The Network Rail (Buxton Sidings Extension) Order

Contaminated Land

Formal Submission

Planning Condition 8

further information

Part 1 of 4 including:

Remediation Implementation plan

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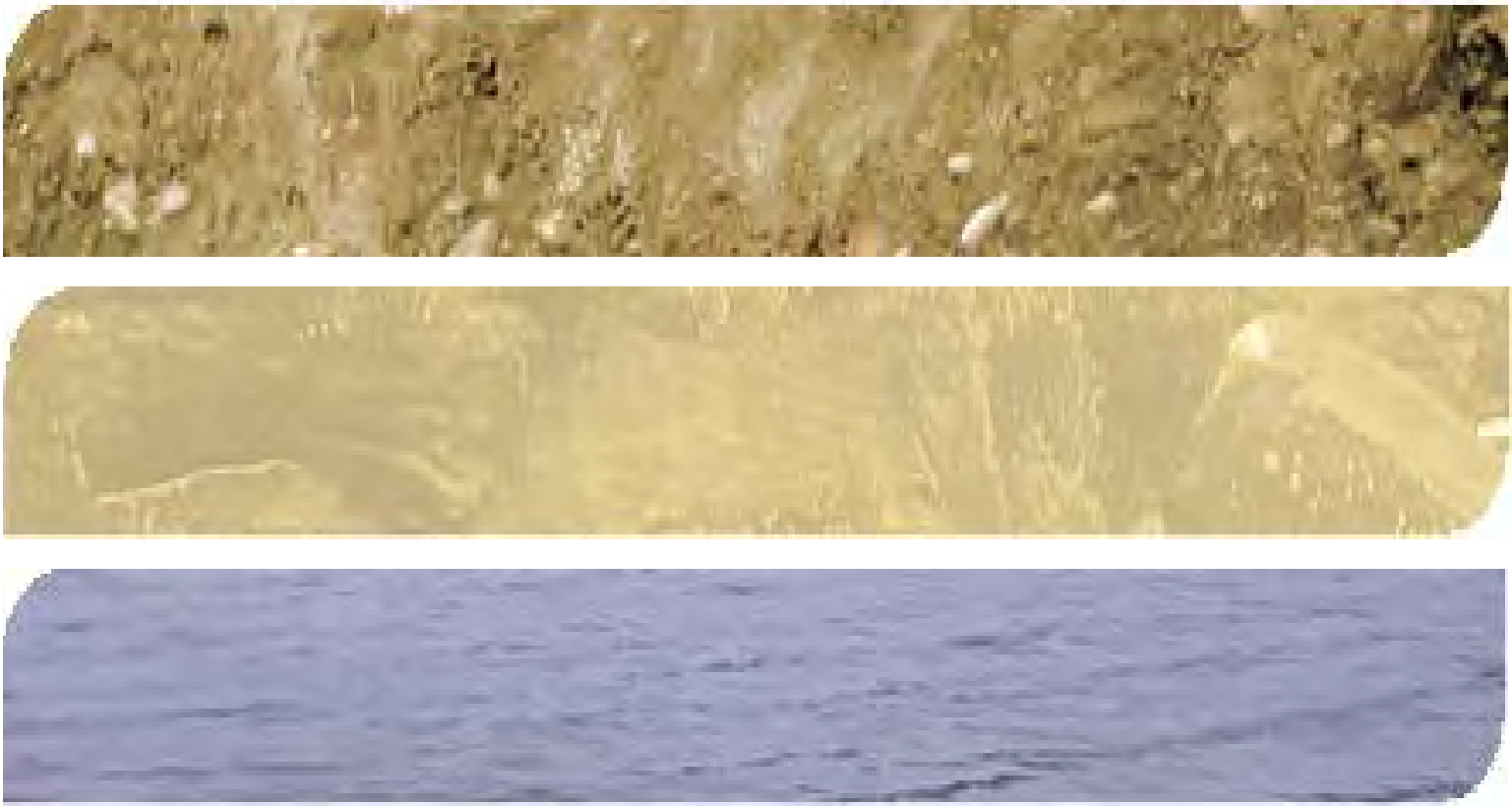
Roundhay Environmental
Consulting Limited

BUCKINGHAM GROUP CONTRACTING LIMITED

BUXTON SIDINGS EXTENSION SCHEME

REMEDIATION IMPLEMENTATION PLAN

Report No. PF1/F15005/5.2/MIC
June 2018



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1.0 Introduction

Buckingham Group Contracting Limited (BGCL) is commissioned by Network Rail to construct new sidings at Buxton to accommodate longer freight trains. The Buxton Sidings Extension Scheme site is located in the Hogshaw area of Buxton, Derbyshire, approximately 400m north east of the town centre within the administrative boundary of the High Peak Borough Council (HPBC). The approximate National Grid Reference (NGR) of the centre of the site is 406400E, 374600N. The site location is shown on **Figure 1**.

The scheme was given approval and deemed Planning Permission under the Transport and Works Act 1992 by the Department of Transport on 26 October 2017. The deemed Planning Permission included Condition 8 relating to Contaminated Land. Condition 8a requires approval of a written scheme to deal with the contamination described in the Outline Remediation Strategy which was submitted with the Environmental Statement for the scheme.

The Contaminated Land Scheme includes earlier reports previously submitted to the regulators and this new Remediation Implementation Plan for the works.

The extent of the site, including the access and working areas and the proposed permanent works, is shown on the drawings in **Appendix 1**. The total area is approximately 11 hectares (ha) and comprises agricultural land in the north, part of the former Hogshaw Refuse Tip, the existing sidings and former railway land to the south of the former tip. The former Hogshaw Refuse Tip is an area of 3.9ha of uneven, roughly vegetated raised ground mostly on the west side of Nun Brook. Nun Brook flows from north to south outside the site boundary through a culvert running beneath the eastern edge of the former tip.

The purpose and aims of this report are:

- to describe the investigation and assessment reports to be submitted for Condition 8b
- to identify the extent of any contamination as required by Condition 8b
- to present details of the planned remedial measures to be taken to render the land fit for its intended purpose as required by Condition 8b including:
  - sequence of working
  - method of handling former tip material including asbestos controls
  - provision of cover to prevent human exposure to tip materials
  - control of drainage to reduce impact on surface water
  - monitoring of air and water quality during the works
  - methods of validating completion of remedial works
- to present a management plan for any long-term measures needed for any contaminants remaining on the site as required by Condition 8b
- to present a procedure for dealing with any previously undetected contamination that may be found during the course of the works as required by Condition 8d
- to present an outline of the contents of the verification report for the works which will be required under Condition 8c

This report has been prepared by Roundhay Environmental Consulting Ltd (Roundhay ECL) for Buckingham Group Contracting Limited (BGCL) and Network Rail (NR) with all reasonable skill, care and diligence in accordance with our terms and our proposal dated 7 April 2017. Roundhay ECL is not obliged to update the report in respect of any future events nor should further relevant information become available. The report has been prepared for use by BGCL and NR and for submission to the regulatory authorities. Roundhay ECL accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known.

2.0 Site Description and History

2.1 Previous Investigations and Reports

Investigations have been carried out in parts of the site from the late 1990s onwards. The findings of Phase I and Phase II investigations completed by BGCL in 2015 and by others before 2015 were assessed, a conceptual site model (CSM) generated, options for remediation of excavated tip materials considered and an outline remediation strategy presented. In order to present the full requirements for the contaminated land scheme, the following relevant reports will be submitted to High Peak Borough Council together with this report .

Desk Study

- Tata Steel Projects 'Buxton Hindlow (Peak Forest) Buxton Up Refuge Sidings: Factual and Interpretative Report' for Network Rail, reference B80101-REP-GEO0001 P01, dated April 2012
- Roundhay ECL for Buckingham Group Contracting Limited Buxton Sidings Extension Scheme 'Additional Ground Investigation Geo-Environmental Interpretative Report', reference PF1/F15005/1.3/BAF, dated March 2016
- Envirocheck Report from Landmark Information Services for Peak Forest, Buxton reference PF1, dated 7 April 2015

Ground Investigation and Assessment

- Tata Steel Projects 'Buxton Hindlow (Peak Forest) Buxton Up Refuge Sidings: Factual and Interpretative Report' for Network Rail, reference B80101-REP-GEO0001 P01, dated April 2012
- Roundhay ECL for Buckingham Group Contracting Limited Buxton Sidings Extension Scheme 'Additional Ground Investigation Geo-Environmental Interpretative Report', reference PF1/F15005/1.3/BAF, dated March 2016
- Roundhay ECL for Buckingham Group Contracting Limited Buxton Sidings Extension Scheme 'Post Investigation Groundwater and Gas Monitoring Report', reference PF1/F15005/4.1/MIC, dated November 2017

Remedial Proposals

- Roundhay ECL for Buckingham Group Contracting Limited Buxton Sidings Extension Scheme 'Outline Remediation Strategy', reference PF1/F15005/2.2/MIC, draft dated June 2016

A full list of factual and interpretative reports of earlier investigations is presented in the References section.

The remediation to be completed to enable construction of the sidings extension was presented in the outline remediation strategy. The method of implementation of the strategy is presented in this report.

2.2 Site Description

The location and features of the site in relation to the surrounding area are shown on **Figure 2**.

2.2.1 Existing Sidings

Sidings for freight trains from Dowlow and Hindlow Quarries are currently operational and link to the passenger line which runs north from Buxton to Manchester. Two tracks in the sidings are operational and converge to a single track terminating at the public footpath shown on **Figure 2**. A further two tracks on the west side are disused and overgrown with vegetation.

The passenger railway line is adjacent on the west side beyond which is housing on Hogshaw Drive. The land rises steeply to further housing on Ladycroft Avenue, beyond which the land falls slightly to housing on Brown Edge Road and recreation areas with playing fields. To the west of the recreation areas is a small watercourse and open country.

On the east side of the current sidings is an area of former railway land. A track from Hogshaw Villas Road to a railway access point crosses the land. On the east side of the former railway land the ground falls steeply to a track used as a public footpath with Nun Brook and housing beyond.

The town of Buxton is to the south of the existing sidings.

2.2.2 Former Hogshaw Refuse Tip

The central section of the new sidings will run north from the existing sidings passing through the former Hogshaw Refuse Tip. The extent of the former tip is shown on **Figure 2**. A plan showing current features and locations of investigation points in the vicinity of the proposed extension is presented as **Figure 3**.

The former tip land is currently raised above the surrounding natural ground with a steep face falling 3m to 4m to the adjacent natural ground level at the north end. The surface of the former tip is uneven with depressions. Most of the tip is covered in rough vegetation including grass, brambles, reeds, small trees and a range of wild plants. Between the line of the proposed extension and the main railway line there are several groups of trees.

A surface covering of topsoil is apparent in some areas. In addition there are small stockpiles of topsoil or subsoil. Soil is also exposed adjacent to a vehicle track into the tip from the east where the track is more than a metre lower than the tip surface.

A footpath used mainly by dog walkers runs close to the line of the proposed sidings and further informal footpaths cross the tip area. A public footpath runs along the southern boundary of the tip.

There are discoloured orange and pale brown water seepages on the north west side of the tip close to the railway boundary, at the south east corner where the water runs down the footpath creating boggy areas adjacent to Nun Brook and at the entrance to the Nun Brook culvert.

Nun Brook enters a culvert near the north eastern corner of the tip. The culvert is 200m long, ending near the south eastern corner of the tip where the brook emerges and runs in an open channel.

To the west of the tip beyond the railway there is a pasture field beyond which is housing on Brown Edge Road at a higher elevation of around 330m AOD. Beyond Brown Edge Road open land rises to Brown Edge at a level of approximately 430m AOD with further moorland beyond.

To the east of the tip there are open fields and the buildings of Nunsfield Farm at a distance of 300m and the A6 road beyond.

2.2.3 Agricultural Field

The north side of the tip is separated from an agricultural field (Henshaw's Field) to the north by a wire mesh fence. The field is used as pasture for sheep and cattle. The proposed new sidings run north for approximately 220m across the pasture.

To the west of the proposed sidings extension there will be a narrow strip of land that is currently pasture. The railway lies to the west of the pasture and beyond the railway the land is mostly pasture fields rising steeply to housing on Brown Edge Road. There is a single dwelling named Low Croft on the west side of the railway 50m from the site.

To the east of the field the land rises towards the A6. A public footpath from Brown Edge Road crosses the railway 250m north of the site and continues south eastwards to the A6. Access to the site during the construction period will be provided along the line of the footpath.

2.3 Wildlife Area

A Derbyshire Wildlife Trust area, designated a local wildlife site (LWS), extends across the part of the former tip adjacent to Nun Brook and the former railway land. A narrow strip extends across the southern part of the tip. On the former railway land the area is adjacent to the existing sidings. The proposed sidings extension through the former tip will cross a small part of the LWS near the boundary of the tip and the former railway land.

The ecology of the LWS is described in the ecologist's report for the project. The approximate boundary of the area is shown on **Figure 3**.

2.4 History

Reference to published historical Ordnance Survey (OS) maps (reference 11) indicates that the railway was present from 1879 or earlier and the current sidings from at least 1898. The sidings reached maximum development in 1967 with an engine shed, turntable and coal hoppers. The ground level appears to have been lowered on the west side and was raised considerably on the east side to accommodate the sidings. By 1977 most of the sidings and the engine shed had been cleared with only the lines closest to the railway remaining.

Hogshaw Refuse Tip is shown on OS maps as an open field until at least 1955 and then as a refuse tip between 1967 and 1973 inclusive. By 1977 it is no longer shown as a tip and it is assumed that deposition of waste had ceased. The area of the proposed sidings extension to the north of the former tip has been agricultural land from the start of OS mapping to the present day.

3.0 Environmental Setting

3.1 Geology of the Area

The geology of the area is summarised in the Outline Remediation Strategy.

3.2 Geology of the Site

3.2.1 Introduction

Information from reports of ground investigations from 1999 onwards listed in the References section was assembled and reviewed in the Additional GI report. The following is a summary.

The main soils and strata beneath the site and immediately surrounding area are summarized in **Table 1** and described in Sections 3.2.2 to 3.2.4.

