

# Bro Tathan Utilities

B048494

## Preliminary Risk Assessment, Remediation & Reactive Strategy



**V3**

**Welsh Government**

**January 2024**

**Document prepared on behalf of Tetra Tech Limited. Registered in England number:  
01959704**



Tetra Tech Cardiff, Atlantic House, Greenwood Close, Gate Business Park, Cardiff, CF23 8RD

Tetra Tech Limited. Registered in England number: 01959704

Registered Office: 3 Sovereign Square, Sovereign Street, Leeds, United Kingdom, LS1 4ER

# DOCUMENT CONTROL

<b>Document:</b>	Preliminary Risk Assessment, Remediation and Reactive Strategy
<b>Project:</b>	Bro Tathan Utilities
<b>Client:</b>	Welsh Government
<b>Project Number:</b>	B048494
<b>File Origin:</b>	\\lds-dc-vm-101\Data\Projects\784-B048494_Bro_Tathan___Utilities\60 Project Output\61 Work in Progress\Remediation Strategy\B048494 - Bro Tathan Reactive Remediation Strategy_V3 Issue.docx

<b>Revision:</b>	<b>V1</b>	<b>Prepared by:</b>	Sarah Roberts
<b>Date:</b>	July 2023	<b>Checked by:</b>	Adam James
<b>Status:</b>	<b>Issue</b>	<b>Approved By:</b>	Chris Pugh
<b>Description of Revision:</b>	First Issue – to support planning application		

<b>Revision:</b>	<b>V2</b>	<b>Prepared by:</b>	Sarah Roberts
<b>Date:</b>	October 2023	<b>Checked by:</b>	Adam James
<b>Status:</b>	<b>Issue</b>	<b>Approved By:</b>	Chris Pugh
<b>Description of Revision:</b>	Updated to include information from ground investigation and additional MMP requirements.		

<b>Revision:</b>	<b>V2.1</b>	<b>Prepared by:</b>	Sarah Roberts
<b>Date:</b>	November 2023	<b>Checked by:</b>	Adam James
<b>Status:</b>	<b>Issue</b>	<b>Approved By:</b>	Chris Pugh
<b>Description of Revision:</b>	Updated to expand testing suites		

<b>Revision:</b>	<b>V3.0</b>	<b>Prepared by:</b>	Sarah Roberts
<b>Date:</b>	January 2024	<b>Checked by:</b>	Adam James
<b>Status:</b>	<b>Issue</b>	<b>Approved By:</b>	Chris Pugh
<b>Description of Revision:</b>	Re-named as PRA and Rem Strat		

## TABLE OF CONTENTS

---

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>6</b>
1.1	Instruction .....	6
1.2	Brief.....	6
1.3	Planning Context and Proposed Development .....	6
1.4	Report Objectives and Scope.....	8
1.5	Project Team .....	8
1.6	Legislative Context & Guidance Documents .....	9
1.7	Previous Reports .....	10
1.8	Limitations.....	12
<b>2.0</b>	<b>SITE INFORMATION .....</b>	<b>13</b>
2.1	Location.....	13
2.2	Site Description .....	13
2.3	Geology, Hydrogeology, Hydrology & Radon.....	15
2.4	Summary of Site History .....	17
<b>3.0</b>	<b>SUMMARY OF PREVIOUS GROUND INVESTIGATION .....</b>	<b>18</b>
3.1	Scope of Works.....	18
3.2	Strata Encountered .....	18
3.3	Summary of contamination.....	18
<b>4.0</b>	<b>POTENTIAL SOURCES OF CONTAMINATION .....</b>	<b>21</b>
4.1	Introduction .....	21
4.2	Summary of Conceptual Site Model.....	21
<b>5.0</b>	<b>REMEDIATION STRATEGY .....</b>	<b>25</b>
5.1	Introduction .....	25
5.2	Excavation of Soils from Utility Trenches .....	25
5.3	Re-use of Stockpiled materials ('Western Parcel' Stockpile) .....	25
5.4	PFAS Contamination – Fire Fighting Area (TP6a).....	26
5.5	Asbestos – Y Porth.....	26
<b>6.0</b>	<b>REACTIVE STRATEGY .....</b>	<b>28</b>
6.1	Proactive Approach (Watching Brief) .....	28
6.2	Identification of Potential Contaminants .....	28

6.3	Outline Approach .....	29
6.4	Asbestos.....	30
6.5	Risks to Groundworkers.....	30
6.6	General Site Practices .....	31
<b>7.0</b>	<b>MATERIALS MANAGEMENT .....</b>	<b>32</b>
7.1	Reuse of Site Won Materials.....	32
7.2	Importation of Materials.....	33
7.3	Offsite Disposal.....	33
<b>8.0</b>	<b>VERIFICATION PLAN .....</b>	<b>34</b>
8.1	On site Documentation.....	34
8.2	Monitoring.....	35
8.3	Verification Report .....	35
<b>FIGURES</b> .....		<b>0</b>

---

## LIST OF FIGURES

---

Figure 1 – Site Location Plan

---

## LIST OF TABLES

---

<b>Table 1-1 – Project Team .....</b>	<b>8</b>
<b>Table 1-2 – Previous Reports Provide to WYG / Tetra Tech.....</b>	<b>10</b>
<b>Table 4-1 – Summary of Key Contaminant Sources.....</b>	<b>21</b>
<b>Table 5-1 – Stockpile Summary .....</b>	<b>26</b>
<b>Table 6-1 – Summary of Potential Contaminants .....</b>	<b>28</b>

---

## APPENDICES

---

- Appendix A: Report Conditions
- Appendix B – Proposed Services Plans (Burroughs)
- Appendix C: Constraints Plans and Risk Register
- Appendix D – WYG / Tetra Tech Ground Investigation Summary
- Appendix E: Chemical Screening Criteria for Re-use and Importation

## ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
AOD	above Ordnance Datum
bgl	below ground level
BGS	British Geological Survey
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
C4SL	Category 4 Screening Levels
CIEH	Chartered Institute of Environmental Health
CLEA	Contaminated Land Exposure Assessment
CoC	Constituent of Concern
CSM	Conceptual Site Model
DEFRA	Department of Environment, food and Rural Affairs
DQRA	Detailed Quantitative Risk Assessment
DTS	Desktop Study
DRO	Diesel Range Organics
DWS	Drinking Water Standard
EA	Environment Agency (England)
EPH	Extractable Petroleum Hydrocarbons
EQS	Environmental Quality Standards
FOC	Fraction Organic Carbon
GPR	Ground Penetrating Radar
LOD	Limit of detection
LQM	Land Quality Management
NRW	Natural Resources Wales
OS	Ordnance Survey
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PPE	Personal Protection Equipment
ppm	parts per million
PRO	Petroleum Range Organics
SGV	Soil Guideline Values
SOM	Soil Organic Matter
SVOC	Semi-volatile organic compounds
TPH	Total Petroleum Hydrocarbon
TSV	Tier 1 Screening Values
VOC	Volatile Organic Carbon
VPH	Volatile Petroleum Hydrocarbons

## 1.0 INTRODUCTION

### 1.1 INSTRUCTION

---

Tetra Tech Ltd (Tetra Tech) was commissioned by Welsh Government (the client) to prepare a Remediation Strategy to support the development of the site referred to as Bro Tathan (known hereafter as “the site”), specifically relating to the replacement of utilities infrastructure across the site.

### 1.2 BRIEF

---

The brief was to provide a Reactive Strategy (Version 1) to support the proposed trenching works to replace buried services across the site and provide a high-level summary of the environmental setting at Bro Tathan including a brief review of previous environmental reports and investigations previously undertaken on the site and made available to Tetra Tech.

The Reactive Strategy has been prepared to support the development phase should pollutant linkages or previously un-encountered ground contamination be encountered. The Reactive Strategy outlines the necessary risk management procedures to be adopted.

This report has been prepared in line with the requirements outlined in the UK Land Contamination Risk Management Procedures (LCRM) Stage 3: Remediation and Verification.

This document has been updated (Version 2) and retitled as a ‘Remediation & Reactive Strategy’ to support the Materials Management Plan (MMP) which is in development for the site. In accordance with development industry good practice and the objectives of sustainable development, environmental protection and cost effectiveness, approximately 15,000m<sup>3</sup> of surplus arisings from the planned trenching works are to be re-used to raise levels within the Y Porth area of Bro Tathan.

Excavated soils will be re-used under the auspices of a Materials Management Plan (MMP) prepared under the CL:AIRE Definition of Waste: Development Industry Code of Practice (DoWCoP). Although widespread contamination has not been encountered within the ground investigation along the proposed route of the utilities trench (with exception of elevated PFAS concentrations in a soil sample obtained from TP6), given the former use of the site and potential for contamination to be present, the proposed re-use is deemed to fall within the DoWCoP Site of Origin ‘Route A’ (Land affected by contamination or suspected of being affected by contamination). The findings of the ground investigation are documented within ‘*Bro Tathan Utilities. Ground Investigation Report. Tetra Tech. November 2023*’. No remediation has been proposed but further delineation works have been recommended.

### 1.3 PLANNING CONTEXT AND PROPOSED DEVELOPMENT

---

This document has been developed to support the replacement of buried services, utilities and associated infrastructure as well as the raising of ground levels in the y Porth area of the site. The following description will be presented with regards to the proposed planning applications.

