior to the demolition of the on-site car park and bus station, ground surface conditions were found to initially comprise hardstanding (block paving and concrete). Below this Made Ground was found to overlie superficial Alluvial deposits (clays, sands and gravels), beneath which were strata of the Nottingham Castle Sandstone Formation, which was proven to depths of at least 13.6m below ground level (bgl).
- 2.7 The Environment Agency (EA) classifies the Alluvium as a Secondary A Aquifer and the bedrock Sandstone as a Principal Aquifer. The site is located within a Source Protection Zone (SPZ) 3 although there is no local potable abstraction.

3. CONCEPTUAL SITE MODEL

Summary of Significant Pollutant Linkages

- 3.1 The results of investigation at the site identified marginally elevated hydrocarbon concentrations within localised groundwater and a hotspot of elevated leachable cyanide within soil, presented as **Table 3:1** below.
- 3.2 There was no requirement for gas protection at the site.

Table 3:1: Summary of Significant Pollution Linkages

Source	Pathway	Receptor	Con	Prob	Risk	Mitigation
S1: Marginally elevated Aliphatic C12-C16 hydrocarbon concentrations within localised groundwater.	P1: Vertical and lateral migration of contaminated groundwater.	R1: Secondary A and Principal Aquifers underlying the site and surrounding area	Mi	Lw	L	A localised hotspot of elevated Aliphatic C12-C16 hydrocarbons was identified within groundwater samples collected from BH203 and to a lesser extent BH202A. Additional groundwater monitoring has been undertaken at the site, which has identified no elevated concentrations within BH203 and marginally elevated concentrations within BH202A on one occasion. Given the lack of significant contamination observed at the site, it is considered that these concentrations pose a low risk to controlled waters underlying the site.
S2: Hotspot of elevated leachable cyanide within soil.	P2: Leaching followed by groundwater migration.	R1: Secondary A and Principal Aquifers underlying the site and surrounding area	Mi	Lw	L	It is likely that the hotspot of contamination will be removed during the development of the site, which will reduce the risk to controlled waters. Additionally, the proposed development will see the majority of the site covered in hardstanding, which
		R2: Groundworkers and future maintenance workers				

						will reduce rainwater ingress and contaminant mobility. It is considered that the risk to groundworkers can be mitigated using appropriate working methods and PPE and maintaining good hygiene practices.
VH = Very High, H = High, M = Moderate, M/L = Moderate/Low, L = Low, VL = Very Low KEY: Sv = Severe, Md = Medium, Mi = Mi, Mr = Minor Hi = High, Li = Likely, Lw = Low Likelihood, UI = Unlikely						

5. REMEDIATION WORKS

5.1 The remediation objectives were to:

- Provide sufficient evidence of remediation to support the discharge of relevant planning conditions;
- Detail procedures employed for managing unexpected sources of contamination which may be uncovered during the works; and
- Produce a Verification Report (this document) that provides details of the mitigation measures incorporated.

5.2 The following objectives were to be undertaken/implemented by the Building Contractor:

- Provision of a sufficient thickness of suitable capping media underlain by geotextile membrane in areas of soft landscaping to prevent contact with the underlying strata; and
- Treat and record any unforeseen contamination concerns identified during the construction phase.

Variations to Agreed Strategy

5.3 BWB have not been informed of any variations to the strategy by Galliford Try.

6. MATERIAL MANAGEMENT RECORDS

Soil for re-use

- 6.1 BWB understand that no soils were reused during the development, with approximately 2,920 tonnes of crushed concrete reused on site as subbase material.

Off-site Disposal

- 6.2 A total of 9,900 tonnes of waste soil arisings was produced during the construction of the site with 1,540 tonnes from general cut / arisings and 8,360 tonnes generated as pile arisings. 770 tonnes of this were directed to landfill (Welbeck Colliery Restoration) with the rest reused / recycled off site at Oakfield Recycling, Dunton Environmental, Cedars Academy in Birstall, and Bardon Aggregates. The area around the DS204 where a marginally elevated cyanide concentration was recorded in the soil leachate was removed during archaeological works.
- 6.3 Waste management documentation and copies of waste consignment notes are included as **Appendix 2**.

7. SOIL VERIFICATION TESTING

Hotspots

- 7.1 No unforeseen contamination issues were identified by Galliford Try during construction as confirmed by Jonathan McGovern via an email dated 10th February 2021 presented as **Appendix 3**.
- 7.2 A layer of ash was encountered during the BWB ground investigation (DS201) which included determinant concentrations that resulted in the material being classified as hazardous waste. During construction, this small volume of material (1.84 tonnes) was delineated and segregated from other soils/arising, as the material was clearly different visually, and then underwent separate off-site disposal.

Capping Layer

- 7.3 There has been no requirement for a soil cover system within the development with all areas covered by hardstand, breaking the potential pollutant linkage between site users / workers and the slightly elevated contaminant concentrations in the shallow Made Ground.

Imported Materials

- 7.4 No materials have been imported.

8. COMPLETION STATEMENT

- 8.1 BWB is satisfied that the remedial works have been completed in line with the objectives of the agreed Remediation Strategy. The remediation works have been completed and are compliant with meeting the required standards of Environment Agency Report, Land Contamination Risk Management, 2020.

9. REFERENCES

- 9.1 British Standards Institution, (BSI), BS 8485:2015, Code of Practice for the characterization and remediation from ground gas in affected developments
- 9.2 British Standards Institution, (BSI), BS 8576:2013, Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)
- 9.3 Building Research Establishment Special Digest 1 Third Edition. Concrete in Aggressive Ground (2005)
- 9.4 Construction Industry Research and Information Association (CIRIA), Report 132, A Guide to Safe working on Contaminated Sites (1996).
- 9.5 Construction Industry Research and Information Association (CIRIA). 2001, C522 Contaminated land risk assessment, A guide to good practice.
- 9.6 Construction Industry Research and Information Association (CIRIA). 2007, Report C665, Assessing Risk Posed by on Hazardous Ground Gases to Buildings
- 9.7 Construction Industry Research and Information Association (CIRIA). 2014, Report C735, Good Practice on the testing and verification of protection systems for buildings against hazardous ground gases
- 9.8 Department for Communities and Local Government (DCLG), 2012, National Planning Policy Framework.
- 9.9 Department for Environment Food and Rural Affairs (DEFRA), 2012, Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance.
- 9.10 Environment Agency report Land Contamination Risk Management, 2020.
- 9.11 Environment Agency 2008, Updated technical background to the CLEA model Science Report – SC050021/SR3
- 9.12 Environment Agency 2008, Human health toxicological assessment of contaminants in soil Science Report – SC050021/SR2
- 9.13 Environment Agency 2009, CLEA Software (Version 1.05) Handbook Better Regulation Science Programme Science report: SC050021/SR4
- 9.14 Environment Agency 2008, A review of body weight and height data used within the Contaminated Land Exposure Assessment model (CLEA) Project SC050021/ Technical Review 1
- 9.15 Environment Agency, 2006, Remedial Targets Methodology, Hydrogeological Risk Assessment for Land Contamination

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- 9.16 Environment Agency, 2010, Report SC030114/R1, Verification of remediation of land contamination.
- 9.17 Health and Safety Executive (HSE) 'Protection of workers and the general public during the Development of Contaminated Land (1991).
- 9.18 NHBC Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D Publication 66: 2008