Table 1 Summary of Geology

Horizon	Geological Name	Description	Maximum proved thickness close to sidings, m
Made Ground	Made ground – railway land	Sandy gravel – ash, slag, clinker, brick over 0.2m of limestone cobbles	1.0
	Made ground – tip material	Predominantly largely decayed mixed industrial and domestic waste. Some odorous.	5.8
Soil	Buried topsoil	Dark grey brown or black soft organic CLAY with many decayed rootlets	2.0
	Weathered bedrock	CLAY with mudstone lithorelicts Soft or very soft, becomes firm with depth	5.0
Bedrock	Bowland Shale Formation	Mudstone. Weathered zone may be fragmented and water bearing	>3.3
	Eyam Limestone	Limestone – to east of site	>0.45

3.2.2 Made Ground

In the **existing sidings** area the made ground below the track ballast and adjacent to it comprises black or dark grey sandy gravel of ash, slag and clinker with occasional cobbles of brick to a maximum proved depth of 0.80m as seen in trial pits TP01 to TP06 (2010). There is an underlying 0.2m thick layer of limestone cobbles or boulders over the natural ground below. At trial pits TP90, TP91 and TP97 (2000) which are east of the current sidings an oily sheen was recorded and hydrocarbon odour was noted. At boreholes BH7 and BH7A drilling could not progress below 1.30m because of brick and concrete which are likely to be old engine shed foundations and at TP91 a brick structure was recorded to 1.70m below ground level.

Made ground in the area of the proposed extension through the **former tip** comprises topsoil over a variable thickness of tip material underlain by natural soils and the weathered mudstone of the Bowland Shale Formation.

Topsoil is generally described as brown, dark brown or black, sometimes ashy, sandy and/or slightly clayey soil with rootlets and vegetation, with common anthropogenic inclusions such as glass, plastic, brickwork and concrete. The topsoil is not present at all locations, but where present the thickness generally varies between 0.1m and 0.5m with the exception of trial pit location TP108. At this location the topsoil is 1.4m thick and appears to comprise a processed material, possibly prepared during the active phase of tipping to serve as a cover layer.

Tipped material is present at proved thicknesses between 1.0m and 7.2m, generally deepening to the east. The thickness decreases towards the western (railway) edge of the former tip, where it is between approximately 1.0m and 3.0m. Thicknesses in the centre of the area of the proposed sidings extension are mostly between 2.3m and 5.8m. At the southern end the thickness reduces to nothing at trial pit TP105. The thicker areas of material are present in the northern parts at boreholes BH101 and BH1 (1999) and in the southern part at boreholes BH103 and BH2 (2011). These deeper areas are likely to be filled topographical lows associated with former tributaries of Nun Brook.

A plan showing the thickness of the made ground in the former tip is presented as **Figure 4**.

The tip material comprises household and industrial waste including clayey fine gravel to cobble sized material comprising glassware, wood, plastic, metal, old bundled newspapers, cans, polythene, concrete, brick, clinker, ash, slag, organic material with common zones of asbestos brake linings and cobbles and boulders of limestone and brick. Larger items including bagged sandy construction waste, fabric, vehicles bodies, household appliances and vehicle tyres are present. Partially decomposed vegetation including large sawn logs and tree stumps are also present at some locations. The percentage of hard coarse components (i.e. brick, concrete, stone) mostly ranges from approximately 40% to 65%.

In addition to the topsoil and tipped material there are a number of small mounds, the largest of which is located in the central north of the site adjacent to trial pits TP113a and TP113b. Trial pit TP113a was excavated into this mound and encountered a mix of reworked clay and topsoil which was free from any visual or olfactory signs of contamination. It is considered likely that this material was deliberately stockpiled, possibly for use as a cover material.

No evidence of an engineered base to the tipped material was encountered during the ground investigation.

Made ground was not present in the **agricultural field** to the north of the former Hogshaw Tip.

3.2.3 Natural Soil

In the area of the existing sidings and adjacent railway land the uppermost natural material is described as soft or firm grey or brown clay with a thickness of 0.8m to 2.0m. Beneath the northern part of the existing sidings, however, soil is generally absent.

Beneath the former tip buried topsoil with plant remains was recorded at a few locations. At most locations the natural ground encountered comprised a firm, becoming stiff, light brown to grey clay which graded at depth to mudstone. The recorded thickness of clay is generally less in the boreholes in earlier investigations.

Natural ground was present from the surface in the agricultural field to the north of the former tip and comprised soft or very soft grey clay mostly to a depth of 1.0m to 2.0m. Some clay is thought to have been disturbed and weakened by periglacial processes as described in the Arup Geotechnical Report (reference 10).

Chemical testing has shown the clay and underlying mudstone to have a high sulphate content, with water soluble sulphate up to 1000 mg/l and total sulphate up to 12%, and a pH less than 5 in some samples. The sulphate and low pH are attributed to the presence of pyrite in the clay and mudstone.

3.2.4 Bedrock

Mudstone of the Bowland Shale Formation is present below the whole site. Highly weathered mudstone is present as clay with mudstone lithorelicts. At boreholes BH105 and BH106 which penetrated 5m and 7m into natural ground below the tip, the material is described as clay with mudstone lithorelicts or with thin mudstone beds for a thickness of 4m to 5m. Below this, in BH106, extremely weak dark grey carbonaceous mudstone was described. The maximum thickness of mudstone bedrock proved is 9.1m at borehole BH04 (2011) which was located on the track 250m north of the sidings extension. Within the site, or within 50m, the greatest thickness penetrated was 3.3m at borehole BH02 (2011) with the base not proved.

There is evidence of minor contamination of the top of the mudstone at a depth of around 1.0m by hydrocarbons in the existing sidings area.

In the eastern part of the former tip at borehole BH4 (1999), which was located close to the southern end of the Nun Brook culvert, 0.45m of limestone was proved below 0.50m of clay. It is interpreted that the rock is the Eyam Limestone which is shown on BGS maps to be present at this location to the east of the site.

3.3 Hydrogeology

The Millstone Grit Series is designated a Secondary Aquifer – A. Springs issue from the Millstone Grit sandstones to the north and west of the site and there are seepages in the field and on the north side of the tip which are likely to originate from the sandstones and from landslipped ground on the valley side.

The Carboniferous Limestone Series on the east side of the Nun Brook valley and to the south in Buxton is designated a Principal Aquifer. The site is not within a Source Protection Zone (SPZ) for the limestone groundwater. Limestone lies almost directly below tip material close to Nun Brook. It is likely that limestone groundwater contributes baseflow to Nun Brook.

The alignment of the proposed sidings is entirely on the Bowland Shale mudstone. Mudstones of the Bowland Shale Formation are present below the former tip. Whilst these mudstones may carry water in the slightly weathered horizon where fragments predominate, they have a low vertical permeability and therefore form an aquiclude over the limestone.

3.4 Watercourses

The closest surface water to the site is Nun Brook which flows through a culvert beneath the eastern edge of the former tip.

The ground in the agricultural field is poorly drained and part of the standing water is interpreted as groundwater which will gradually seep into the brook. Limestones crop out on the eastern side of Nun Brook and no tributaries have been seen flowing from the limestone into Nun Brook, but it is likely that groundwater from the east side provides baseflow.

Pools and boggy ground in the tip area described in Section 2.2.2 are likely to be a combination of surface water from rainfall and groundwater.

Nun Brook flows into Hogshaw Brook 500m south of the tip. Hogshaw Brook is a tributary of the River Wye which flows east through Buxton towards the River Derwent. Buxton is near the top of the Wye catchment. The flow in the River Wye has a large element of baseflow from Carboniferous limestones.

3.5 Rainfall

The annual average rainfall in the Buxton area including the site for the period 1981 to 2010 as shown on the map on the National River Flow Archive website (http://nrfa.ceh.ac.uk/) is between 1200mm and 1400mm per annum.

4.0 Conceptual Site Model and Risk Assessment

4.1 Introduction

Potential environmental liabilities and risks were evaluated in the Additional GI report in terms of a source - pathway - target relationship in accordance with the approach set out in the Environment Agency and DEFRA guidance document CLR11 'Model Procedures for the Management of Land Contamination' (reference 12).

A risk assessment was undertaken for the length of the proposed sidings, including the realignment of the existing sidings to the south, through the former Hogshaw Refuse Tip, as well as the northern extension into the agricultural field. Given the nature of the fill material encountered, however, the main focus is on the line of the cutting through the former tip where the bulk of the excavation earthworks will be undertaken.

4.2 Pollutant Linkages

A table of potential pollutant linkages was presented in the Outline Remediation Strategy and is reproduced as **Table 2** here. Potential linkages in the long term as well as those during the development phase are listed.

Remediation is proposed that will remove the pollutant linkages either by source removal or breaking of the pollutant pathway. Remediation proposals are for Option 3 for the tip materials combined with Option C for the natural materials as described in the Additional GI report.

Diagrammatic conceptual site models of pollutant pathways before and after remediation are shown on **Figure 5**.

Table 2 Source – Pathway – Receptor Relationships

Source	Pathway	Receptor
ACM and asbestos fibres in the tip material	• Release of fibres to atmosphere during excavation and exposure of soil to wind and sun, airborne dispersion and human inhalation	• Neighbouring residents • Recreational users of the surrounding area and new landform • Passengers on trains • Services personnel • Wild and domestic animals • Network Rail personnel post development • Construction workers and neighbours during construction
Hydrocarbons in fill materials	• Dermal contact • Inadvertent ingestion and inhalation	• Future recreational users of new landform • Construction workers • Network Rail personnel post development
Bulky and unsuitable objects in tip material	• Dermal contact and physical injury	• Future recreational users of new landform • Flora and fauna • Construction workers
Mobile organic contaminants in tip material including hydrocarbons and ammonia	• Infiltration and leaching by incident rainfall and lateral flow at clay interface	• Water quality in Nun Brook • Water quality in seepages • Groundwater quality in underlying aquifers
Hydrocarbons in made ground and underlying Bowland Shale mudstone beneath the proposed new footbridge foundations	• Infiltration and leaching by incident rainfall and lateral flow at clay interface • Migration in track drainage • Dermal contact • Inadvertent ingestion and inhalation • Construction materials	• Water quality in track drainage • Water quality in Nun Brook • Groundwater quality in underlying aquifers • Construction workers • Network Rail services personnel post development • Footbridge foundation materials
Ground gas from degradation of tip material (carbon dioxide and methane)	• Migration through higher permeability horizons and accumulation in places of low air circulation. Inhalation, asphyxiation, explosive risk if ignited	• Construction workers • Network Rail personnel post development • Network Rail property post development • Adjacent land users

4.3 Risk Mitigation

Remediation will mitigate risks to the identified receptors. The principles of mitigation for currently known contamination at the site are listed below.

Asbestos in the former tip

- Creation of an exclusion zone during the works
- Strict controls during earthworks to minimise generation of dust and airborne fibres
- Use of asbestos trained construction personnel
- Independent asbestos analyst to provide air quality monitoring and guidance on results
- Cover to prevent direct contact in the long term
- Cover for avoidance of generation of airborne fibres in the long term

Hydrocarbons and other contaminants in tip material

- Cover to prevent direct contact in the long term
- Cover to reduce infiltration and generation of leachate in the long term

Bulky and unsuitable objects in tip material

- Remove during transfer of materials from cutting

Mobile contaminants in tip material

- Low permeability cover in long term to reduce infiltration
- Interception of drainage on uphill side to reduce flow through tip material

Hydrocarbons in former railway land

- Remediate contaminated soil to reduce concentrations then reuse
- Cover with railway construction to prevent direct contact in the long term
- Provide interceptor for track drainage and wetland area to reduce risks to Nun Brook
- Use suitable construction methods for bridge foundations

Ground gas

- Provide gas venting measures

The proposed mitigation will reduce the risks that currently arise from materials in the poorly restored former tip and from contaminants below the former railway land. The methods of completing mitigation are presented in Sections 5 to 10.

5.0 Remediation Implementation in the Agricultural Fields

5.1 Access and Compound

No contamination has been detected in the agricultural field therefore proposals relate to avoidance of adverse impact during the construction phase. Construction of the access and compound will be at the start of the project in spring 2018 before any earthworks for the sidings begin.

In order to minimise the impact of construction traffic and plant an access road will be constructed from the A6 to a compound to be set up close to the railway beyond the northern end of the extension in the agricultural field. The line of the access route, which is approximately along the line of the existing public footpath is indicated on the 'Red Line' drawing in **Appendix 1**.

A single haul road will run from the compound southwards parallel to the railway on the east side of the proposed sidings. A subsidiary compound for use by the licensed asbestos contractor will be set up at the southern end of the haul road. The general layout is shown on the 'Red Line' drawing.

Natural topsoil will be stripped along the line of the access road, the haul road and in the compounds. Bound asphalt surfacing will be laid on the access road and main compound car park. In areas of equipment and plant storage and along the internal haul road unbound hard surfacing will be provided. Further information on the licensed asbestos contractors compound is given in Section 6.3.1.

Topsoil will be retained in stockpiles no more than 2m high in a dedicated area that will not be disturbed during the works, for use in reinstatement at the end of the project.

5.2 The Cutting

There are no proposals for remediation in respect of contamination in the cutting as no known contamination is present. The cutting will be excavated in a way that will enable soils to be reused as uncontaminated cover in the former tip area and as cover for the sides of the cutting, thus making optimum use of available materials. The depth of the cutting is mostly less than 2m but will increase to over 3m along a short length at the northern end.

5.2.1 Topsoil and Subsoil

Topsoil and subsoil will be removed from the line of the cutting and placed in separate stockpiles in a dedicated area where there will be no disturbance until they can be placed on the side slopes of the cutting. Topsoil stockpiles will be no more than 2m high to protect the soil condition. Any topsoil and subsoil not required for the cutting slopes in the field will be stockpiled near the southern end of the field and retained for use as cover to tip material in the area to the south. The estimated volume of topsoil/subsoil to be stripped is 2500m^3.