*“This Utility Project has been prepared to support the Welsh Government in the development of the Bro Tathan Business Park. The site is located to the Northwest of the village of St Athan in the heart of the Vale of Glamorgan. The site is the existing and former Ministry of Defence base with a fully operational 1,800m runway*

*which is licensed by the Civil Aviation Authority. The site is an existing business park providing approximately 1.6 million sq ft of employment floor space and home to major occupiers. Bro Tathan is embarking on the next phase in its exciting evolution to create a groundbreaking destination for business offering a range of development and occupational opportunities. The future growth at the site is likely to be a mixed-use development consisting of commercial and industrial units, as well as small retail shop units and potentially a new hotel.*

*In order to achieve this future development but also continue to serve utility provisions to the existing premises, the site is required to undertake a number of utility diversions to provide separation from the Ministry of Defences retained private utility networks as well as utility upgrades which will result in improving efficiency of services through installing a new electricity and water network to transition from private networks to statutory authority adopted networks. The proposed works also include establishing a site wide ducting network improving connectivity to the site and the surrounding area which will future proof the site whilst also minimise distribution. The utility works include:*

*Electricity:*

- - installing a new site wide electricity network*
- - the relocation of the Aston Martin Lagonda 11kV electricity substation*

*Water:*

- - installing a new site wide water network*
- - connections from the site wide water network to each building premises*
- - installation of 3no water tanks for fire fighting purposes*

*Gas:*

- - installation of 6no LPG tanks and associated pipework to provide a local gas network to the buildings utilising gas on the site.*
- - carrying out gas diversions to serve West Camp and Beggars Pound*

*Drainage:*

- - carrying out surface water diversions to an outfall position within the Boverton Brook*
- - carrying out foul water diversion to a DCWW manhole located on Eglyws Brewis Road.*
- - installation of a new pumping main to replace ageing infrastructure crossing the New Northern Access Road*
- - carrying out a foul water diversion to Aston Martin Lagonda's foul network to the South East of their premises.*

*Ducting:*

- - installation of Openreach ducts and associated duct chambers to the site's shared utility trenches*
- - installation of Ogi ducts and associated trenches to the site's shared utility trenches*
- - installation of spare ducts and associated duct chambers to the site's shared utility trenches*

*Sustainable Material Reuse:*

- - reuse of material generated from trench work and existing site stockpiles within the Y Porth area of the site

Aspects of the works are deemed permitted development but have been included within the application due to their interface with the remainder of the works.”

## 1.4 REPORT OBJECTIVES AND SCOPE

The Remediation Strategy presented herein includes a summary of the ground conditions and anticipated contaminants, methodologies for the identification of ground contamination, associated control measures, monitoring and sampling requirements and the requirement to seek regulatory approval for any subsequent remedial works.

The overall objectives of the Remediation Strategy are as follows:

- Provide a summary of the findings of a ground investigation undertaken across the site with regards to ground contamination;
- Provide a framework for the re-use of materials within the proposed development to support the Materials Management Plan
- Establishment of a watching brief to monitor groundworks;
- Outline management procedures to protect key receptors in relation to contamination being identified on the site;
- Provide a Reactive approach to allow for the assessment of ground contamination which was not identified during the ground investigation including a requirement to undertake an updated risk assessment to identify any remedial measures required to protect end users and controlled waters.

This report is intended to be treated as a live document and should be reviewed as follows:

- At regular intervals throughout the development works.
- In the event that contamination is identified during the development works to ensure the adopted procedures are appropriate to manage the removal of identified pollutant linkages.

Any revision to this document will be subject to approval from the appropriate regulatory authorities.

## 1.5 PROJECT TEAM

The following table outlines the project team and individual responsibilities for key contacts associated with the development.

**Table 1-1 – Project Team**

Role	Organisation	Contact Details	Responsibility
Site Owner / Client	Welsh Government	Keith Thomas Airfield Contracts & Development Manager Wales <a href="mailto:Keith.Thomas@gov.wales">Keith.Thomas@gov.wales</a>	Ultimate Client / Site Owner
Client	Welsh Government	Lindsay Neville Technical Project Manager	Ultimate Client / Project Manager



Role	Organisation	Contact Details	Responsibility
		<a href="mailto:Lindsay.Neville@gov.wales">Lindsay.Neville@gov.wales</a>	
Principal Designer	Burroughs	Robert Stokes Senior Project Manager <a href="mailto:Robert.Stokes@burroughs.co.uk">Robert.Stokes@burroughs.co.uk</a>	Plan, manage and monitor the pre-construction and construction phases of works.
Principal Contractor	TBC	TBC	Undertake ground works incorporating recommendations of Reactive Strategy
Geoenvironmental Consultant	Tetra Tech	Adam James Associate <a href="mailto:adam.james@tetrattech.com">adam.james@tetrattech.com</a>	Preparation of Reactive Remediation strategy including regular reviews as outlined in document.
Regulator	Natural Resources Wales	TBC	Regulatory approval of documentation.
Regulator	Vale of Glamorgan Council (via Shared Regulatory Services)	Deborah Margetson <a href="mailto:dmmargetson@valeofglamorgan.gov.uk">dmmargetson@valeofglamorgan.gov.uk</a>	Regulatory approval of documentation.

## 1.6 LEGISLATIVE CONTEXT & GUIDANCE DOCUMENTS

This Remediation Strategy has been prepared in accordance with the Health & Safety at Work Act 1974. Other legislative regulations and guidance documents relevant to this report are presented below:

- Land Contamination Risk Management (LCRM). How to assess and manage the risk from land contamination. Environment Agency. 2020 (last updated 19<sup>th</sup> April 2021).
- Control of Asbestos Regulations (CAR) 2012.
- Control of Substances Hazardous to Health Regulations (2002).
- Construction Design & Management (CDM) Regulations (2015).
- CL:AIRE Control of Asbestos Regulations 2012. CAR Soil 2016. Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials. Industry Guidance.
- Control of Substances Hazardous to Health (sixth edition). HSE.
- CIRIA C733. Asbestos in Soils and Made Ground (2014).
- European Waste Framework Directive (2008/98/EC).
- Environmental Protection Act (EPA) 1990. Part 2A. Contaminated Land Statutory Guidance. April 2012.
- The Environmental Damage (Prevention and Remediation) (Wales) Regulations 2009.
- Hazardous Waste Regulations (2005).

- Contaminated Land Regulations (Wales) 2006 (As amended 2012).
- The Land Contamination (Wales) Code of Practice (SP237)
- SP354: Guidance for the Remediation of PFAS Contaminated Land and Groundwater
- SP353:Guidance for Assessing and Managing PFAS Contamination in Land and Groundwater.

## 1.7 PREVIOUS REPORTS

Tetra Tech (formerly WYG) have undertaken a series of desk based and intrusive ground investigations across the site. The following reports have been reviewed as part of this assessment:

- B048494 – Bro Tathan Utilities. Ground Investigation Report, November 2023.
- B048494 – Bro Tathan Utilities. Earthworks Strategy, October 2023
- B048494 – Bro Tathan Utilities. Additional Ground Investigation Letter Report, November 2023
- B048494 – Bro Tathan Utilities. Stockpile Survey Letter Report, November 2023
- A093950-21. Bro Tathan – East Camp. Phase 1 Combined Geo-environmental & Geotechnical Assessment. Desk Top Study. September 2019.
- A093950-21. Bro Tathan – Gateway Development Site. Phase 1 Combined Geo-environmental & Geotechnical Assessment. Desk Top Study. September 2019.
- A093950-21. Bro Tathan – Keithrow Development Site. Phase 1 Combined Geo-environmental & Geotechnical Assessment. Desk Top Study. September 2019.
- A093950-21. Bro Tathan – Gateway Development Site. Interpretive Ground Investigation Report. January 2020.
- A093950-21. Bro Tathan – Keithrow Development Site. Interpretive Ground Investigation Report. V2 January 2020.
- A093950-21. Bro Tathan – Keithrow Development Site. Additional Ground Investigation Report. December 2019.
- A093950-21-1. Bro Tathan – Beggars Pound Development Site. Phase 1 Combined Geo-environmental & Geotechnical Assessment. Desk Top Study. December 2019.
- A093950-21-1. Bro Tathan – Beggars Pound. Interpretive Ground Investigation Report. January 2020.
- A093950-21-3. Bro Tathan – Rotary Zone. Phase 1 Combined Geo-environmental & Geotechnical Assessment. Desk Top Study. April 2020.
- A093950-21-3. Bro Tathan – Rotary Zone. Interpretive Ground Investigation Report. April 2020.
- A093950-21-8. Bro Tathan – Keithrow, Aircraft Rubb Hangar and Associated Development. Interpretive Ground Investigation Report. August 2020.
- A093950-28\_GWMP\_V1. Bro Tathan, Keithrow. Groundwater Monitoring Plan. May 2021.

In addition to the above, the following reports have also been provided to WYG / Tetra Tech to aid in the preparation of the aforementioned reports.