5.2.2 Clay and Weathered Mudstone

The cutting excavation will continue below the subsoil into clay and weathered mudstone to the depth required to achieve the final track level. Soft soils to a maximum depth of around 2m are present at the level of excavation along much of the line of the cutting. In these areas if the soils do not meet the geotechnical requirement additional excavation will take place as directed by the geotechnical engineer. Either imported material will be used to replace the soft soil or the soft material will be treated by lime stabilisation to achieve a suitable strength before being placed back in the base of the cutting.

The expected volume of clay and mudstone generated by the cutting in the field is 6,000m^3 which will be available for use as tip material cover. Provisional earthworks volumes were provided by Arup in September 2015 and a summary is attached in **Appendix 2**. The excavated clay and weathered mudstone will be stockpiled near the southern end of the field as shown schematically on **Figure 6**.

The cutting side slopes will be formed at a gradient of 1 in 3. After formation and when no further tracking by heavy vehicles will occur the slopes will be covered with a 150mm thickness of the stockpiled locally derived subsoil and topsoil.

5.2.3 Embankment

Along approximately 20m of the sidings the ground level will be raised by a maximum of 0.5m. Here topsoil, subsoil and the underlying soft clay will be excavated to a depth where suitable ground conditions are found and the level raised using imported or treated locally derived material. Excavated topsoil, subsoil and clay will be placed in stockpiles with other similar soils from the field ready for subsequent placement on the sides of the cutting or on the tip materials.

5.3 Drainage

There are numerous seepages in the agricultural field and water is standing close to ground level through much of the year. Water enters the area from the west uphill side across the existing railway track. It has been interpreted that the seepages have caused landslipping in the field and softening of clays. Interception and diversion of the land drainage is designed into the works to reduce the potential for inflow to excavations, to potentially achieve some reduction in moisture content of soft soils and to reduce risks of future ground instability.

At the start of the project in spring 2018 land drainage and seepages will be intercepted on the west side of the sidings. The drainage is divided into surface drainage and land drainage. Water will be diverted as shown on the Drainage General Arrangement drawing in **Appendix 1**. The drawing shows the lobate slopes which are believed to be landslipped material.

A surface water drain will be constructed to the east of the lobate features at the top of the cutting and will intercept run off and water issuing from the spring lines shown. The construction details of the drain are shown as Crest Drain through Henshaw's Field Detail 2 on the Earthworks General Arrangement drawing in **Appendix 1**. It features a gravel filled trench at least 1.2m deep containing a pipe below which is an impermeable membrane wrapped round the base of the trench. The drain will fall to the south.

Water designated land drainage that is present at the clay mudstone interface will be intercepted in the base of the cutting on the western side of the track. The construction details of the drain are similar to the field drain, but without the impermeable liner in the base, as shown on Field Drainage Pipe Detail P3. The drain will fall to the south and will combine with surface water drainage to flow at right angles to the east down the southern side of the field and discharge via a new short ditch into Nun Brook.

Early interception of surface water will reduce the volume of water entering the earthworks area and the consequent risk of discharge of suspended solids or contaminants such as oils to Nun Brook during earthworks.

6.0 Remediation Implementation in the Former Hogshaw Tip Area

6.1 Outline of Works

The works will proceed from the northern end using access along the haul road from the main compound. The proposed cutting through the former tip will be 3m to 4m deep and approximately 30m wide. An area to the east within the Red Line Boundary will be used to place the excavated tip material in a flat surfaced landform suitable for use as a recreation area by the public in the context of the local planning designation of residential development.

The general layout of the working area is shown on **Figure 6**. The general sequence of working is shown in **Table 3**.

Earthworks that expose or penetrate the tip materials will be carried out by a licensed asbestos contractor experienced in dealing with asbestos in soils.

Works will be carried out in approximately 50m lengths of the cutting which will be sequentially handed back from the licensed asbestos contractor to BGCL when the new ground surface has been formed and covered with a no dig separator membrane.

6.2 Early Stage Works

Limited devegetation was carried out by BGCL before the start of the nesting season in March 2018. Trees, bushes, shrubs and soft vegetation on the former tip within the Red Line Boundary were cut to stump level. Care was taken not to strip vegetation to ground level or to pull up roots, as this would disturb potentially asbestos containing soils possibly resulting in fibre release.

In July 2018, after the haul road has been constructed, work in the tip area will start. BGCL will construct the surface water drain along the railway boundary to intercept water that flows down the slope from the west and that has been forming a pool in the north west corner of the former tip. The line of the drain is shown on the Drainage General Arrangement drawing in **Appendix 1** and the construction details are the same as the surface water drain in the agricultural field.

The drain will fall to the north to join the surface water drain from the field. Construction of the drain at the early stage will reduce the volume of water entering the tipped materials thus will reduce the production of leachate which flows towards Nun Brook. Interception will also reduce the volume of water that would flow into the cutting during construction with potential for the need for pumping contaminated water.

6.3 Soil Movement

6.3.1 Preparation

Before the start of soil movement, BGCL will appoint a licensed asbestos contractor who will provide Risk Assessments and Method Statements for the proposed works. Advice will be taken from the licensed contractor on whether HSE notification is required in accordance with CAR (2012) (reference 13) and the contractor will handle any such notifications or applications for licensing.

An independent asbestos analyst will be appointed to carry out air monitoring. Before the start of ground disturbance, air monitoring on the site boundaries within the tip will be carried out to provide baseline information. Baseline monitoring will start three months before the start of work in the tip. The monitoring method and timetable will be as advised by the independent analyst.

Table 3 Sequence of Working in the Former Tip

	Activity	Who	Comment
1	Devegetation to stump level	BGCL	To discourage potential nesting birds. No soil disturbance to avoid exposure of asbestos
2	Construct surface water interception drains along railway boundary	BGCL	Early interception to reduce flow of water through tip material and into the future cutting
3	Appointed licensed asbestos contractor notifies HSE of proposed notifiable non-licensable asbestos in soils work (NNLW) and potential for licensed work, if considered necessary	Asbestos contractor	As required under Control of Asbestos Regulations 2012 (CAR 2012)
4	Licensed contractor and BGCL will designate first working area and arrange exclusion of all non trained personnel	BGCL and asbestos contractor	For safety of non specialist workforce
5	Licensed contractor will set up Heras fencing, decontamination unit, stockpile areas and method of importing cover soils	Asbestos contractor	For safety of specialist workforce and efficient working to avoid cross contamination of soils
6	Devegetation and topsoil removal within designated area. Place in stockpiles and test for asbestos fibres	Asbestos contractor and BGCL geo-environmental specialist	Topsoil to be retained for future use in cover
7	Removal of any clay cover within designated area. Place in stockpiles	Asbestos contractor	Clay cover to be retained for future in cover
8	Excavation of tip material from cutting and placement in new landform to east. Removal of any bulky items or items containing voids and placement in quarantine area.	Asbestos contractor	Reuse of materials. Avoidance of risk of damage to new landform surface from collapse of voids or exceptionally hard spots
9	Note any mass burial of fibrous asbestos material and suspend works if HSE notifiable conditions arise	Asbestos contractor	To avoid spread of large volumes of fibrous asbestos
10	Lightly compact tip material at new location. Lightly compact sides of cutting at new profile level	Asbestos contractor	To achieve the design profile with low risk of future significant differential settlement
11	Excavate natural clay to track formation level or deeper if too soft. Stockpile in uncontaminated area.	Asbestos contractor	Clay and mudstone to be retained for use as cover soils
12	Place demarcation membrane over tip material	Asbestos contractor	To prevent future disturbance
13	Place gas vents, rabbit mesh, 350mm clay and 150mm topsoil/subsoil cover over tip materials	BGCL	To provide long term protection to people, flora and fauna that will use the landform and adjacent land

At the start of the works BGCL and the licensed asbestos contractor will set up the asbestos site compound to be managed by the licensed contractor at the northern boundary of the former tip. It will contain welfare facilities for people working with asbestos contaminated soils and a decontamination unit will be sited at the entry and exit point to the former tip. The analyst's laboratory will be within the compound. PPE will be stored at the compound and will issued to workers before they enter the working area. Within the compound there will be areas for equipment storage.

BGCL and the licensed contractor will set up the designated working area extending approximately 100m along the sidings and to the Red Line boundary on either side. The boundary of the working area will be secured with Heras fencing to form an exclusion zone.

A quarantine area will be provided for holding any materials that may need to be taken off site for disposal. The area will be on low permeability hardstanding or on an HDPE membrane and a bund will be placed round the sides of the area to intercept any runoff. Any water collecting in the quarantine area will be directed to a sump and removed to a holding tank.

Areas will also be designated for holding the various different soil types while they are awaiting reuse as cover materials. The areas are shown on **Figure 6**. Additional areas may be added as the works progress if there are delays due to weather conditions or unexpected ground conditions.

The designated working area will move progressively south as the northern part of the cutting is completed, probably in 50m stages, so that construction of the railway track can be progressed.

Use of the public footpath adjacent to the southern boundary of the tip will be suspended in consultation with the local authority. The current informal public access to the tip will also be suspended.

6.3.2 Excavation and Soil Movement in the Tip Area

All vegetation, topsoil and cover material will be removed from the line of the cutting, the area between the cutting and the railway to the west and the working area to the east of the cutting within the Red Line Boundary. The materials will be placed in separate stockpiles for each soil type in a designated soil storage area on the former tip as shown on **Figure 6**. The mound of topsoil and subsoil at trial pit location TP113a, the materials in the sides of the former tip access track and any other areas of thicker subsoil and topsoil will be excavated and stockpiled. Any soils forming a clay cover will also be excavated and stockpiled.

Samples of the stripped soils will be taken for testing for the presence of asbestos and other contaminants and compared with the site criteria in **Appendix 3**. Further detail of soil testing is given in Section 8.

Any protruding bulky or unsuitable objects will be removed from the exposed tip surface and the in situ tip material will be lightly compacted.

The cutting will be excavated along the line of the sidings. Any bulky objects or objects containing visible voids will be removed from the tip material for off site disposal as described in Section 6.5.

Excavated tip material will be placed directly into the new landform on the former tip to the east of the cutting. The location and shape of the landform is shown on the Landform General Arrangement drawing in **Appendix 1**. The surface will be generally flat with a 1 in 100 gradient towards the east to allow surface drainage. On the west side of the cutting the surface of the tip material will be trimmed to form a more regular shape. Slopes in tip material on the cutting sides and the west, north and south sides of the landform will be at a maximum gradient of 1 in 3 to achieve geotechnical stability. On the east side a slightly steeper 1 in 2 slope may be integrated with the gas venting design.

Placed tip material will be lightly compacted as it is placed, to avoid risks of voids or extensive soft spots in the material giving rise to an uneven surface in the future. Exposed tip material in the cutting sides will be lightly compacted to provide a stable surface for railway use and for placement of cover soil.

Any soft clay below the base of the tip material will be excavated to a level where the soil meets the design geotechnical standard. Either imported material will be used to replace the soft soil or the soft soil will be treated, for example by lime stabilisation, to achieve a suitable strength before being placed back in the base of the cutting ready for construction of the railway track.

The volume calculation attached in **Appendix 2** shows 14,000m^3 of tip material and 4,600m^3 of natural soil will be excavated. The estimated volume of topsoil/subsoil from the tip is 2100m^3.

The tip materials exposed between the cutting and the railway, along the cutting slopes and in the landform will be covered with a brightly coloured demarcation geotextile to indicate a level below which contaminated material is present as shown on the Earthworks General Arrangement drawing Detail 4 in **Appendix 1**. When the separator has been laid the licensed asbestos contractor will hand the area back to BGCL who will complete the cover layers.

6.3.3 Placement of Cover Soils

Detail on the Earthworks General Arrangement drawing in **Appendix 1** shows the design of the cover to the tip materials.

Tip materials will be covered with clay or highly weathered mudstone from the cutting in the agricultural field or from below the tip materials excavation with a minimum thickness of 350mm. The clay will form a low permeability cover. Two laboratory results for residual clay from the field have given permeabilities of 1 x 10 $^{-10}$ m/s and 6 x 10 $^{-10}$ m/s. The weathered mudstone and clay in the stockpiles will be inspected by a geo-environmental or geotechnical engineer and approved as suitable before use in the cover layer.

Clays which are too soft to be handled or tracked over will be lime stabilized in the field adjacent to the northern side of the former tip, or other uncontaminated area, and transported onto the tip by conveyor belt or other method that precludes the need for tracking across the former tip boundary.

Clay will be placed in one or two layers to achieve the minimum 350mm thickness and lightly compacted. The geo-environmental or geotechnical engineer will inspect the placed material and ensure that it meets the design requirements.

Stockpiled subsoil and topsoil from the field and from the tip will be placed over the clay to provide a final cover thickness between 500mm and 600mm.

Any clay, subsoil or topsoil to be placed in the upper 500mm will only be acceptable for use if it has been tested and meets the site acceptance criteria in **Appendix 3**.

Rabbit mesh will be placed over the cover soils as additional protection on both sides of the cutting to prevent burrowing thus disturbance of the profile.

Gas venting will be installed at the crest of the slope on the east side of the cutting and along the eastern boundary of the landform as described in Section 6.7.

A drainage channel will be provided along the top of the slope along the eastern boundary of the landform. The channel will comprise a downwarp in both the base and the top of cover soils such that a depression is formed without loss of cover thickness. Protection will be provided over the cover soil to prevent erosion of the clay. The dimensions will be determined from run-off calculations. The drain will fall to the south. A channel will be provided for flow from the drain to the seepage collection point on the southern side of the tip and subsequent discharge through existing wetland to Nun Brook.

Planting on the landform will be in accordance with a scheme to be agreed with High Peak Borough Council. Planting on the cutting sides and the area to the west of the cutting will be in accordance with the ecologist's and Network Rail's recommendations. Planting will exclude trees, large shrubs or other vegetation with deep roots as the demarcation geotextile will inhibit their development.

6.4 Management of Asbestos in the Tip Materials

6.4.1 Known Materials

Tip materials include a wide range of waste from industrial and domestic sources. Industrial materials include numerous off-cuts and reject asbestos-containing brake shoe liners. Asbestos cement sheeting, asbestos containing gaskets and other asbestos containing materials (ACM) were also found in the former tip during ground investigations.

6.4.2 Bulk Excavation

Precautions to be taken to manage asbestos contamination are central to the method of working. All works in the tip will be under the full time supervision of a licensed asbestos contractor and a geo-environmental specialist.