**Table 1-2 – Previous Reports Provide to WYG / Tetra Tech**

Author	Title	Date
Atkins	RAF St. Athan Building 377 Groundwater Contamination Investigation Report	October 1998

Author	Title			Date
RAF Command Scientific Support Branch	RAF St Athan Land Quality Assessment, Phase 1 (Vol 1-5)			March 2001
Enviros Aspinwall	RAF St Athan, LQA Phase One			December 2001
Enviros Aspinwall	RAF St Athan, Additional Areas LQA Phase One: Desk Study Land Quality Assessment Report			November 2002
Enviros Aspinwall	RAF St Athan East Camp, LQA Phase Two: Intrusive Survey Land Quality Assessment Report			November 2002
Enviros Aspinwall	RAF St Athan, West Camp, LQA Phase Two: Intrusive Survey Land Quality Assessment Report			November 2002
Enviros Aspinwall	RAF St Athan Picketston, LQA Phase Two: Intrusive Survey Land Quality Assessment Report			November 2002
Enviros Aspinwall	RAF St Athan, South of Runway LQA Phase Two: Intrusive Survey Land Quality Assessment Report			November 2002
Enviros Aspinwall	RAF St Athan Extension Areas, LQA Phase Two: Radiological Assessment Report			May 2003
Parsons Brinckerhoff	WDA Reports	Volume 1	Factual Report on Ground Investigation Undertaken February – March 2004.	March 2004
		Volume 2	Interpretive Report and Risk Assessment	May 2004
		Volume 3	Pollution Source Prevention Audit Report	October 2004
		Volume 4	Outline Remediation Strategy	July 2004
Parsons Brinckerhoff	Remediation of Land at RAF St Athan			June 2004
Parsons Brinckerhoff	RAF St Athan: Explosive Clearance and Development Desk Study			December 2007
Parsons Brinckerhoff	RAF St Athan, Groundwater Remediation Position Statement			March 2009
Pell Frischmann	St Athan, Ground Validation Report (SA-C100E-RP-XXX-PC-X-3129)			March 2010
Earth Science Partnership	Proposed Northern Access Road, St Athan, Vale of Glamorgan – Ground Investigation Report (Factual Report)			April 2018

Author	Title	Date
Earth Science Partnership	Proposed Northern Access Road, St Athan, Vale of Glamorgan – Ground Investigation Report (Interpretive Report)	April 2018
Earth Science Partnership	Proposed Northern Access Road, St Athan, Vale of Glamorgan – Ground Investigation Report (Geotechnical Design Report)	April 2018

It should be noted that the above list constitutes reports that have been provided to WYG / Tetra Tech by Welsh Government and is not a full list of Geo-Environmental reports that have been prepared for the site.

## 1.8 LIMITATIONS

The recommendations and opinions expressed in this report are based on information obtained as part of the previous works completed by Tetra Tech or provided by others. Information provided from other sources is taken in good faith and Tetra Tech cannot guarantee its accuracy.

This report is subject to the report conditions presented in Appendix A.

The information contained in this report is intended for the use of the Welsh Government and Tetra Tech can take no responsibility for the use of this information by any third party or for uses other than that described in this report or detailed within the terms of our engagement.

## 2.0 SITE INFORMATION

### 2.1 LOCATION

The site is located within the former RAF St Athan site, located within the former Ministry of Defence (MOD) St. Athan airfield, which is situated north-west of St. Athan village, Vale of Glamorgan, South Wales. St. Athan Airfield is centred at National Grid Reference (NGR) SE 998 685.

A Site Location Plan is presented as Figure 1 at the end of this report.

### 2.2 SITE DESCRIPTION

This report has been prepared in support of the works associated with upgrading buried services across the site and as such the associated planning application is limited to the area immediately surrounding the proposed service networks. Copies of the proposed development plans are included in Appendix B.

Previously, the airfield and surrounding area at the former Royal Air Force (RAF) St. Athan, was managed by the Ministry of Defence (MOD) under Military Aviation Authority (MAA) regulations. Following the purchase by Welsh Government in 2003, there was significant investment in the airfield infrastructure and the airfield transferred from military to civilian control on 1<sup>st</sup> April 2019.

The site consists of a series of buildings, predominantly in the north and west of the site which range in size from small office facilities to large commercial buildings and aircraft hangars. The buildings are associated with areas of open space, car parking and access roadways. Waste storage areas and ancillary plant are also present on the site.

In the southern area of the site is a single runway with associated taxiways and service roads. The main aircraft hangars are located in the south-eastern part of the site, with service facilities located in the southern extent of the site. The area immediately surrounding the runway consists of undeveloped grass covered areas.

The development area is subdivided in two six zones: Bro Tathan West (including Keithrow), Y Porth, Bro Tathan North, Bro Tathan South, Bro Tathan East and the airfield. A brief description of these areas along with their use and contaminative history is outlined below in the following sub-headings. A summary of the potentially contaminative sources are presented in Appendix C.

#### 2.2.1 Bro Tathan West

This area covers the majority of buildings present on site and forms the western portion of the site. The buildings include small individual buildings and large workshops / engineering buildings. Potential contaminative land uses have been identified associated with individual buildings in the form of fuel tanks, the use and storage of solvents, washdown areas and waste storage areas. Stockpiles of surplus materials are present along the eastern extent of this site (Keithrow) from recent development works on the site (Apron One Hangar and Access Road). These stockpiles will be subject to further assessment to determine the suitability for re-use on the site under the provision of a Materials Management Plan.

The WYG / Tetra Tech reports relevant to this area of the site are as follows:

- A093950-21. Bro Tathan – Keithrow Development Site. Phase 1 Combined Geo-environmental & Geotechnical Assessment. Desk Top Study. September 2019.
- A093950-21. Bro Tathan – Keithrow Development Site. Interpretive Ground Investigation Report. V2 January 2020.
- A093950-21. Bro Tathan – Keithrow Development Site. Additional Ground Investigation Report. December 2019.
- A093950-21-8. Bro Tathan – Keithrow, Aircraft Rubb Hangar and Associated Development. Interpretive Ground Investigation Report. August 2020.
- A093950-28\_GWMP\_V1. Bro Tathan, Keithrow. Groundwater Monitoring Plan. May 2021.

### **2.2.2 Y Porth**

Y Porth is also referred to as ‘Gateway’ and forms the central northern area of the site and areas immediately surrounding the northern access point to the site. Y Porth is proposed to be a strategic gateway to Bro Tathan with capacity to deliver approximately 200,000 sq ft of office, hotel, retail, and showroom type uses on approximately 17 acres (6.88 hectares). There is currently no development on this part of the site. WYG (now Tetra Tech) have prepared a desktop stud report and ground investigation report for this part of the site. The WYG / Tetra Tech reports relevant to this area of the site are as follows:

- A093950-21. Bro Tathan – Gateway Development Site. Phase 1 Combined Geo-environmental & Geotechnical Assessment. Desk Top Study. September 2019.
- A093950-21. Bro Tathan – Gateway Development Site. Interpretive Ground Investigation Report. January 2020.

### **2.2.3 Bro Tathan North**

Formerly known as ‘Picketson’, this part of the site is located directly adjacent to Y Porth, within an enclave site discrete from the runway with direct vehicular access from Ffordd Bro Tathan. It consists of a series of aircraft hangars and large buildings linked by access roads and areas of green space.

Tetra Tech have not previously undertaken any ground investigation works previously however, potential contamination risks have been identified as per the plans attached at Appendix C.

### **2.2.4 Bro Tathan South**

This area of the site is made up of Beggars Pound, the Rotary Zone, and Western Orchard. All areas have access to the fully operational runway. The Rotary Zone is the location of the National Police Air Services and Bristow Group Search and Rescue.

Beggars Pound is located in the south eastern extent of the development site including two large aircraft hangars and associated ancillary buildings. The Rotary Zone area covers the main runway which crosses the site orientated approximately WSW-ENE. To the south of the runway are a series of hangars, smaller buildings and associated access roadways and taxiways.

The WYG / Tetra Tech reports relevant to this area of the site are as follows:

- A093950-21-1. Bro Tathan – Beggars Pound Development Site. Phase 1 Combined Geo-environmental & Geotechnical Assessment. Desk Top Study. December 2019.
- A093950-21-1. Bro Tathan – Beggars Pound. Interpretive Ground Investigation Report. January 2020.

- A093950-21-3. Bro Tathan – Rotary Zone. Phase 1 Combined Geo-environmental & Geotechnical Assessment. Desk Top Study. April 2020.
- A093950-21-3. Bro Tathan – Rotary Zone. Interpretive Ground Investigation Report. April 2020.

### 2.2.5 Bro Tathan East

This part of the site is formerly known as ‘East Camp’. It was formerly utilised for mixed use including residential, engineering training, officer mess facilities, sports and recreation, and other supporting facilities. Much of the buildings have been demolished and the MoD are due to decant from this area at the end of 2023. It now presents an area comprising approximately 130 acres suitable for large inward investment opportunities with capacity to deliver over 2 million sq ft of floor space to satisfy almost any occupational needs.

WYG (now Tetra Tech) prepared a desktop study report for this part of the site in c.2019. Full reference is below:

- A093950-21. Bro Tathan – East Camp. Phase 1 Combined Geo-environmental & Geotechnical Assessment. Desk Top Study. September 2019.