There will be continuous damping down of arisings and exposed tip material by fine mist spray to avoid generation of dust. Air quality monitoring by an independent analyst will be carried out including continual on-site monitoring around the area of current operation, personal monitoring of selected operatives and perimeter monitoring. Monitors will be checked daily or as advised by the specialist. Full details will be provided in the Network Rail Code of Construction Practice Part 2 and the licensed contractor's risk assessments and method statements.

All asbestos monitoring results will be forwarded to the Local Authority Environmental Health Officer within 48 hours of receipt.

The results of asbestos fibre monitoring will be compared with the 'control limit' of 0.1 fibres/cm^3. An assessment made if the limit is exceeded and the local authority informed.

ACM will be moved during bulk excavation and transfer of materials to new locations. No attempt will be made to separate ACM from other tip materials. The materials will be transferred directly into dumpers and moved to the former tip area to the east of the cutting to construct the landform with minimum handling. Once placed the tip materials will be kept damp and contoured to fill low areas and lightly compacted to form the smooth design profile at the final destination. Tip materials will be covered at the earliest opportunity within the earthworks programme to break the potential pathway through airborne dust to workers and neighbouring areas. Sequential hand over from the licensed contractor to BGCL will aid the timely placement of cover.

6.4.3 Fibrous Asbestos

If any large volumes of fibrous asbestos, such as lagging, are found during excavation, works will cease whilst the HSE is notified and a licence obtained to move the material. Works will then proceed with additional precautions in place as required by the HSE licence.

If the fibrous material is scattered it will be moved with other tip material to the landform. If large volumes are found the material will be removed from site to a licensed disposal facility. The volume would be considered large if it were more than 1 m^3 and containing more than 20% fibrous ACM by volume.

The licensed contractor's method statement will describe the method of removal which will make use of sealed containers to be stored in a separate designated area before removal from site to a licensed disposal facility.

6.5 Bulky and Unsuitable Items in the Tip Materials

It is known from ground investigations that there are items in the tip materials that are bulky and could form hard spots and protuberances from the tip surface. There are also items that contain voids and could subsequently cause instability at the surface due to collapse and items that are unsuitable to remain in the environment, such as car batteries.

During excavation any encountered unsuitable bulky items such as tyres, tree stumps, vehicles, car batteries and household appliances will be removed from the bulk of the tip materials and placed in a temporary stockpile in the quarantine area for classification assessment or testing for waste disposal or recycling purposes. Items will be deemed bulky if the intermediate dimension is more than 500mm.

Removal of items will include any protruding from the cutting face that might prevent formation of a surface smooth enough for placement of the separator geotextile.

The unsuitable material will be placed in separate stockpiles for metals, organic material, tyres, batteries and other identifiable recyclable or treatable material. Materials suitable for testing will be analysed for asbestos. Materials potentially suitable for recycling will be washed down to remove soils potentially containing asbestos fibres. Wash waster will be collected and subsequently discharged into the landform before the cover is placed. Materials will be classified for waste type and sent off site to a licensed disposal or recycling facility. Some materials are likely to be classified as hazardous waste.

6.6 Hydrocarbons and Wastes in the Tip Materials

No remediation of tip materials containing hydrocarbons or other chemicals is proposed other than those stated in Section 6.5. This proposal will not change unless hazardous materials are encountered that had not been predicted. Examples of these are unexploded ordnance, radioactive materials, animal burial waste or large volumes of sludge or liquids.

6.7 Ground Gas

Ground gas was monitored from July 2015 to July 2016 and the results presented and interpreted in the November 2017 report. A gas risk assessment is provided in the following document:

- Buckingham Group Contracting Limited Buxton Sidings Extension Scheme 'Ground Gas Risk Assessment' Technical Note PF1/F15005/6.1/MIC, dated May 2018

It was concluded that some gas venting was necessary to prevent build up of pressure below the new low permeability cover. The proposed measures are a line of gas vents along the crest of the cutting on the east side and a gas venting zone on the eastern slope of the landform. Because of the very low gas flows, however, the vent pipes in the cutting slope proposed in the June 2016 Outline Remediation Strategy are not now considered necessary.

6.7.1 Vents Adjacent to the Cutting

Vertical gas collection pipes will be installed at 20m intervals along the crest within the Network Rail land as shown on Detail 3 and Detail 5 of the Earthworks General Arrangement drawing and **Figure 7**. They will comprise 90mm diameter slotted HDPE geotextile wrapped riser pipes from the base of the tip material to the surface of the tip material with plain pipe from the top of the slotted pipe through the cover layers. At the location of each riser pipe there will be a low level static vent. The venting system will be installed after placement of cover.

A cable percussion, auger or sonic drilling rig will form 200mm diameter boreholes into which the riser pipes will be placed. Fine gravel will be placed in the annulus between the pipe and the tip material. Bentonite will be used to form a seal through the cover materials. During drilling, a low permeability membrane will be placed adjacent to the borehole for temporary placement of contaminated arisings. Contaminated material from the boreholes will be added to the tip material in the landform or will be disposed of off site to a licensed facility.

Members of the drilling crew will hold asbestos awareness qualifications and will be required to use PPE appropriate to working in asbestos contaminated soils. The drilling contractor will be required to produce a risk assessment and method statement for the conditions on site, to be assessed and approved by BGCL, and to work in accordance with the method statement. The method will include use of sprays to dampen tip materials arising during drilling. BGCL will provide precautionary air monitoring.

6.7.2 Venting on Eastern Side of Landform

On the eastern side of the landform placed tip materials will form a 1 in 1 slope of height approximately 2m. Gas venting will be through stone placed on the face to an external slope of 1 in 2.

A demarcation geotextile will be placed over the tip materials along the slope as a warning that contaminated materials are present below the geotextile. Single size angular stone providing a pore space of at least 30% will be laid over the geotextile. The horizontal thickness of stone will be a minimum of 500mm.

There will be no planting on the surface of the venting zone.

7.0 Remediation Implementation in the Former Railway Land and Footbridge

7.1 Construction in the Former Railway Land

The new footbridge over the sidings will be close to the boundary of the former Hogshaw Refuse Tip and the former railway land. The new layout of the sidings crosses land that was formerly occupied by railways and an engine shed.

The ground conditions are known at locations investigated in 1999/2000 and 2010 as described in Section 3.2.2. Brick and concrete obstructions were found at boreholes BH7 and BH7A (2000) and at trial pit TP91 (1999). Most of the ground is granular material and is suitable for re-use.

Major excavation along the line of the new sidings is not proposed. Excavation into made ground for track drainage will be to a depth of almost 2m below current ground level. The Drainage General Arrangement (GA) drawing in **Appendix 1** shows the drain design. The design includes a gravel filled trench with a perforated pipe in the base.

The drain will fall towards the north where it will join track drainage from the more northerly parts of the sidings extension at the southern end of the former tip as shown on the Drainage GA drawing. The drain will then turn east and continue along the edge of the former tip to discharge into Nun Brook.

There is potential for excavations to intercept contaminated materials to the base of made ground and continuing to 2m below ground level (bgl) in underlying fissured mudstone. Excavations for footbridge foundations also have potential to intercept hydrocarbon contaminated made ground.

Remedial work will be completed to reduce the risk from any hydrocarbons encountered in the existing sidings and former railway land as described in Section 7.2.

7.2 Hydrocarbon Remediation

7.2.1 Preparation

The areas where hydrocarbons have been detected are shown on **Figure 8**. A quarantine and treatment area will be set up for hydrocarbon contaminated soils on the former railway land. The area will be on low permeability hardstanding or on an HDPE membrane and a bund will be placed round the sides of the area to intercept any runoff. Any water collecting in the quarantine area will be directed to a sump and removed to a holding tank.

Before the start of excavation of the drain trenches, investigation points at 20m intervals along the line of eastern trench will be used to find the extent hydrocarbon contamination.

7.2.2 Soils in Drain Excavations

Hydrocarbon contaminated soil and weathered mudstone that may be intercepted in drain excavations close to the locations of trial pits TP90 and TP97, as identified during the preliminary investigation and by visual or olfactory means, will be removed and placed in windrows in the treatment area. The extent of the excavation will terminate when material meeting the specified hydrocarbon criteria is present in the walls of the void or when the void extends to the limit of the proposed permanent Network Rail land. The base of the void will terminate at low permeability mudstone strata or 2m bgl whichever is the shallower.

Hydrocarbon contaminated soil in windrows will be treated by ex-situ bioremediation. If the programme does not allow time for treatment of hydrocarbons, the soils will be tested and held in quarantine until the results are available and then disposed to a licensed facility.

Initially the method of bioremediation will involve introducing oxygen into the materials to promote development of native hydrocarbon degrading microbes by turning the windrows. Turning will take place every two weeks or more frequently for a month, then soils will be analysed.

Further treatment including addition of nutrients may be used if the results of analysis show that introduction of oxygen alone does not result in satisfactory progress. Products will be introduced into the windrows which will be turned weekly. Samples will be taken for analysis after a further month. The process will continue until satisfactory results are achieved or until it is concluded that progress has halted and a different method is required. The maximum proposed treatment period is three months. At this stage off-site disposal to a licensed treatment facility or a landfill may be considered, depending on the general progress of the project and the need to finish the earthworks stage.

Treatment will take place in accordance with deployment of the Buckingham Group Contracting Limited Environmental Permit for Mobile Plant. Details of the method will be submitted with the deployment notice for the Environmental Permit.

Targets for hydrocarbons in the existing and former railway land will be the same as those for cover soils in the former tip area listed in **Table 3.1**. Hydrocarbon targets related to protection of controlled waters are listed in **Table 3.2** in **Appendix 3**. Soil samples will be taken and tested for the range of hydrocarbons present (TPHCWG) and groundwater data will be obtained down hydraulic gradient of the proposed sidings. This baseline data will be used in decisions on rational targets for groundwater quality which may be higher than the **Appendix 3** targets. Target values for groundwater are discussed further in Section 9.0.

7.2.3 Soils at Bridge Foundations

Hydrocarbon contamination may be present at the location of footbridge foundations. Bridge foundations will be concrete pads on the downhill side and piles on the uphill side. Exploration at the location of the foundations will be carried out before the start of construction in consultation with the geotechnical engineer. If contamination by hydrocarbons above the **Table 3.2** limits is found at the level of excavation for pad foundations, soil to will be removed for treatment. If concentrations of hydrocarbons do not present a risk to water but present a risk to concrete, precautions will be taken to protect the concrete for example by placing a low permeability barrier between the ground and the concrete.

The piled foundations on the uphill side of the footbridge will be in land adjacent to the current railway that was on the boundary of the sidings and was not within the former tip. The closest investigation point is trial pit TP105 in which topsoil was recorded overlying natural clay with no indications of contamination. It is unlikely that hydrocarbon contaminated material is present and no special precautions will be taken. If evidence arises during the works that indicates the presence of hydrocarbons a risk assessment will be carried out.

7.2.4 Reuse of Soils

Soils will arise from drainage and foundation excavations, including treated soils. Some of the materials will be ballast which will be sent to the Network Rail ballast recycling centre. Any natural soils or ashy made ground that meet the SAC and geotechnical requirements will be reused in the works as general fill. They may be used in formation of the landform if cover is needed additional to that provided by the clay and mudstone from the agricultural field and from below the former tip.

The volume of soils arising from this source is likely to be less than 500m^3.

7.3 Hydrocarbons in Track Drainage

Identified hydrocarbon contamination will have been removed along the line of track drainage but nevertheless there is potential for small volumes of hydrocarbon not intercepted during the works to enter track drainage. In addition there is a risk of hydrocarbons flowing with groundwater in the drainage trench granular bedding. There is also a risk of hydrocarbon leakage from engines in the future although this risk is significantly reduced with modern freight trains.

To reduce risks to the environment from free phase hydrocarbons in track drainage an oil separator/ interceptor will be fitted in the drainage line as shown on the Drainage GA drawing. Track drainage from the north will also pass through the interceptor. The separator tank will be fitted with a high level oil alarm so that if a significant volume of oil accumulates the tank can be emptied before oil passes into the drain downstream. The interceptor will be on Network Rail land and will be the responsibility of Network Rail.

The interceptor will discharge to a pipe carrying drainage eastwards towards Nun Brook. The pipe may pass through tip material and thus there may be some mobilisation of tip leachate and migration along the pipe bedding.

The existing wetland area adjacent to Nun Brook will be retained as a means of improving drainage and leachate water quality by increasing the oxygen content thus promoting natural degradation of hydrocarbons. Track drainage, currently uncontrolled leachate seepage and runoff from the landform drainage channel will be directed through the wetland area. Sufficient area has been included on the Red Line drawing in **Appendix 1** for provision of the treatment area.

On completion of construction the land on which the wetland is located will be managed by the current land owner which is High Peak Borough Council. Wetland areas are low maintenance installations. As the concentrations of any contaminants are expected to decrease with time the need for treatment will also decrease and the value of supporting wetland flora and fauna may predominate over the value for treatment.

8.0 Chemical Quality of Soils

8.1 Soil Assessment Criteria

There will be no site assessment criteria (SAC) for the following areas where there will be no pathway to people or animals:

- materials within the former tip and in the landform that will be below the demarcation geotextile at 0.5m or more below ground surface
- soils that will be below track ballast or other imported aggregate or hard standing

There will be no SAC for the following area where only naturally occurring soils are present:

- soils in the agricultural field that will remain in the field

There will be a direct pathway, however, between surface soils and receptors, including railway workers, recreational users of open space, domestic animals, flora and wild fauna. In addition there will be an indirect pathway through generation of dust to nearby residents, gardens, passengers on trains and agricultural land.

Surface soils above the geotextile in the upper 0.5m, or 0.6m if present, will be required to meet the SAC. On the land retained by Network Rail the standard will generally be for industrial land use and in the tip area the standard will generally be for public open space (parks). The criteria are listed in **Appendix 3**, **Table 3.1**. The criteria differ from those in the Outline Remediation Strategy as regulatory guidance has changed. The preferred basis for SAC is now, in order of preference:

- Suitable for Use Levels (S4UL) - use the CLEA UK methodology - accepted by DEFRA and Environment Agency (reference 14)
- Category 4 screening levels (C4SL) – accepted by DEFRA and Environment Agency (reference 15)
- John Moore's University publication values - where S4ULs are high and would be detrimental to plant growth (reference 16)
- Values chosen from a more sensitive land use or from experience for avoidance of gross pollution where S4UL or other values might allow use of soils with odour or visual appearance that would be unacceptable or that would indicate that free phase organic compounds are present

Soils moved from the field to be used as tip cover will not be deemed unsuitable for use due to natural occurrences of contaminants above the SAC unless the risk relates directly to human health.

Leachability criteria are listed in **Appendix 3 Table 3.2** in order that any imported cover soils can be assessed and action taken to ensure they do not introduce additional concerns on groundwater or surface water quality or impact on wild flora and fauna. As soils currently on site are in situ natural material or alternatively have been brought onto the tip but have been part of the tip ecosystem for many years, it is proposed that they should not be deemed unsuitable due to leachability exceeding the criteria. This includes the reported content of water soluble sulphate in natural clays up to 1000 mg/l, probably resulting from the weathering of pyrite.

8.2 Testing of Cover Soils

A schedule of contaminant testing will apply to the cover soils. The frequency and test suite will be greater for soils retrieved from the tip area than for soils transferred from the agricultural field. Whenever possible, soils will be tested before treatment and placement. If any cover soils are imported, for example for any special areas of planting, information will be obtained before the soils are imported.

The frequency of testing and the resulting area covered, assuming 500mm of cover soils, are shown in **Table 4**.

Table 4 Soil Testing Frequency

Source	Frequency*	Equivalent Area, m^2
Natural soil from field	1 per 1000 m^3	2000
Natural soil below tip	1 per 250 m^3	500
Tip cover and mounds	1 per 100 m^3	200
Imported soil cover	1 per 250 m^3 for first 2000m^3 , then 1 per 1000m^3 if from same source	500 2000

* Minimum of 3 per soil type

The contaminant analytical suite will be:

- Arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc
- Total petroleum hydrocarbons Criteria Working Group split (TPH CWG)
- Benzene, toluene, ethylbenzene, xylenes (BTEX)
- Poly aromatic hydrocarbons (PAH) US EPA 16 speciated
- pH

In addition, soils from the tip will be tested for:

- Asbestos screen, quantified if asbestos detected
- Chromium (hexavalent)

Imported soils may be tested for the following additional contaminants, depending on the geo-environmental specialist's advice on whether the soil has potential to be contaminated:

- Water soluble sulphate
- Volatile organic compounds (VOC)
- Polychlorinated biphenyls (PCB)
- Cyanide

The results of testing will be reviewed and recommendations made on the soil's suitability for use by the geo-environmental specialist.

8.3 Sampling and Testing Procedures

Soil samples will be taken by a qualified environmental specialist. Samples will be taken either directly into glass jars or vials or using a stainless steel trowel which will be cleaned between sampling points. The samples will be placed in a cool box with ice packs and when returned to the site compound will be kept in a refrigerator until one hour before collection for transport to the laboratory. Samples will be transported to the laboratory in a cool box with ice packs to maintain a temperature between 4°C and 8°C, normally on the same day as sampling.

The project laboratory is:

Envirolab Limited
Unit 7-8 Sandpits Business Park
Mottram Road, Hyde, Cheshire
SK14 3AR

Envirolab is accredited by UKAS for ISO17025 and MCERTS standards for most analytical tests. Chain of custody forms will be used and kept on file or alternatively automatic electronic chain of custody will be in place. Analytical results will be available in pdf and Excel formats and other formats if required. Results will be made available on site for inspection.

On site testing is not currently proposed. If odorous soils other than tip materials are found, however, vapour monitoring may be carried out during the works, using a photo-ionisation detector (PID).

The results of analysis will be assessed by the geo-environmental specialist immediately on receipt and, where any soils do not meet the SAC, advice will be given on whether further detailed risk assessment should be carried out or whether the soils should be used at a less sensitive location, such as below the geotextile. Where analyses for determinands additional to those in **Tables 3.1** and **3.2** are carried out, the results will be assessed against standard regulatory guidance (for example reference 17) and used in a detailed quantitative risk assessment if needed.

8.4 Validation

Where any soils do not meet the SAC, samples of surrounding soils will be taken to ensure that the lateral and vertical extent of soil failing the criteria are known.

After excavation of soil not meeting the site criteria either in a stockpile or an in-situ void, the surveyor will set out points that will meet the required sampling frequency for validation including points where sample results are already available. The minimum required sampling frequency is 1 sample per 10m by 10m square in the base and 1 sample per 10m length of the sides of the void. An additional sample will be taken per metre depth if the void is more than 1m deep. The geo-environmental specialist will direct the sampling.

Samples will be analysed for the determinand that did not meet the site criterion. If the validation sample does not meet the criterion further separation of the unacceptable soil and further validation testing will be carried out.

8.5 Imported Materials and Disused Materials

Construction materials including materials for formation level, ballast and track will be brought onto the site and materials at the end of their useful life including contaminated ballast, sub-base formation materials, lines and sleepers will be removed. The imported material will be freshly quarried or manufactured material that has been tested at source. No further contamination testing is proposed.

Disused materials taken off site will be handled in accordance with the Duty of Care and will be taken to recycling centres, such as that run by Network Rail for ballast cleaning, or if necessary to a disposal site by a licensed contractor. An area will be provided in the former railway land for storage of materials in segregated areas depending on material type and proposed destination before removal from site, as shown on **Figure 6**. If testing is needed before off-site disposal, materials will remain in the storage area until results are known and have been interpreted.

9.0 Controlled Water

9.1 Approach to Remediation

The main risks to controlled water are related to discharge of surface water or shallow seepages from made ground to Nun Brook. It will not be possible to separate the impacts on Nun Brook from the ground that is within Network Rail land, ground that is temporarily in Network Rail control and contaminated land that is outside the working area throughout.

The aim of remediation is betterment of geo-environmental conditions within the area of the works which will result in consequential improvements in conditions outside the area. The approach is in general accordance with Environment Agency guidance (reference 22).

9.2 Remedial Targets

The over-riding remedial target for groundwater will be absence of free phase hydrocarbons. The concentration of ammoniacal nitrogen will also be used as an indicator of groundwater quality.

Groundwater targets for the site are listed in **Table 3.2** in **Appendix 3**. The criteria differ from those in the Outline Remediation Strategy as regulatory guidance has changed. The preferred basis for the targets is now, in order of preference:

- Environmental quality standards (EQS) from the Water Framework Directive 2015 (reference 18)
- UK Drinking Water Standards (reference 19)
- Petroleum Hydrocarbons in Groundwater, CL:AIRE 2017, which uses WHO drinking water standards (references 20 and 21)

The targets in the above guidance documents are for protection of aquatic life in high quality surface water suitable for drinking water supply and may not be achievable in the local environment. The **Table 3.2** criteria will be used for comparison rather than as rigid targets.

Baseline concentrations of contaminants in surface and shallow groundwater have been recorded during 12 months of monitoring in 2015 to 2016. Monitoring will be carried out in the periods before, during and after site work and trends in contamination will be noted. Improvements achieved through remediation will be assessed. If there is any deterioration in groundwater or surface water quality, remedial action will be taken.

The schedule of proposed water monitoring is presented in Section 11.

9.3 Groundwater Remediation

Currently there are no proposals for groundwater remediation. During preliminary investigations in the existing sidings area and during excavation in the former tip, if free phase hydrocarbon is observed on groundwater remedial action will be taken.

The method of remediation will depend on the extent of contamination as follows:

- If contamination is a sheen or a layer too thin to be measured with an interface meter, booms and absorbent mats will be used in open excavations until no further reduction in free phase can be made and only a fragmented sheen is present. The likely duration is one to two months.
- If contamination is a measureable layer on the surface of the groundwater, skimming by pumping may be employed until no further progress can be made, after which booms and absorbent mats will be used. The likely duration is two to three months.

After skimming has ceased the location will be monitored for three months. If free phase returns further remediation will be carried out until a clear three month period is achieved. If remediation cannot be achieved within an acceptable period for completion of the works, other methods of remediation, such as in situ treatment, will be used.

9.4 Water Management

Controls will be in place to ensure that no contaminated water leaves the site. This may require the use of holding ponds, settlement areas, silt interceptor tanks and silt fencing in the agricultural field to avoid suspended solids entering tributaries of Nun Brook. Within the tip area existing seepages will be intercepted at an early stage and directed to holding ponds until the water can be diverted through the permanent wetland area as described in Section 6.

Whilst excavation of the cutting is in progress before permanent drainage is in place, some groundwater may be intercepted and pumping may be necessary. Any pumped water potentially contaminated by tip material will be recirculated through tip material by discharging onto the surface of the part of the landform area that is not yet covered with low permeability soil. The volume pumped and discharged will be less than $20m^3$ per day and will not require an environmental permit.

Discharge of water to Nun Brook is authorised through the TWAO and monitoring will be carried out to ensure regulatory compliance.

10.0 Previously Undetected Contamination

The former tip is an area where previously undetected contamination is expected therefore materials will be managed under the procedures in Section 6 rather than introducing any different procedure for previously undetected contamination. The other likely area where previously undetected contamination may be found is the former railway land. Hydrocarbon contamination is already known to be present.

During excavations outside the tip area if any material type is seen that was not encountered during the ground investigations an assessment will be made by the geo-environmental specialist of any special action to be taken. If the material is potentially contaminated, based on visual or olfactory appraisal, it will be transported to the quarantine area, samples will be taken for testing and on receipt of results a course of action will be proposed for agreement with the client and with the regulatory authorities.

Works will cease in the area of previously undetected contamination until a method of dealing with the contamination has been agreed with the client and the local planning authority. When agreement is reached, remediation will proceed in accordance with the agreed process.

The void left after removal of potentially contaminated material will be validated by taking samples on four sides and the base as described in Section 8.4. The extent of the void will be recorded by the surveyor.

11.0 Environmental Monitoring

Environmental monitoring for water quality, ground gas, dust and noise will be carried out throughout the works. An outline of the approach is provided in the Code of Construction Practice Part 1 and further detail will be presented in Part 2. Monitoring will include the elements listed in **Table 5**.

Table 5 Monitoring Locations and Timetable

Feature	Location	Monitoring Points	Timetable
Groundwater 1	On line of cutting	BH101, BH102, BH103, BH105	**Full suite:** Monthly for 2 months before start of ground disturbance; Monthly during ground disturbance; **Reduced suite:** Weekly during ground disturbance **Water Level:** On all sampling visits
Groundwater 2	In the former tip in landform area	BH106, BH108, BH109, BH110, BH111	**Full suite:** Monthly for 2 months before start of ground disturbance; Monthly during ground disturbance; Monthly for 6 months after completion of ground disturbance. **Reduced suite:** Weekly during ground disturbance; Weekly for 3 months after completion of ground disturbance. **Water Level:** On all sampling visits
Groundwater 3	Down gradient of the hydrocarbon area	Currently none. Depends on ground conditions found during works.	To be reviewed during works
Surface water 1	Ponded water upstream of the former tip	Seep 1	As Groundwater 2
Surface water 2	Seepages east of former tip	Seep 2 Seep 3 - new point at north east corner of former tip	As Groundwater 2
Surface water 3	Seepage at highest point on footpath to monitor hydrocarbons	New Seep 4	Monthly for 2 months before start of ground disturbance; Weekly during ground disturbance in hydrocarbon area; Monthly for 6 months after completion of ground disturbance.
Surface water 4	Nun Brook	Upstream, Downstream	As Groundwater 2
Ground gas 1	Gas at all groundwater monitoring boreholes	BH101, BH102, BH103, BH105, BH106, BH108, BH109, BH110, BH111	As Surface Water 3
Ground gas 2	In cutting adjacent to face	Recently exposed faces	Daily when personnel working in cutting
Dust 1	Personnel working in the area	Personal monitoring for asbestos fibres (air quality)	As advised by specialist
Dust 2	Former tip boundary	Monitoring for asbestos fibres (air quality)	Background monitoring for 3 months before start of ground disturbance. As advised by specialist during ground disturbance
Dust 3	Depositional dust between works and residential areas	To be shown on environmental monitoring plan	From one month before start of works to completion of works
Noise and vibration	As advised by specialist		As advised by specialist

A weather station may be used to provide continual data on weather conditions. Alternatively conditions will be noted on daily Environmental Monitoring Sheets. An example is attached in **Appendix 4**.

The locations of monitoring boreholes listed in **Table 5** are shown on **Figure 3** and in the water monitoring report (reference
8). Water monitoring points may not be available or may not be needed for the full duration of the works. The monitoring points along the line of the cutting will be decommissioned as the excavation of the cutting progresses. Within the landscape area boreholes are expected to be retained for a longer period. At least four monitoring points in the former tip will be monitored after completion of soil movement and placement of cover. If the existing boreholes are not available replacement boreholes will be provided.

The suites of contaminants to be monitored are listed in **Table 6**. Water samples will be taken by the geo-environmental specialist and will be sent to the project laboratory for chemical analysis. Ground gas will be monitored using a portable instrument which will be available on site for the duration of the works on the former tip. Dust, noise and vibration sampling and analysis will be carried out by specialists. The locations of the dust, noise and vibration monitoring points will change as the works progress to cover the relevant areas between the source and sensitive receptors such as residents.

Table 6 Monitoring Suites

Sample Type	Determinands - On site	Determinands - Laboratory
Groundwater Full suite	None	Metals, TPHCWG, PAHs, chloride, ammoniacal nitrogen, e.c., pH
Groundwater Reduced suite	None	Chloride, ammoniacal nitrogen, e.c., pH
Surface water 1, 2 and 4	Note iron deposits	As groundwater
Surface water 3	Note any sheen	TPHCWG, PAHs, pH
Ground gas	Methane, carbon dioxide, oxygen, hydrogen sulphide, carbon monoxide, atmospheric pressure, weather conditions including wind direction	
Dust 1	Asbestos fibres quantification	
Dust 2	Optional	Asbestos fibres quantification
Dust 3		Quantification
Noise	As advised by noise specialist	
Vibration	As advised by specialist	

Metals are arsenic, cadmium, total chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium and zinc.
TPHCWG is Total Petroleum Hydrocarbons Criteria Working Group.
PAHs are 16 USEPA speciated poly aromatic hydrocarbons.
e.c. is electrical conductivity.