### 2.2.6 Airfield

The airfield is managed by Cardiff International Airport Limited. There are two runways, one which is active and is 1,765m long trending east-west across the site; and a smaller runway which is approximately 1,000m in length running north-south. The smaller runway is predominantly utilised as a taxiway supporting businesses located at Bro Tathan West and Keithrow.

## 2.3 GEOLOGY, HYDROGEOLOGY, HYDROLOGY & RADON

---

### 2.3.1 Geology

BGS mapping does not record superficial strata on the site, with the underlying bedrock strata associated with the interbedded limestone and mudstone of the Porthkerry Member. Made ground is not recorded in BGS mapping, however due to the historical development of the site the presence of Made Ground is anticipated in the vicinity of current structures and associated with boundary features (bunds) and stockpiles known to be present on the site.

### 2.3.2 Hydrogeology

The Porthkerry Member bedrock beneath the site is designated as a Secondary A Bedrock Aquifer. These are 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.

The Porthkerry Member is part of the Lower Lias Group which is described on the South Wales Hydrogeology Map (Sheet No. 17) as an “*alternating sequence of shales and limestones (commonly nodular) and marginal facies of limestones and limestone conglomerates*”. The Porthkerry Member therefore constitutes a multi-layered aquifer system rather than one continuous groundwater body.

Due to the absence of superficial strata, the depth to bedrock across the site is relatively shallow, ranging between 0.5 to 2.5m with a clay rich mantle present representing the weathered upper strata underlying topsoil/made ground.

A review of the Groundwater Vulnerability Maps for England & Wales has revealed that the Porthkerry Member is categorised as ‘Secondary Aquifer – High’. High vulnerability aquifers are defined as being “able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits”. EA / NRW guidance document<sup>1</sup> goes on to state that high vulnerability aquifers “...results in a high overall pollution risk to groundwater from surface activities. Operations or activities in these areas are likely to require additional measures over and above good practice pollution prevention requirements to ensure that groundwater isn’t impacted.”

The site is not shown to be situated within an NRW defined groundwater SPZ.

Groundwater levels are known to vary across the site in response to seasonal changes and in response to heavy rainfall. Depth to ground water recorded as part of the various phases of ground investigation indicates an approximate depth of water of 0.5 to 3m, although deeper depths to groundwater (up to 10m bgl) have been recorded in some areas of the site; with seasonal fluctuations in level apparent. There is a groundwater divide at the site. Groundwater flow within the underlying aquifer is anticipated to provide baseflow to the surrounding streams (see below). There are no licensed abstractions or private water supplies within 1km of Bro Tathan.

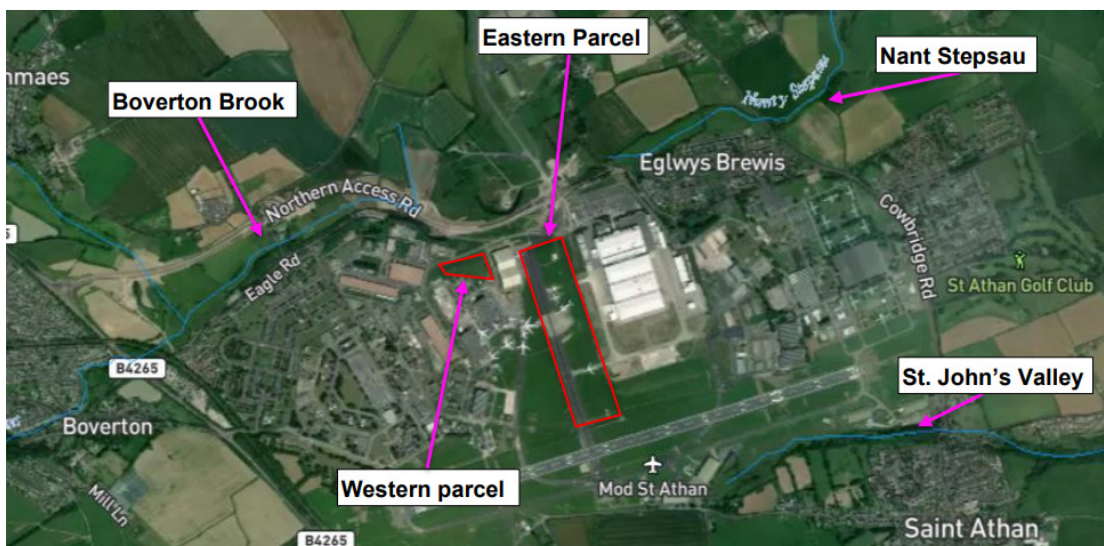
### 2.3.3 Hydrology

There are no surface water bodies within the main areas of the site. The Nant y Stepsau stream flows in an easterly direction adjacent to the Northern Access Road in the northern extent of the site. The Nant y Stepsau discharges to the River Thaw which is located beyond the site to the east.

An unnamed stream is located within the south-eastern extent, within the Western Orchard areas, which is sourced from emerging springs, within St. John’s Valley. The water flows in an easterly direction and discharges to the River Thaw to the East. In the north-west, the Boverton Brook flows to the south-west and joins the Hoddnant watercourse, ultimately discharging to the Afon Col-huw in Llantwit Major. The Boverton Brook is culverted along the northern extent of the Northern Access Road (NAR), flowing from east to west and emerging as an open channel east of the Y Porth (‘Gateway Phase’) development.

The surface water divide between the Boverton Brook and Nant y Stepsau is located approximately 300m north-west of the Y Porth Development. A hydrological summary is shown in Insert 1 below.

Insert 2-1 – Hydrology Summary (Red Line denotes Keithrow Development Area)





### 2.3.4 Radon

UK Radon mapping coverage for the area indicates that the site is classified as between 3-5% (western and southern parts of site) and 10-30% (northern and eastern parts of the site) of properties are above the Radon action level. Radon protection measures are therefore likely to be required for new developments on the site.

## 2.4 SUMMARY OF SITE HISTORY

---

Earliest mapping (1876) shows the site to be predominantly open agricultural land with infrequent small buildings within the site. The Vale of Glamorgan railway is shown to run roughly east-west to the south west of the Bro Tathan East. The railway runs through the settlement of Boverton roughly 750m to the west.

The area surrounding St. Athan is largely agricultural fields with the villages of Beggars Pound and St. Athan shown to be located outside of the study site areas to the south-west and south-east, respectively.

Site use is shown to remain relatively unchanged until 1969, at which point a large number of buildings of various sizes are shown within the site, in relation to the wider RAF St Athan development in the area. It is known that development existed prior to this date, however, data is frequently omitted from military areas in historical mapping during war time periods.

From 1969 maps to the present day there are no significant changes to the land use within or surrounding the site. Several buildings have been constructed and demolished across this period, however, the general site layout and use largely remains the same.

Based on the site history outlined in the previous 2001 Command Scientific Support Branch LQA Report, the site was bought by the Air Ministry in c.1936 to build an Aircraft Storage Unit (ASU) with construction on the site beginning in c.1937. The station opened in c.1939 and was originally meant to be the permanent base for ASU and 'No. 3 School of Technical Training' (SofTT) but also included 'No. 19 & No.32 Maintenance Units' (MU), with No. 3 SofTT renamed to No. 4 SofTT.

The original airbase in c.1939 comprised extensive interspersed sites, with the main areas consisting of West Camp, East Camp, Pickeston and West Orchard. The airfield originally comprised 3 No. grassed runways, the longest runway trending east/west at approximately 1,120m in length with a perimeter track. Two of the runways were metalled within two years of the station opening.

West Camp included living accommodation, messing facilities, aircraft hangers, a variety of workshops, motor transport section, battery charging facility, destructor house, machine gun range, machine gun test butt and a number of bulk fuel installations. A train track was located in the northern area of West Camp and proceeded along the northern boundary of the site until the former BFI compound where it split into two separate tracks trending east/west.

## 3.0 SUMMARY OF PREVIOUS GROUND INVESTIGATION

A ground investigation, targeting the route of the proposed water pipe infrastructure, was undertaken by Tetra Tech in 2023 with the findings presented in the following report:

- B048494 – Bro Tathan Utilities. Ground Investigation Report, October 2023.

### 3.1 SCOPE OF WORKS

- The scope of works included the following 32 hand excavated trial pits to a maximum depth of 1.20m bgl. Four of these locations were advanced to collect samples from the stockpiled materials in stockpiles identified as ‘East’ and ‘West’.
- Four samples obtained from stockpiled materials on site.
- On-site inspection and logging of recovered samples;
- Representative soil samples taken and submitted for geotechnical classification testing;
- Representative soil samples taken, submitted and tested for a suite of potential contaminants.

### 3.2 STRATA ENCOUNTERED

- In-situ strata
  - Topsoil
  - Made Ground
  - Weathered Porthkerry Member
- Stockpile Materials (material)

### 3.3 SUMMARY OF CONTAMINATION

#### 3.3.1 General contamination

Laboratory testing of samples obtained from the site did not indicate the presence of any potential contaminants at concentrations above the relevant screening criteria for a commercial end use. Significant contamination was not noted during the site investigation.

#### 3.3.2 Water Pipe Assessment

The report also includes an assessment in line with the UKWIR document *“Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, (Ref 10/WM/03/21)”*.