The results of monitoring will be reviewed by the geo-environmental specialist immediately on receipt of test results and site managers informed of any issues requiring action. The monitoring schedule may be adjusted if needed in view of the site conditions found.

During works in the former tip as described in Section 6.4 environmental controls will be in accordance with the advice of the licensed asbestos contractor and an independent specialist, who will submit monitoring proposals to the Health and Safety Executive as required. Measures will be in place to minimise the risk of production of airborne asbestos fibres which could be released during work in the tip. Members of the public will be excluded from areas where there is potential for fugitive fibres.

The results of environmental monitoring will be available on site in electronic or paper format throughout the works. HPBC will be sent air quality test results as they become available. The results will be reviewed by the respective specialists and the BGCL Project Manager and HPBC will be informed of any unsatisfactory result. Assessment will include review of absolute values of results and will also include comparison with background results that occurred before the start of the works. In the case of water analyses the target will be a trend of improving quality. In the case of dust the results will be reviewed in relation to wind direction and speed as well as pre start background levels.

If results show unsatisfactory trends mitigatory action will be taken to halt the trend before environmental damage occurs.

12.0 Supervision and Reporting

12.1 Set Up of Management and Supervision

The works will be supervised by a site manager experienced in earthworks, remediation and railway construction. All people working on site will receive a site specific induction relevant to site features including potential contamination and the type of earthworks. Excavator drivers will be briefed on areas of potential contamination and procedures to be followed.

The former Hogshaw Refuse Tip will be fenced off as a separate working area to be entered only by those trained in asbestos awareness and fitted with the necessary personal protective equipment (PPE). This will include works managers, operatives, surveyors, geo-environmental specialists and asbestos specialists. All personnel entering and leaving the exclusion area will follow the asbestos health and safety protocols.

Geo-environmental work and geotechnical work will be supervised by a geo-environmental specialist and a geotechnical engineer, respectively. They will work in close co-operation for maximum efficiency.

Before the start of works the geo-environmental specialist, in close co-operation with the BGCL Environment Manager, will check that all appropriate consents and licences have been obtained. These will include:

- CL:AIRE Code of Practice Materials Management Plan to allow movement of soils within the site. To be prepared two months before the start of earthworks. Must be approved by a Qualified Person who will submit a Declaration to CL:AIRE (reference 23)
- Confirmation from the Environment Agency or High Peak Borough Council of the TWAO conferred right to discharge uncontaminated water from the site to Nun Brook
- Consent to discharge contaminated water to the foul sewer if needed
- Deployment Notice for Mobile Plant Environmental Permit for hydrocarbon treatment if considered to be needed after completion of exploratory investigation points. Apply four months before start of earthworks in existing sidings area

The Code of Construction Practice Plan part 2 will be completed by Network Rail to provide detail of environmental management and controls. It will include a means of communicating with members of the local community.

12.2 Supervision during Earthworks

The geo-environmental specialist will be present during any earthworks in made ground and shallow soils and will be available at short notice if unusual contamination is found at other times. The geo-environmental specialist will supervise all matters relating to contamination and potential contamination.

The work will include:

- Guiding BGCL on the location and extent of the asbestos exclusion area
- Reporting if there is any deviation from the agreed Method Statement for working with asbestos contaminated soils
- Liaison with the licensed asbestos contractor, the independent asbestos analyst and BGCL if large amounts of fibrous asbestos are found and HSE licensing may be necessary
- Supervision of sampling and scheduling of analysis of soils and compiling an electronic and a paper dataset of results
- Monitoring of excavations with a PID if landfill gas or hydrocarbon contamination is suspected until cover soils are in place
- Noting any unusual contamination from visual or olfactory evidence and taking appropriate action including either covering the material or moving it to the quarantine area
- Assessing the need for testing and subsequent assessment of results and action on any soils in quarantine
- Groundwater and surface water monitoring
- Deciding whether the local authority should be alerted to any unforeseen contamination
- Tracking implementation of soil movement including soil import and compilation of the soil tracking register in accordance with the Materials Management Plan
- Ensuring that soil sample locations are recorded by the surveyor
- Making use of photographs and surveying to record site conditions and work completed
- Assessing all test results and producing tables, graphs and drawings as appropriate
- Ensuring daily environmental monitoring sheets are completed

The geotechnical engineer will be present as needed during earthworks, track base construction and foundation construction.

A surveyor will be on site to carry out surveys and setting out as needed for geo-environmental and geotechnical purposes. The surveyor will produce plans and sections of soil movement from the cutting to the new landform and tip cover areas for use with the daily tracking record. In any areas of natural soil excavation where contamination or unexpected soil types are found and are excavated the surveyor will record the source and destination areas. A progress drawing will be maintained and made available for reference to all those involved in the project.

Additional professional staff, such as an ecologist or archaeologist, will be employed at relevant stages in the project using suitably qualified personnel known to BGCL.

12.3 Verification Plan and Reporting

All work will be recorded as described in this report. Records will be maintained on site and will be held in the head office of BGCL for two years after completion of earthworks. Interim records will be available on site for reference by Network Rail and the regulators.

On completion of the works a Verification Report will be prepared for Network Rail and the regulatory authorities to demonstrate that works have been completed in accordance with the strategy and specifications. The report will be submitted to the Local Authority. The report will be part of the site Health and Safety File.

The verification report will include:

- Results of any additional ground investigation
- All factual information including geotechnical and contaminant test results collected during the works
- Survey plans of the level of excavation, plans of stages of construction of the new landform including the separate cover layers, contamination voids, backfilled areas, areas of known contamination remaining in the ground, sampling locations, and an as-built survey of final levels
- Records of installation of the separator geogrid, gas protection measures and rabbit mesh
- Records of installation of the oil interceptor and the wetland treatment area
- Summary plans showing test results and compliance with requirements
- Daily records of soil or aggregate import and movement on site
- Photographs of work in progress and completed formation
- Transfer notes if any recyclable or waste material is removed from site
- Results of groundwater and other environmental monitoring

The report and data will be produced in paper and electronic formats. This will include drawings in AutoCad, analytical results and weights/volumes in Excel spreadsheets, pdf certificates of analytical results and copies of paper and text documents in pdf.
The Verification Report will be compiled progressively throughout the works. The final report will be produced within one month of completion of works in contaminated land and post works monitoring.

13.0 Recommendations

It is recommended that this report is submitted to the Environmental Protection Officer at High Peak Borough Council and the Environment Agency at Nottingham for their comments. On receipt of any comments and consequent action it is recommended that the report is submitted to Peak District Borough Council Planning Department, together with the reports listed in Section 2.1, with an application to discharge Conditions 8(a) and (b) of the Deemed Planning Permission for the Buxton Sidings Extension Scheme.

It is recommended that the works are carried out in accordance with the details in this report. When the works are completed it is recommended that the Verification Report is submitted to High Peak Borough Council with an application to discharge Condition 8(d) of the deemed Planning Permission.

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4. Corus 'Peak Forest to London Freight Train Lengthening Factual Report for Buxton Refuge Sidings' for Network Rail Infrastructure Limited, reference B70222-REP-GEO0002 version P01, dated March 2010
5. Tata Steel Projects 'Buxton Hindlow (Peak Forest) Buxton Up Refuge Sidings: Factual and Interpretative Report' for Network Rail, reference B80101-REP-GEO0001 P01, dated April 2012
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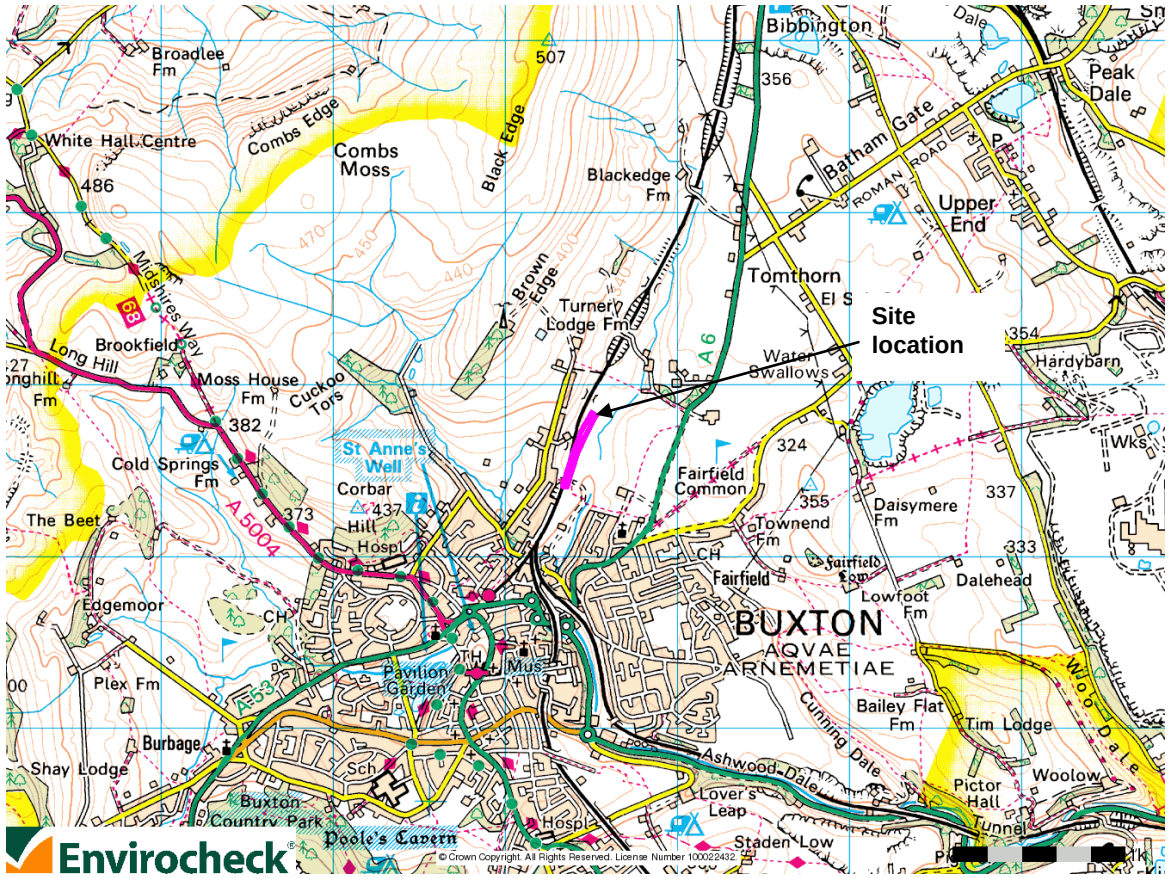
FIGURES



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www.buckinghamgroup.co.uk

Job Title

Buxton Sidings Extension Scheme

Location

Buxton

NetworkRail

Roundhay Environmental Consulting Limited

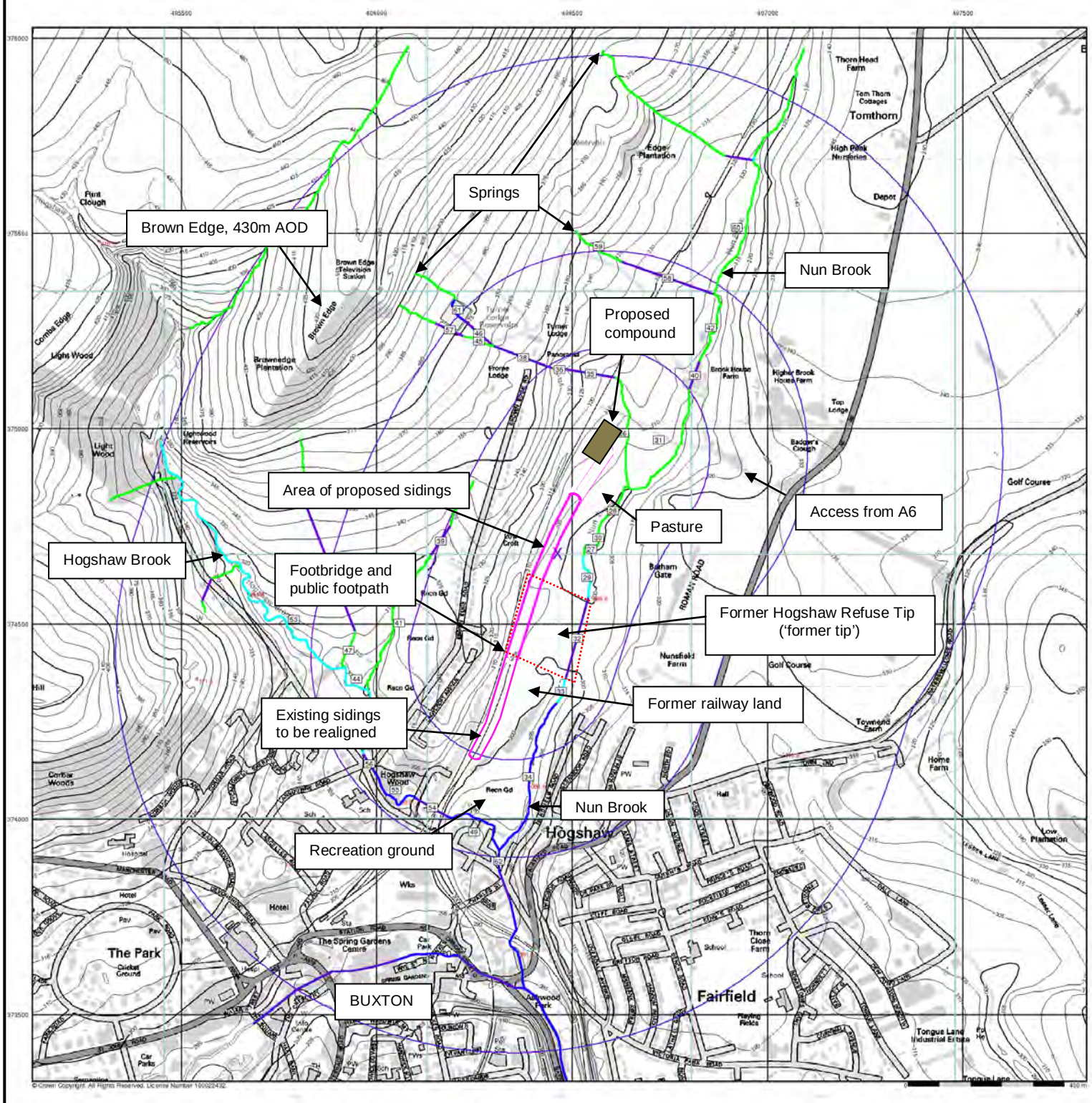
Buxton Sidings Extension Scheme

Figure 1: Site Location Plan

Scale	NTS
Date drawn	30 September 15
Drawn by	MIC
Original size	A4

Drawing no. PF/D2rev1

N



Detailed River Network Data

- Primary River
- Secondary River
- Tertiary River
- Canal
- Canal Tunnel
- Undefined River
- Lake/Reservoir
- Offline Drainage Feature
- Extended Culvert (greater than 50m)
- Underground River (inferred)
- Underground River (local knowledge)
- Downstream of High Water Mark
- Downstream of Seaward Extension
- Not assigned River feature