Laboratory testing indicates the majority of the site is suitable for the installation of standard PE water pipe, however a number of areas indicated elevated concentrations of contaminants whereby barrier pipe may be required. These are summarised as follows:

- Aliphatic and aromatic hydrocarbons (C10 to C16)
  - TP06
- Total SVOC (excluding PAH)
  - TP05, 0.25m

- TP07, 0.2m
- TP11, 0.2m
- TP25, 0.6m

### 3.3.3 PFAS

Six samples were scheduled for analysis for a suite of PFAS chemicals. These were scheduled on four samples from the stockpiled materials and two investigation locations associated with the route of the proposed utilities installation.

The two samples from the western stockpile showed all determinants to be below the relevant laboratory limit of detection. The two samples from the eastern stockpile recorded concentrations of 0.10µg/kg of PFOS, which is noted to be at the laboratory limit of detection which is below the screening value of 13µg/kg.

Of the two samples obtained from in-situ locations, the sample from TP16 recorded no determinants above the relevant laboratory limit of detection, the sample obtained from TP6a indicate the presence of a number of PFOS and PFOA at concentrations above the laboratory limit of detection.

Screening values for PFAS are not available for soils to assess risk to human health, however the following screening values for PFOA and PFOS have been adopted based on EA guidance.

- PFOA - 19µg/kg
- PFAS - 13µg/kg

The recorded concentrations in TP06A are considered to be notable (PFOA, 2µg/kg and PFOS, 53µg/kg), especially when consideration is given to the location of the site in the vicinity of the on-site firefighting facility.

Due to the potential for these compounds to be mobilised into the controlled waters of the wider environment (groundwater, surface waters) soils derived from this area of the site are not considered to be suitable for re-use within the proposed development and any excavated soils will need to be disposed of to an off site disposal facility.

Further investigation and testing should be undertaken to further delineate the extent of PFAS contamination in this area and identify soils which may be suitable for re-use if concentrations of PFAS are deemed to be suitably low. This work should be undertaken prior to the excavation of soils to allow segregation of materials during the development phase.

### 3.3.4 Asbestos

Asbestos containing materials have been identified in Made Ground (sub base) below the concrete slab in the area of proposed deposition (Y Porth), as recorded in the following report:

- B048494 – Bro Tathan Utilities. Additional Ground Investigation Letter Report, November 2023

Whilst only one investigation location identified the presence of asbestos and the recorded concentrations are low, it is also noted that a further investigation location in the adjoining site to the west also indicated the presence of asbestos.

As such it is considered possible that asbestos containing materials may be present in the Made Ground below the concrete slab in this area. It is understood that prior to the placement of soils in this area to raise ground levels, the slab will be broken out.

Due to the proposed development, the presence of asbestos is not considered to pose a risk to future site users, however to be protective of site workers during the development phase, a Pro-Active Watching Brief is recommended during the initial ground works to remove the concrete slab.

## 4.0 POTENTIAL SOURCES OF CONTAMINATION

### 4.1 INTRODUCTION

The site has been subject to previous phases of investigation and assessment with the findings presented in the reports summarised in Section 1.7 and the findings of the ground investigation undertaken by Tetra Tech in 2023 (summarised in Section 3.0 above). As part of these assessments, potential sources of contamination have been identified which in some cases have been physically investigated through ground investigation, confirming ground conditions. The plan attached as Appendix D depicts the locations that WYG / Tetra Tech have carried out ground investigation works at the site between c.2019 and 2022.

The following section provides a summary of the key sources of contamination within the context of the Conceptual Site Model. Potential sources of contamination that have been identified at Bro Tathan (excluding Bro Tathan East) are marked on figures attached at Appendix C.

### 4.2 SUMMARY OF CONCEPTUAL SITE MODEL

Previous assessments have identified a number of potential sources of contamination across the development site which are summarised below and within the drawings presented in Appendix C as well as an extract of the Risk Register for the site relating to contaminated land.

A ground investigation targeting the route of the proposed new water main did not identify any contamination with the exception of PFAS chemicals in the vicinity of the current fire fighting facility.

#### 4.2.1 Sources

The following table outlines the anticipated pollutant sources associated with the site and should be read in conjunction with the constraints plans and risk register appended to this report.

**Table 4-1 – Summary of Key Contaminant Sources**

Site Area	Key Potential Sources	Potential Contaminants	Comment
Keithrow (Bro Tathan West)	<ul style="list-style-type: none"> <li>Current and historical UST including fuels (including PFS), solvents and acid.</li> <li>Paint spraying areas</li> <li>Electroplating facilities</li> <li>Print works</li> <li>Storage of explosives</li> <li>Waste facilities, scrap metal storage, waste oil disposal facility.</li> <li>Former firing range</li> <li>Substations</li> <li>Aircraft servicing facilities.</li> </ul>	Hydrocarbons, BTEX, PAH, VOC, SVOC, chlorinated solvents, asbestos, heavy metals, PCBs, PFAS	<p>Contaminants are likely to be localised within the soil and unsaturated zone with potential mobilisation into the groundwater below the site.</p> <p>Potential for vapour phase associated with volatile contaminants will also need to be considered.</p>

Site Area	Key Potential Sources	Potential Contaminants	Comment
	<ul style="list-style-type: none"> <li>Stockpiled materials</li> </ul>	Hydrocarbons, BTEX, PAH, asbestos, heavy metals, PFAS	Stockpiled materials are primarily derived from natural materials however contaminant concentrations will need to be confirmed through sampling and analysis to support the MMP process.
Y Porth	<ul style="list-style-type: none"> <li>Aircraft maintenance and storage</li> <li>Substation</li> <li>Elevated TPH concentrations within soils.</li> </ul>	Hydrocarbons, BTEX, PAH, VOC, SVOC, chlorinated solvents, asbestos, heavy metals, PCBs, Radiological waste, PFAS.	Contaminants are likely to be localised within the soil and unsaturated zone with potential mobilisation into the groundwater below the site. Potential for vapour phase associated with volatile contaminants will also need to be considered.
	<ul style="list-style-type: none"> <li>Radiological materials (dials)</li> </ul>	Radiological materials	Radiological risk assessments and surveys may be required to be undertaken by specialists. Specialist remediation lies outside the scope of this report. Visual identification is possible due to the presence of dials and instrumentation associated with former military infrastructure. Likely to be present in historical waste disposal areas and areas of infilled ground.
	<ul style="list-style-type: none"> <li>ACM in soil</li> </ul>	Asbestos	Recorded in Made Ground below concrete slab.
Bro Tathan North	<ul style="list-style-type: none"> <li>Paint spraying area</li> <li>Solvent soakaway and storage tank</li> <li>Solvent tank</li> <li>Aircraft dismantling areas</li> <li>Fuel tanks (UST)</li> </ul>	Hydrocarbons, BTEX, PAH, VOC, SVOC, chlorinated solvents, asbestos, heavy metals, PCBs, PFAS	Contaminants are likely to be localised within the soil and unsaturated zone with potential mobilisation into the groundwater below the site. Potential for vapour phase associated with volatile contaminants will also need to be considered.
	<ul style="list-style-type: none"> <li>ACM in soil</li> </ul>	Asbestos	Localised to made ground, risks associated with mobilization and inhalation of free fibers.
	<ul style="list-style-type: none"> <li>Backfilled quarry</li> </ul>	Hydrocarbons, BTEX, PAH, VOC, SVOC, chlorinated solvents,	Potential contaminants may be entrained within the backfill materials within former quarry

Site Area	Key Potential Sources	Potential Contaminants	Comment
		asbestos, heavy metals, PCBs, PFAS	voids. These may be localised or widespread.
Beggars Pound – Bro Tathan South	<ul style="list-style-type: none"> <li>Firing range</li> <li>POL</li> <li>Substation</li> </ul>	Hydrocarbons, BTEX, PAH, VOC, SVOC, chlorinated solvents, asbestos, heavy metals, PCBs,	Contaminants are likely to be localised within the soil and unsaturated zone with potential mobilisation into the groundwater below the site. Potential for vapour phase associated with volatile contaminants will also need to be considered.
	<ul style="list-style-type: none"> <li>Backfilled quarry</li> </ul>	Hydrocarbons, BTEX, PAH, VOC, SVOC, chlorinated solvents, asbestos, heavy metals, PCBs, PFAS	Potential contaminants may be entrained within the backfill materials within former quarry voids. These may be localised or widespread.
	<ul style="list-style-type: none"> <li>ACM in soil</li> </ul>	Asbestos	Localised to made ground, risks associated with mobilization and inhalation of free fibers.
	<ul style="list-style-type: none"> <li>Radiological materials</li> </ul>	Radiological materials	Radiological risk assessments and surveys may be required to be undertaken by specialists. Specialist remediation lies outside the scope of this report.
Rotary Zone – Bro Tathan South	<ul style="list-style-type: none"> <li>Bulk fuel storage</li> <li>Vehicle re-fueling area</li> <li>Firefighting area</li> <li>Hazardous waste storage area</li> <li>Hydrocarbons in groundwater</li> <li>Substation</li> <li>Aircraft servicing areas</li> <li>Solvents in soils.</li> </ul>	Hydrocarbons, BTEX, PAH, VOC, SVOC, chlorinated solvents, asbestos, heavy metals, PCBs, PFAS	Contaminants are likely to be localised within the soil and unsaturated zone with potential mobilisation into the groundwater below the site. Potential for vapour phase associated with volatile contaminants will also need to be considered.
	<ul style="list-style-type: none"> <li>Former air raid shelters (backfilled, anticipated ACM)</li> </ul>	Asbestos	Localised to made ground, risks associated with mobilization and inhalation of free fibers.
	<ul style="list-style-type: none"> <li>Historical tip areas</li> </ul>	Hydrocarbons, BTEX, PAH, VOC, SVOC, chlorinated solvents, asbestos, heavy metals, PCBs, PFAS	Potential contaminants may be entrained within the backfill materials within former quarry voids. These may be localised or widespread.

Site Area	Key Potential Sources	Potential Contaminants	Comment
All sites	<ul style="list-style-type: none"> <li>Radon</li> </ul>	Radon	New developments are likely to require radon protection measures to protect site users.

#### 4.2.2 Pathways

The key active pathways associated with the site are considered to include:

- Human health
  - Inhalation, ingestion, direct dermal contact with contaminated soils
  - Inhalation of vapour phase
  - Mobilisation and inhalation of asbestos.
- Controlled waters
  - Leaching and vertical migration within the unsaturated zone
  - Lateral migration with groundwater at depth
  - Lateral migration of contaminated groundwater towards surface water bodies.

#### 4.2.3 Receptors

In terms of risks to human health, the site will remain as a commercial facility with site users representing the key receptors. Risks to site construction workers should be controlled under the Health and Safety regulations with including the use of appropriate PPE and the adoption of good on site hygiene practices, in addition to the provision of training and tool box talks during the development phase.

The risks to controlled waters will predominantly be associated with the risk to groundwater underlying the site. The absence of overlying superficial strata indicates potential contaminants will mobilise directly to the groundwater within bedrock strata via the underlying unsaturated zone. Localised run off or connectivity between groundwater and surface water bodies indicates the potential impact to surface water bodies, especially where potential sources are located close to surface water features.



## 5.0 REMEDIATION STRATEGY

### 5.1 INTRODUCTION

The proposed development consists of two key elements:

1. Installation of new utility infrastructure across the site including the excavation of soils to facilitate the works.
2. Re-use of the soils under the auspices of a Materials Management Plan to raise levels in the area of the site known as Y Porth to form a level development platform. This will consist of:
  - a. Material arising from the excavations in utility trenches;
  - b. Material currently stored in one stockpile which is situated on the eastern parcel of Keithrow.

### 5.2 EXCAVATION OF SOILS FROM UTILITY TRENCHES

The ground investigation undertaken across the site to support the installation of the new utility network did not identify any contamination across the majority of the study area. However, it is noted that this data relates to localised areas of the site only and further testing will be required to confirm suitability for use within the context of the Materials Management Plan.

Material arising from the excavation of the utility trenches is intended for re-use in Y Porth to raise site levels. The excavated materials should be transferred to a dedicated materials storage area and stockpiled prior to testing as per the requirements outlined in Section 7.0 below.

#### 5.2.1 Material deemed unsuitable for re-use.

The following scenarios are anticipated where materials are considered to be unsuitable for re-use within the context of the Remediation Strategy / Materials Management Plan.

- Materials originating from the Fire Fighting Area (TP6a) (See Section 5.4) unless suitability for re-use is confirmed following additional ground investigation.
- Areas of previously unidentified contamination encountered during the earthworks phase of the development (See Section 6.0).
- Material deemed chemically or geotechnically unsuitable following the testing requirements outlined in Section 7.0 below.

Materials deemed unsuitable for reuse will be disposed of off site to a suitable disposal facility.

### 5.3 RE-USE OF STOCKPILED MATERIALS ('WESTERN PARCEL' STOCKPILE)

Materials currently stockpiled within Keithrow Western Parcel have been sampled as part of the 2023 Tetra Tech ground investigation which confirm the materials are generally suitable for re-use within the proposed development. However, the testing frequency does not currently meet the requirements for re-use as outlined in Section 7.0.

A survey of the stockpiles on site was undertaken by Tetra Tech and the findings are presented in the following document:

- Tetra Tech, 2023. Bro Tathan – Stockpile Walkover Survey Letter Report. Dated 11<sup>th</sup> November 2023.

The information presented in this letter report is summarised below within the context of the stockpiles that are present both on the western and eastern parcels of Keithrow.

**Table 5-1 – Stockpile Summary**

Stockpile Reference		Description	Volume m <sup>3</sup>	Number of samples obtained to date	Number of samples required to meet testing requirements
East	1	Comprises predominantly <b>subsoil</b> (clay with limestone cobbles).  Smaller sub stockpiles of <b>concrete</b> and <b>topsoil</b> present.	4,110	2 soils	8 soil (including PFAS) 4 leachate
West	5	Grassed, but understood to comprise predominantly <b>subsoil</b> .	6,570	2 soils	13 soil (including PFAS) 7 leachate

Further sampling will be required in line with the requirements for Materials Re-use outlined in Section 7.0.

## 5.4 PFAS CONTAMINATION – FIRE FIGHTING AREA (TP6A)

Concentrations of PFAS have been recorded in samples obtained from TP6a, located near to the fire service station associated with the airfield.

The recorded concentrations of PFAS in TP6a indicate that the soil in this area is not suitable for re-use within the proposed development to raise levels in Y Porth without further assessment due to the risk posed by PFAS to the wider environment. This is associated with the recorded concentrations of PFOS at concentrations above the adopted screening value.

In the event that further assessment is not undertaken, excavated soils from the firefighting facility will need to be disposed of off-site at a suitable disposal facility.

To limit the volume of soil designated for off site disposal, further investigation and testing is recommended to identify areas of this part of the site which are not impacted by PFAS and as such may be re-used in line with the MMP documentation.

## 5.5 ASBESTOS – Y PORTH

A watching brief will be required during the removal of the concrete slab currently present in the Y Porth area of the site for the presence of potential asbestos containing materials.

The works should be overseen at all times by an operative trained in asbestos awareness. In the event that suspected asbestos containing materials are identified, the works should stop and procedures outlined in Section 6.4.

## 6.0 REACTIVE STRATEGY

In common with all brownfield sites, there is the potential for contamination to be present within the soils beneath the site, over and above that identified during phases of site investigation. Significant contamination has not been identified on site other than outlined above, however a review of the historical development of the site indicates the potential for localised contamination to be present which may be encountered during the proposed development.

The objective of the Reactive Remediation Strategy is to ensure that a methodology is in place to identify, manage and treat any previously unidentified areas of contamination which may be encountered during future site works. The strategy is consequently required to address the following:

- Provide information on the potential contaminants which may be encountered including how to identify contamination based on olfactory or visual information.
- The procedures to inform the project team.
- Requirements to protect the Health and Safety of site operatives.
- The requirement for further assessment to identify the nature and extent of any identified contamination.
- The requirement to review the Conceptual Site Model and Risk Assessment.
- The requirement to review and update the remedial approach including the requirement to gain regulatory approval.

In the event that significant contamination is encountered, the requirement for additional remedial works cannot be discounted. The nature of these additional works will be determined by the nature of any contamination encountered.

### 6.1 PROACTIVE APPROACH (WATCHING BRIEF)

The Principal Contractor for the works will be responsible for providing an experienced banksman to observe and control excavations. In addition, the supervising person must be suitably trained and experienced in order to identify the presence of visible or olfactory evidence of contamination outlined below.

### 6.2 IDENTIFICATION OF POTENTIAL CONTAMINANTS

Based on the historical development of the site, the potential remains for contamination to be present including, but not limited to contaminants presented in Table 6-1.

**Table 6-1 – Summary of Potential Contaminants**

Contaminant Type	Method of Identification on site
Hydrocarbons (fuels, oils, tars).	Oily sheen on groundwater / perched water Odours Discolouration of soils Tarry wastes (likely to be dark in coloration)

Contaminant Type	Method of Identification on site
BTEX	Solvent like odours, may also be associated with the presence of hydrocarbons
VOC / SVOC	Solvent like odours, may also be associated with the presence of hydrocarbons
Chlorinated solvents	Potentially sweet or solvent type odours.
PCBs	Present as oils and greases, often coloured.
Heavy metals	Present in concentrations of ash and general Made Ground.
PAH	Present in concentrations of ash, oily and tarry materials.
Asbestos	Present as fibrous materials, or within asbestos containing materials such as cement sheet, insulation boards. Operatives should be trained in asbestos identification.
General waste materials	Accumulations of unsuitable materials including scrap metal, and general waste materials which may require removal to facilitate the development.
Radiological waste	Luminous dials and instrumentation, potentially within waste tips and burning ground.

### 6.3 OUTLINE APPROACH

Visual and olfactory inspection shall be used to identify potentially impacted soils. Following agreement on a plan of action it is possible that a conventional delineation exercise can be used to segregate impacted soil from the surrounding material.

The discovery and management of potentially impacted soils should be dealt with on a case-by-case basis in order to address the specific nature of the ground conditions uncovered. However, a general approach is described below:

In the event that evidence of previously unencountered contamination being identified, works should cease in this area and advice sought from a suitably experienced Geoenvironmental Consultant independent of the contractor. The following methodology should be followed as a minimum.