Scale

400m

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Location

Buxton

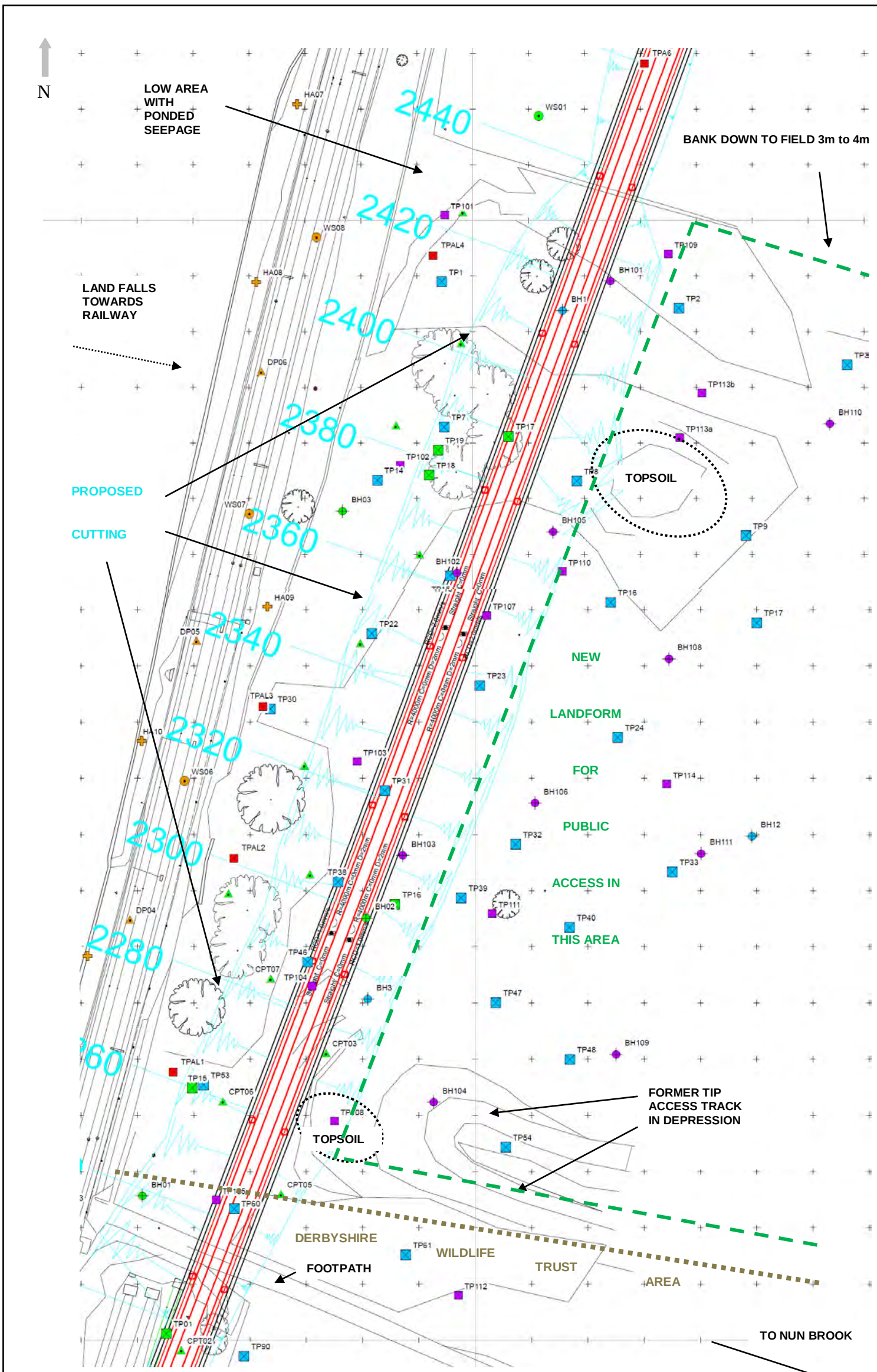
NetworkRail

Roundhay Environmental Consulting Limited

Buxton Sidings Extension Scheme

Figure 2 Features of the Area

Drawing no. PF/D18rev1 June 2016



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Job Title

Buxton Sidings Extension Scheme

Location

Buxton

Legend

2015 geotech holes		1999 GI	
	TP		BH
	WS		TP
2015 Tip boreholes		**2011 GI**	
	BH		BH
2015 Tip trial pits			CPT
	TP		TP
			WS
		2012 GI	
			BH
			DP
			HA
			WS

Scale
50 metres

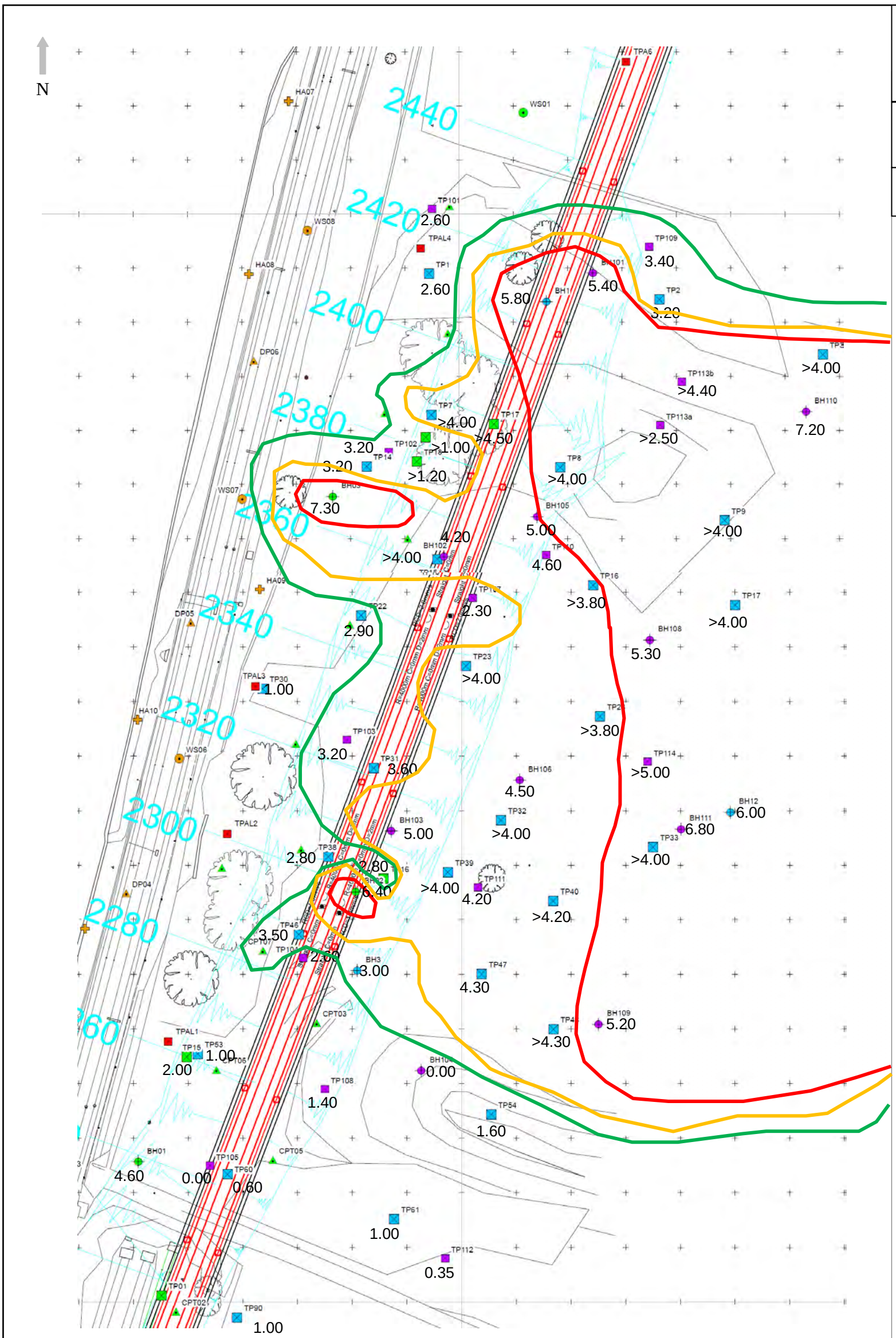
NetworkRail

Roundhay Environmental Consulting Limited

Buxton Sidings Extension Scheme

Figure 3 Remediation Features in the Former Hogshaw Refuse Tip

Drawing no. PF/D19rev2 May 2018



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Job Title

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Location

Buxton

Legend

2015 geotech holes
- TP
- WS

2015 Tip boreholes
- BH

2015 Tip trial pits
- TP

1999 GI
- BH
- TP

2011 GI
- BH
- CPT
- TP
- WS

2012 GI
- BH
- DP
- HA
- WS

0.50 Thickness of made ground (m)

5m Contour

4m Contour

3m Contour

Scale
50 metres

NetworkRail

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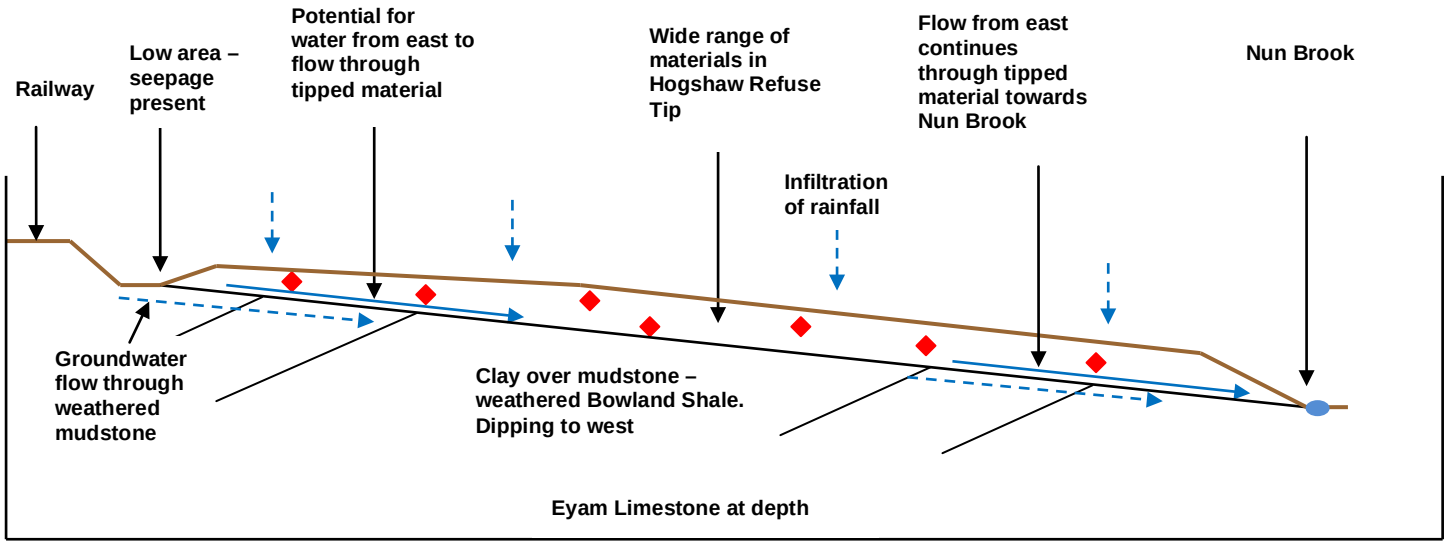
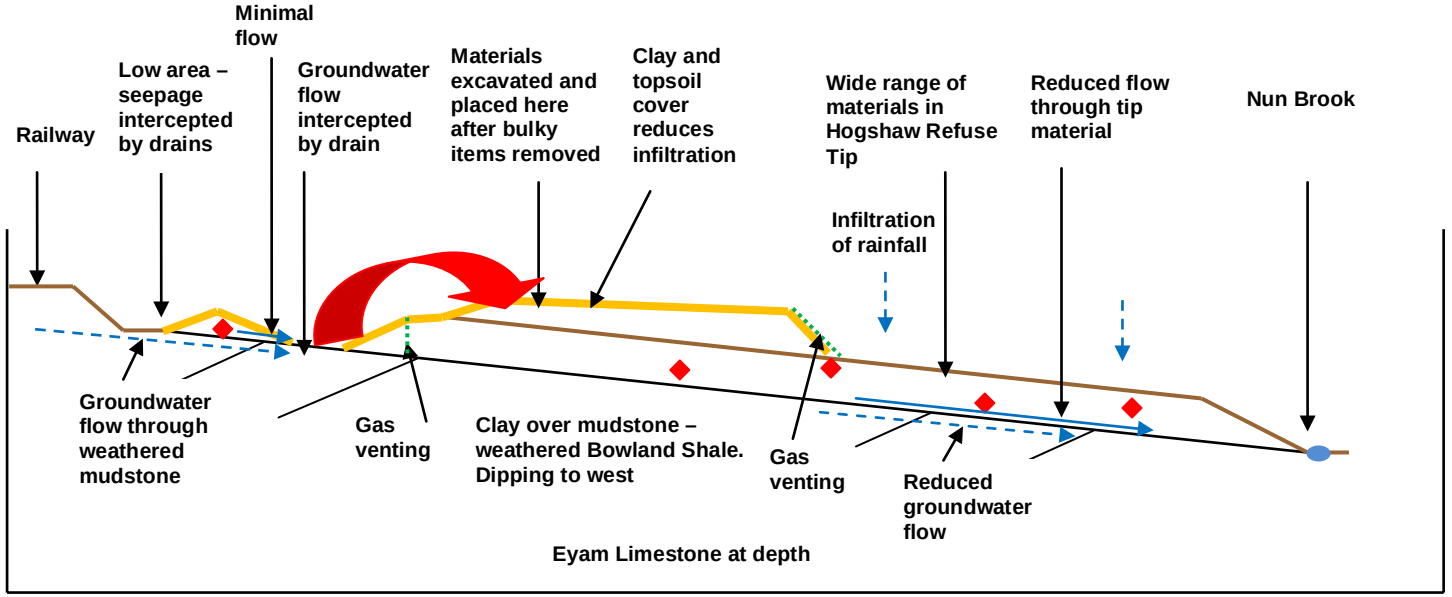
Buxton Sidings Extension Scheme

Figure 4: Thickness of Made Ground in Former Hogshaw Refuse Tip

Drawing no. PF/D5rev1 September 2015

BEFORE





AFTER

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Job Title

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Location

Buxton

NetworkRail

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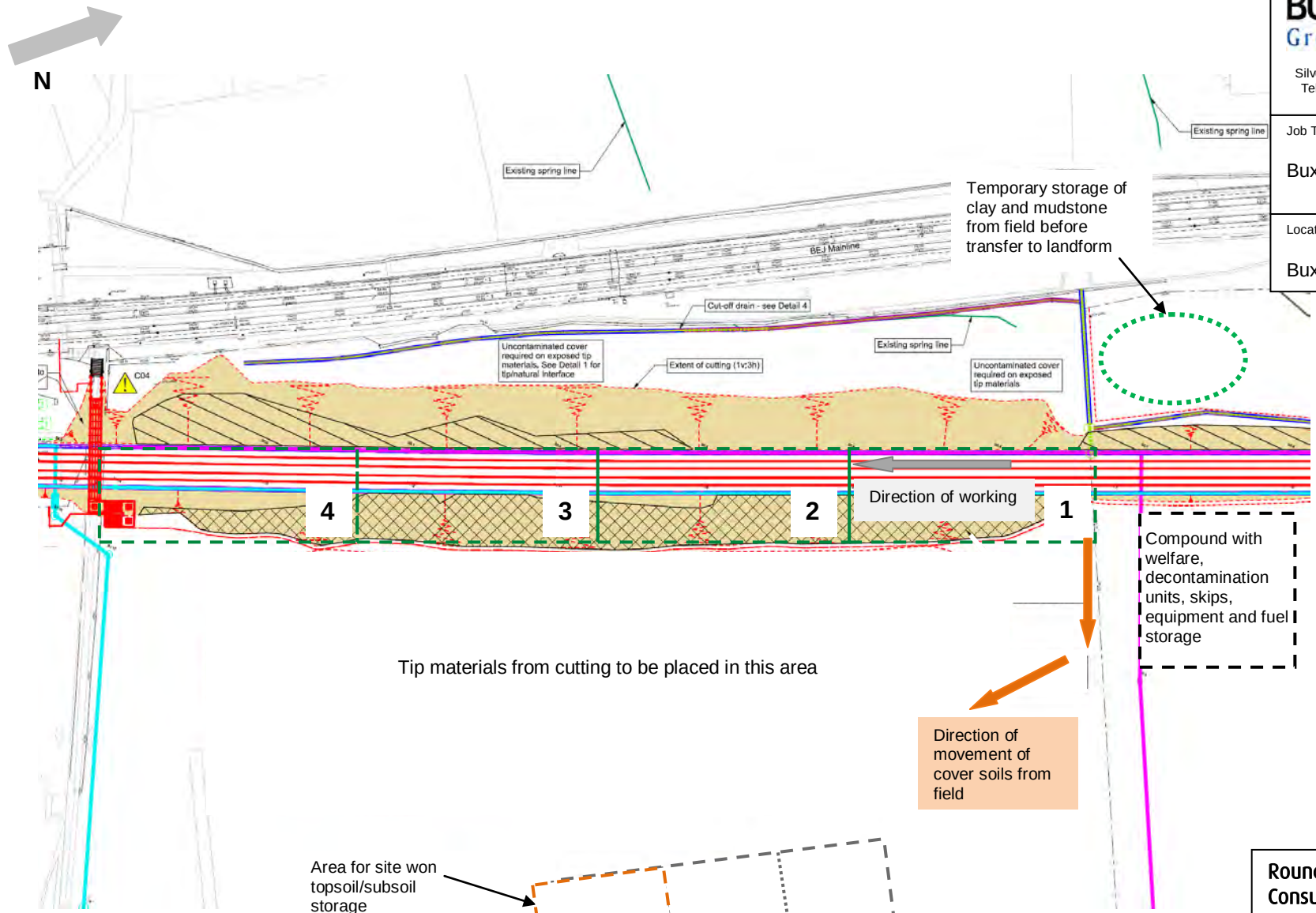
Buxton Sidings Extension Scheme

Figure 5: Conceptual Site Model of Pollutant Pathways

Scale	NTS
Date drawn	30 September 15
Drawn by	MIC
Original size	A4

Drawing no. PF/D8rev4 May 2018



Base plan is an extract from drawing no. ENH-112710-624-CNB4-00-DDR-C-000043

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Job Title

Buxton Sidings Extension Scheme

Location

Buxton

NetworkRail

Key

1 Area of hand back to BGCL with sequence

The landform will be handed back in a similar sequence but later than the adjacent cutting

Scale
Approximately 50m

Roundhay Environmental Consulting Limited

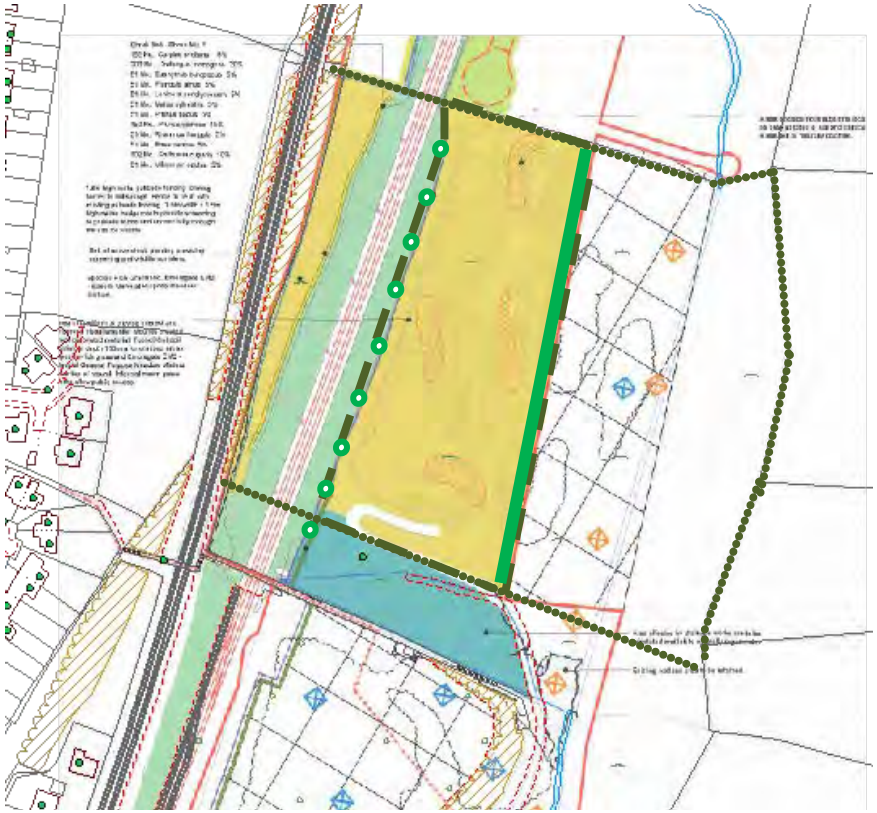
Buxton Sidings Extension Scheme

Figure 6: Proposed Layout during Earthworks in the Former Tip

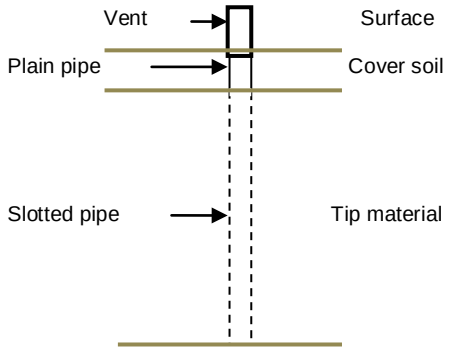
Scale	NTS
Date drawn	2 January 2018
Drawn by	MIC
Original size	A4

Drawing no. PF/D27rev3 June 2018

N



Example of Gas Vent



Vertical Schematic of Riser Pipe and Vent

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www.buckinghamgroup.co.uk

Job Title

Buxton Sidings Extension Scheme

Location

Buxton

NetworkRail

Key

- Position of riser pipe and vent inside Network Rail fence
- Approximate boundary of former tip
- Boundary of proposed landform
- Proposed gas venting zone

Scale, m

50 metres

Roundhay Environmental Consulting Limited

Buxton Sidings Extension Scheme

Figure 7: Gas Venting Layout

Scale	NTS
Date drawn	8 May 2018
Drawn by	MIC
Original size	A4

Drawing no. PF/D33

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Job Title

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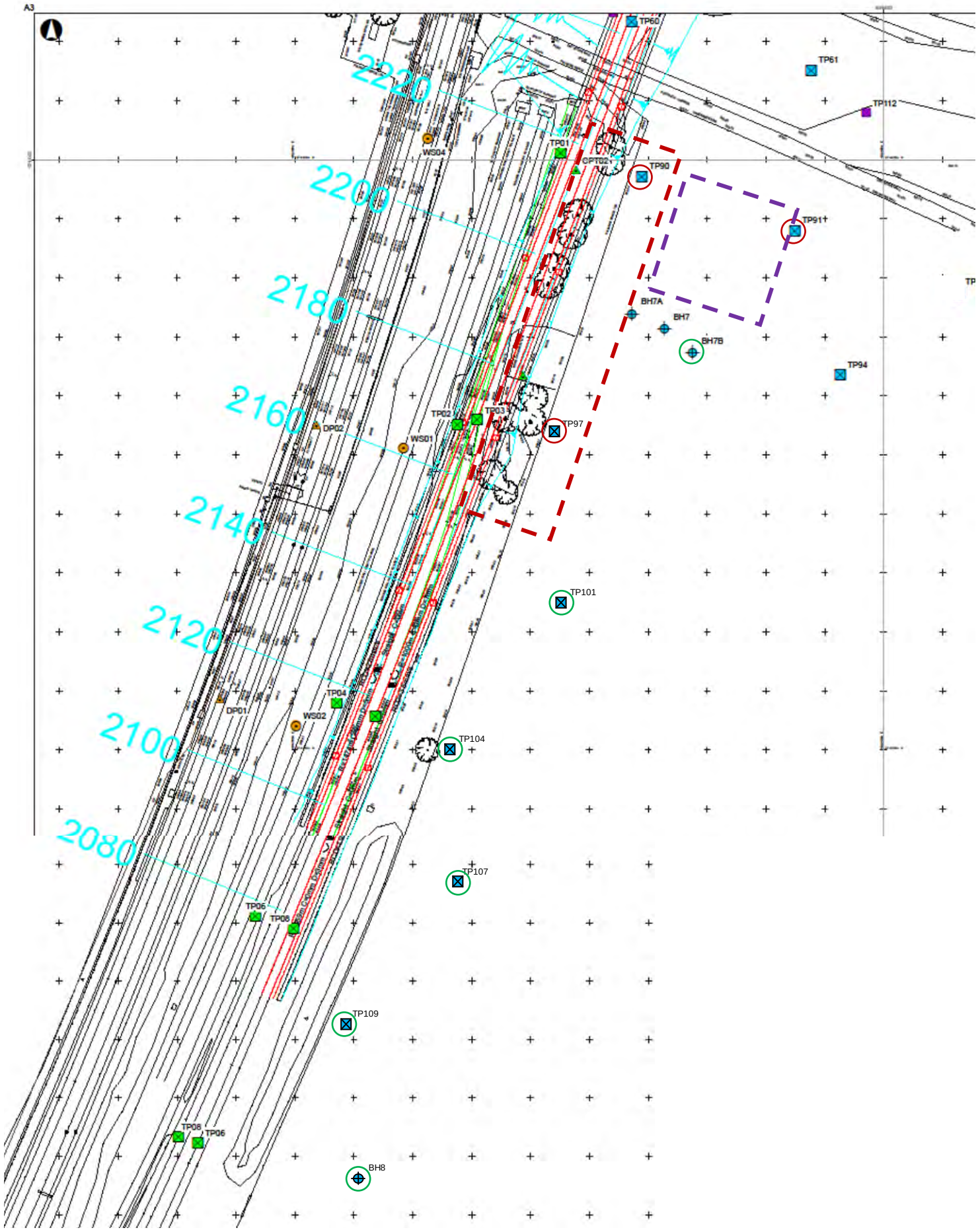
Location

Buxton



No hydrocarbon observed in borehole or trial pit

Hydrocarbon recorded on log and/or in laboratory

Area of potential hydrocarbon contamination

Quarantine and treatment area

For key to borehole and trial pit symbols, see drawing PF/D19rev1

NetworkRail

Scale
50 metres

Roundhay Environmental Consulting Limited

Buxton Sidings Extension Scheme

Figure 8: Hydrocarbon Remediation Plan

Drawing no. PF/D20rev1 December 2017