- Potentially contaminated ground conditions are identified by groundworker(s) and the works are halted in this area.
- Contractor assesses the requirement for any additional health and safety or environmental management control measures.
- The site manager is informed of the identification of potential contamination who will inform the client and Geoenvironmental Consultant to agree a proposed methodology for managing the impacted materials.
- Excavated materials will be separately stockpiled within a dedicated storage area which is bunded and lined with plastic sheeting to prevent contaminants migrating into the underlying soils. Stockpiles should also be covered with plastic sheeting during periods of heavy rain and / or prolonged dry weather. Materials containing suspected ACM should be covered / damped down at all times.

- Requirements for additional sampling and risk assessment is confirmed with the contractor, Geoenvironmental Consultant, Natural Resources Wales and Contaminated Land Officer for the Local Planning Authority. The following is presented as a minimum requirement:
  - Samples of the stockpiled material, and extents of the excavations should be obtained at a rate confirmed by the Geoenvironmental Consultant, but at a minimum of 1 sample per 250m<sup>3</sup> from stockpiled materials, and a minimum of five samples from the excavation (four from the lateral extents and one from the base). Actual frequency of testing may be greater depending on the nature and extent of the contamination and will be determined by the Geoenvironmental Consultant in liaison the Local Authority.
- The samples will be subject to chemical analysis (testing suite to be determined through liaison between the Geoenvironmental Consultant and the Local Planning Authority).
- Additional risk management procedures including remedial action, if necessary, and programming of the works will be agreed with the Local Planning Authority.
- Implementation of agreed remedial actions on site. Works to be overseen by Geoenvironmental Consultant.
- Records updated for inclusion in the Verification Report for the works.

## 6.4 ASBESTOS

---

In the event of previously unidentified asbestos containing materials being encountered on site during the groundworks the following procedures should be implemented:

- Works should cease immediately in the vicinity of the identified asbestos.
- The affected area should be fenced off and covered with plastic sheeting.
- The site manager informed of the identification of potential contamination who will inform the Geoenvironmental Consultant or specialist asbestos consultant to agree a proposed methodology for managing the impacted materials.
- Specialist advice should be obtained from an asbestos consultant with regard the identification of the asbestos and risk management procedures.
- Agreement will be sought between the Contractor, the Specialist Asbestos Consultant, client, Geoenvironmental Consultant, and Local Planning Authority with regard to the additional site procedures and risk management required to appropriately manage the identified asbestos containing materials.
- This document will be updated in line with the additional requirements for risk management in the light of this additional information.

## 6.5 RISKS TO GROUNDWORKERS

---

Risks to ground workers associated with the Made Ground can, in general, be addressed as a precautionary measure through use of appropriate personnel protective equipment and the adoption of good practices on site including:

- Toolbox talks for all groundworks to raise awareness.

- Appropriate PPE.
- Adoption of good hygiene practices during groundworks.

## 6.6 GENERAL SITE PRACTICES

---

Throughout the duration of the groundwork good site practices will be adopted to ensure the following:

- Adequate dust suppression across the site to minimise dust generation.
- Minimisation of tracking across areas of soft cover (soils and made ground).
- Implementation of street sweeper to minimise mud on areas of hardstanding on site and in the surrounding road network.
- The movement of made ground materials will be minimised during periods of extended dry weather where possible.

## 7.0 MATERIALS MANAGEMENT

### 7.1 REUSE OF SITE WON MATERIALS

Excavated materials should be recorded and managed under the procedures outlined within a Materials Management Plan (MMP) in line with the requirement of the Definition of Waste Industry Code of Practice, Version 2 (CL:AIRE, March 2011).

#### 7.1.1 Geotechnical Suitability

Excavated soils, Made Ground soil and limestone bedrock will be stockpiled separately at the site. Prior to the re-use of any materials at the site, the geotechnical suitability of the materials will be tested and confirmed prior to re-use as fill materials in line with the Earthworks Strategy for the site presented in the following report.

- B048494 – Bro Tathan Utilities. Earthworks Strategy Report, October 2023

#### 7.1.2 Chemical Suitability – Human Health

To confirm the chemical suitability of the excavated materials for re-use on site, the material will be subject to soil testing at a rate of one sample per 500m<sup>3</sup>. This sampling should be undertaken once the materials have been excavated and stockpiled prior to reuse to ensure that representative samples are obtained. The following test suites are required for each sample (presented in Appendix E).

- General contamination soil suite
- PFAS soil suite

As the site is proposed for a commercial end use, the material will be deemed suitable for use provided the test results are compliant with the generic assessment criteria for a commercial end use scenario which are presented in Appendix E. PFAS testing results should be screened against the following screening criteria:

- PFOS - 13 µg/kg
- PFOA - 19 µg/kg

#### 7.1.3 Chemical Stability – Mobile contamination

In addition to the above, soil samples at a frequency of one per 1,000m<sup>3</sup> will be scheduled for single state batch leachate analysis at 10:1 ratio (BS EN 12457-2) and screened against water quality standards which are protective against controlled waters, and an updated risk assessment undertaken. The suite of testing requires is presented in Appendix E.

#### 7.1.4 MMP

A formal MMP document will be produced in due course to support the development on the site.

#### 7.1.5 Firefighting area

Unless further investigations are undertaken, material originating from the firefighting area adjacent to the airfield (around TP6a) is deemed to be unsuitable for re-use within the proposed development and as such the material will need to be disposed of offsite at a suitable disposal facility. Additional testing should be undertaken prior to the start of the development phase to further delineate the extent of the contamination and identify any soils which may be deemed suitable for re-use.



## 7.2 IMPORTATION OF MATERIALS

---

With the exception of natural aggregates, to ensure materials brought to site are suitable for use within the proposed development, imported materials will be subject to the following assessment.

- Details of the proposed source, supplier and results of chemical analysis must be recorded and independently validated by a suitable qualified geo-environmental engineer.
- Imported materials will be sampled at a rate of one sample per 500m<sup>3</sup> at source. Results must be compared to the screening criteria presented in Appendix E.
- Soils must be visually free from foreign materials (plastic, wood, glass, metal, tarmac etc).
- Imported aggregate materials should be tested at a frequency of one per 500m<sup>3</sup> for the presence of asbestos at the source.

Imported materials will also be subject to the requirements of the Materials Management Plan for the site.

In the case of imported natural aggregates, the movement of materials should be documented, and copies of the associated consignment notes retained on site.

## 7.3 OFFSITE DISPOSAL

---

If the excavated material is designated for off-site disposal, the materials will be removed in accordance with the requirements of the Duty of Care Regulations, 1991 and where appropriate the Hazardous Waste Regulations, 2005.

Materials removed from site as waste will be subject to waste classification testing to allow for appropriate classification, to ensure correct disposal to an appropriately licensed facility.

It is the responsibility of the Contractor, as waste producer, to classify any materials prior to offsite disposal and to identify an appropriate disposal facility and suitable haulage contractor with appropriate waste management licences in place.

Copies of Waste Transfer Notes and Consignment notes should be maintained on site and presented within the verification report.

## 8.0 VERIFICATION PLAN

An integral part of the remediation strategy proposed for the site involves suitable monitoring of the works to ensure they are undertaken as specified, to demonstrate the achievement of the remediation objectives and to document all aspects of the remediation work.

This includes the monitoring of the works undertaken on site, post remedial monitoring and confirmation that residual risks no longer pose an unacceptable risk to receptors.

### 8.1 ON SITE DOCUMENTATION

The works will be controlled by the appointed contractor. The following records will be maintained on site as a minimum, and provided as necessary to the regulatory authorities for approval, actual records will be determined by the nature and extent of any identified contamination and the remedial works implemented on site:

1. Details of the testing of excavated and stockpiled materials prior to the placement of these materials within the Y Porth area of the site.
2. Details of any previously unencountered contamination identified during the development works including;
  - a. Nature, extent and location of unsuitable materials.
  - b. Record of liaison with Geo-environmental Specialist and relevant regulators (Local Authority and NRW as required).
3. Details of any remedial works undertaken following regulatory approval, including but not limited to:
  - a. Records of the excavations undertaken, including:
    - i. Records of the extent of the areas requiring excavation;
    - ii. Records of the volume of soil excavated from each area;
  - b. Details of the storage of material prior to off-site disposal (if required) including location and number of stockpiles and management systems to minimise cross contamination with clean soils;
  - c. Records pertaining to the volume of soil disposed and waste transfer notes / consignment notes (if required).
4. Results of any additional contamination testing in the event that unexpected and suspect materials are identified, including laboratory quality assurance accreditation information.
5. Details of the actions taken to store, contain, treat, dispose or re-use any suspect materials.
6. Results of testing of all soils proposed for importation, including information on the source location and quantity imported. Contamination testing results are to be approved by a competent person before the soils are brought to site.
7. Site plans showing location(s) of imported and re-used material
8. Chain of custody documentation for any soils imported.

9. Record of all disposals of unsuitable soils or hazardous / contaminated materials, including waste transfer documentation if applicable.
10. Records of health, safety and environmental controls and any variations to the original strategy/specification.
11. Copies of all relevant correspondence with the regulatory authorities during the course of the works.
12. Photographic records as required.

If at any time during remediation any unsuspected contamination is identified, the local authority Contaminated Land Officer will be contacted in order to agree a strategy for its remediation. If required by the Local Planning Authority, interim reports shall be provided as necessary for progress monitoring purposes.

## **8.2 MONITORING**

---

Following the completion of the remedial works, a risk assessment may determine the requirement to undertake additional monitoring of the site to determine:

- The concentrations of residual contamination in areas subject to remedial works;
- Any residual risks to receptors (human health and controlled waters);
- The requirement for further remedial works.

Any long-term monitoring results will need to be agreed with the regulatory authorities prior to implementation and records presented as part of the Verification Report and Long Term Monitoring reports.

## **8.3 VERIFICATION REPORT**

---

Information collected as part of the remedial works (outlined above) should be presented in a Verification Report prepared by a Geoenvironmental Specialist.

The report should include an updated risk assessment to demonstrate that any residual pollutant linkages no longer pose a significant risk to identify receptors associated with the site.

## FIGURES

Figure 1 – Site Location Plan

## APPENDIX A: REPORT CONDITIONS

## **APPENDIX A - REPORT CONDITIONS**

### **GROUND INVESTIGATION**

This report is produced solely for the benefit of Welsh Government and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

This report is based on a visual site inspection, reference to accessible referenced historical records, information supplied by those parties referenced in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented as the best that can be obtained without further extensive research. Where ground contamination is suspected but no physical site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to activities related to the site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, perhaps in higher concentrations, elsewhere on the site cannot be discounted.

Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categoric assurances that they will be accepted by Authorities or Funds etc. without question as such bodies often have unpublished, more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to Tetra Tech. In time improved practices or amended legislation may necessitate a re-assessment.

The assessment of ground conditions within this report is based upon the findings of the study undertaken. We have interpreted the ground conditions in between locations on the assumption that conditions do not vary significantly. However, no investigation can inspect each and every part of the site and therefore changes or variances in the physical and chemical site conditions as described in this report cannot be discounted.

The report is limited to those aspects of land contamination specifically reported on and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents. The opinions expressed cannot be absolute due to the limitations of time and resources imposed by the agreed brief and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites. If migrating pollution or contamination (past or present) exists further extensive research will be required before the effects can be better determined.

## APPENDIX B – PROPOSED SERVICES PLANS (BURROUGHS)



## APPENDIX C: CONSTRAINTS PLANS AND RISK REGISTER

**APPENDIX D – WYG / TETRA TECH GROUND INVESTIGATION SUMMARY**

## APPENDIX E: CHEMICAL SCREENING CRITERIA FOR RE-USE AND IMPORTATION

**Appendix E1 – Soil Suite – General Contaminants including screening values for Commercial / Industrial End Use**

Determinand	Units	Assessment Criteria	Derivation Tool
pH	pH Units	<5, >9	-
<b>Metals and Metalloids</b>			
Arsenic	mg/kg	640	C4SL
Beryllium	mg/kg	12	LQM/CIEH S4UL
Boron	mg/kg	240,00	LQM/CIEH S4UL
Cadmium	mg/kg	410	C4SL
Chromium VI	mg/kg	49	C4SL
Chromium III	mg/kg	8,600	LQM/CIEH S4UL
Copper	mg/kg	68,000	LQM/CIEH S4UL
Lead	mg/kg	2,300	C4SL
Mercury (Inorganic)	mg/kg	1,100	LQM/CIEH S4UL
Nickel	mg/kg	980	LQM/CIEH S4UL
Selenium	mg/kg	12,000	LQM/CIEH S4UL
Vanadium	mg/kg	9,000	LQM/CIEH S4UL
Zinc	mg/kg	730,000	LQM/CIEH S4UL
<b>Speciated PAHs</b>			
Acenaphthene	mg/kg	84,000 (57.0)sol	LQM/CIEH S4UL
Acenaphthylene	mg/kg	83,000 (86.1)sol	LQM/CIEH S4UL
Anthracene	mg/kg	520,000	LQM/CIEH S4UL
Benz[a]anthracene	mg/kg	170	LQM/CIEH S4UL
Benzo[a]pyrene	mg/kg	44	C4SL
Benzo[b]fluoranthene	mg/kg	1,200	LQM/CIEH S4UL
Benzo[g,h,i]perylene	mg/kg	3,900	LQM/CIEH S4UL
Benzo[k]fluoranthene	mg/kg	77	LQM/CIEH S4UL
Chrysene	mg/kg	350	LQM/CIEH S4UL
Dibenz[a,h]anthracene	mg/kg	3.5	LQM/CIEH S4UL
Fluoranthene	mg/kg	23,000	LQM/CIEH S4UL
Fluorene	mg/kg	63000 (30.9)sol	LQM/CIEH S4UL
Indeno[1,2,3-c,d]pyrene	mg/kg	500	LQM/CIEH S4UL
Naphthalene	mg/kg	190 (76.4)sol	LQM/CIEH S4UL
Phenanthrene	mg/kg	22,000	LQM/CIEH S4UL

Determinand	Units	Assessment Criteria	Derivation Tool
Pyrene	mg/kg	54,000	LQM/CIEH S4UL
Phenol and Cyanide			
Phenol	mg/kg	440	LQM/CIEH S4UL
Easily Liberatable Cyanide (free)	mg/kg	40	Acute effects (infant, 1 dose of 3g soil)
Dependent Option (TPHCWG Hydrocarbon Fractions)			
Aliphatic >EC5-EC6	mg/kg	3,200 (304)sol	LQM/CIEH S4UL
Aliphatic >EC6-EC8	mg/kg	7,800 (144)sol	LQM/CIEH S4UL
Aliphatic >EC8-EC10	mg/kg	2,000 (78)sol	LQM/CIEH S4UL
Aliphatic >EC10-EC12	mg/kg	9,700 (48)sol	LQM/CIEH S4UL
Aliphatic >EC12-EC16	mg/kg	59,000 (24)sol	LQM/CIEH S4UL
Aliphatic >EC16-EC35	mg/kg	1,000,000#	LQM/CIEH S4UL
Aliphatic >EC35-EC44	mg/kg	1,000,000#	LQM/CIEH S4UL
Aromatic >EC5-EC7 (benzene)	mg/kg	27	LQM/CIEH S4UL
Aromatic >EC7-EC8 (toluene)	mg/kg	56,000 (869)vap	LQM/CIEH S4UL
Aromatic >EC8-EC10	mg/kg	3,500 (613)vap	LQM/CIEH S4UL
Aromatic >EC10-EC12	mg/kg	16,000 (364)sol	LQM/CIEH S4UL
Aromatic >EC12-EC16	mg/kg	36,000 (169)sol	LQM/CIEH S4UL
Aromatic >EC16-EC21	mg/kg	28,000	LQM/CIEH S4UL
Aromatic >EC21-EC35	mg/kg	28,000	LQM/CIEH S4UL
Aromatic >EC35-44	mg/kg	28,000	LQM/CIEH S4UL

**Appendix E2 – Soil Suite – PFAS Suite including screening values for PFOS and PFOA**

Analytical Parameter	Screening Value
PFBS C4 Sulphonate	-
PHPS C5 Sulphonate	-
PFHxS C6 Sulphonate	-
PFHpS C7 Sulphonate	-
PFOS C8 Sulphonate	13 µg/kg
PFNS C9 Sulphonate	-
PFDS C10 Sulphonate	-
PFUDS C11 Sulphonate	-
PFDoS C12 Sulphonate	-
PFBA C4 Carboxylic acid	-
PFPeA C5 Carboxylic acid	-
PFHxA C6 Carboxylic acid	-
PFHpA C7 Carboxylic acid	-
PFOA C8 Carboxylic acid	19 µg/kg
PFNA C9 Carboxylic acid	-
PFDA C10 Carboxylic acid	-
PFUDA C11 Carboxylic acid	-
PFDoA C12 Carboxylic acid	-

**Appendix E3 – Soil Derived Leachate Suite – General Contaminants**

Determinand	
pH	Phenanthrene
Sulphate	Anthracene
Cyanide (Total)	Fluoranthene
Ammonia (NH3)	Pyrene
Ammonium (NH4)	Benzo (a) anthracene
Nitrate (NO3)	Chrysene
Nitrite (NO2)	Benzo (b) fluoranthene
Chloride	Benzo (k) fluoranthene
Dissolved Organic Carbon (DOC)	Benzo (a) pyrene
Alkalinity as CaCO3	Indeno (1,2,3-cd) pyrene
Antimony	Dibenzo (a,h) anthracene
Arsenic	Benzo (g,h,i) perylene
Barium	TPH Aliphatic >C5-6
Beryllium	TPH Aliphatic >C6-8
Cadmium	TPH Aliphatic >C8-10
Chromium	TPH Aliphatic >C10-12
Lead	TPH Aliphatic >C12-16
Mercury	TPH Aliphatic >C16-35
Molybdenum	TPH Aromatic >EC5-7 (Benzene)
Selenium	TPH Aromatic >EC7-8 (Toluene)
Copper	TPH Aromatic >EC8-10
Nickel	TPH Aromatic >EC10-12
Zinc	TPH Aromatic >EC12-16
Boron	TPH Aromatic >EC16-21
Total Phenol	TPH Aromatic >EC21-35
Naphthalene	Benzene
Acenaphthylene	Toluene
Acenaphthene	Ethylbenzene
Fluorene	Xylenes (mixed isomers)