

6155 Bevis Green, Bury - EA Bespoke Permit - Risk Assessment (Issue 1 - February 2021)

Hazard (Refer to CEC Plan 6155/520 for construction activity locations - Appendix 9)	Receptor (Refer to CEC Plan 6155/521 for Receptor locations - Appendix 9)	Pathway	Probability of exposure	Consequence	Severity	Risk Management Techniques	Overall Risk (after implementation of management techniques)
Risk Category: Increase in Flood Risk							
Impeding the flow of Pigs Lee Brook Tributary during construction	Existing highways including Walmersley Old Road, Mill Road, Lancaster Drive, Lumn Street, Bevis Green and Palatine Drive Existing properties on Mill Road, Lumn Street, Bevis Green, Lancaster Drive and Palatine Drive Woodland area to the south of Mill Road Retained Culvert and open channel of Pigs Lee Brook Tributary Pigs Lee Brook Public sewerage network Nob End SSSI & Ashclough SSSI (located 16km downstream of site)	Overland flow from Pigs Lee Brook Tributary	Flood event could occur at any time during construction works	Increased flood risk at the site and downstream of the site	High	Watercourse flow to be retained at all times during construction. An Environmental Management System has been developed by the Contractor for the management of the watercourse realignment works and treatment of silts. Refer to Appendix 1. This will be supported by activity specific Method Statements. Works to be permitted by the Environment Agency.	Low
Storing excavated materials in a floodplain during construction		Impedance of flood flow	Flood event could occur at any time during construction works	Impedance of flood flow could increase flood risk elsewhere	High	An Environmental Management System has been developed by the Contractor for the management of the watercourse realignment works and treatment of silts. Refer to Appendix 1. This will be supported by activity specific Method Statements. Stockpiling of materials is to be minimised.	Low
Creating overland surface water runoff during construction		Direct from construction activity through alterations to surfacing and landscaping	Flood event could occur at any time during construction works	Regrading of land and removal of impermeable surfacing will alter existing pluvial flow routes with potential to increase flood risk	High	Phased construction works are planned. An Environmental Management System has been developed by the Contractor for the management of the watercourse realignment works and treatment of silts. Refer to Appendix 1. This will be supported by activity specific Method Statements.	Low
Earthworks (land level changes) and removal of Mill Reservoir (Construction Phase)		-	Flood event could occur at any time during construction works	Increased flood risk	High	An Environmental Management System has been developed by the Contractor for the management of the watercourse realignment works and treatment of silts. Refer to Appendix 1. This will be supported by activity specific Method Statements.	Low
Placing heavy machinery or equipment on the bank during construction			Equipment will be required in proximity to banks to facilitate works	Stability of banks compromised	Medium	An Environmental Management System has been developed by the Contractor for the management of the watercourse realignment works and treatment of silts. Refer to Appendix 1. This will be supported by activity specific Method Statements.	Low
Changing the flow regime via removal of Mill Reservoir and deculverting of existing watercourse (Permanent Works)			Overland flow from Pigs Lee Brook Tributary Existing reservoir provides some attenuation to flood flows downstream of site Significant area of impermeable surfacing exists on site. Proposed development will introduce more permeable landscaping including open channel	Flow will travel offsite quicker increasing flood risk downstream Decreased flood risk	High	Watercourse, flood storage area & flow control design to be informed by approved flood risk hydraulic modelling to ensure that flood risk is not increased. Increase in permeable surfacing and introduction of attenuated surface water drainage will reduce flood risk Proposed flood storage area will attenuate flood flows.	Low

Bristol & Swindon

Head & Registered Office: Unit 2, York House, Edison Park, Dorcan Way, Swindon, Wiltshire, SN3 3RB
 Incorporated in UK as Cole Easdon Consultants Ltd No. 202 7005
 Page 1 of 6

6155 Bevis Green, Bury - EA Bespoke Permit - Risk Assessment (Issue 1 - February 2021)

Hazard (Refer to CEC Plan 6155/520 for construction activity locations - Appendix 9)	Receptor (Refer to CEC Plan 6155/521 for Receptor locations - Appendix 9)	Pathway	Probability of exposure	Consequence	Severity	Risk Management Techniques	Overall Risk (after implementation of management techniques)
New channel at potential risk of erosion until vegetation established (Permanent works)	Existing highways including Walmersley Old Road, Mill Road, Lancaster Drive, Lumn Street, Bevis Green and Palatine Drive	Flow along PLB Tributary	Flood event could occur at any time	Failure of adjacent highways	High	Inspection and maintenance programme to be established for the flood storage area, watercourse, flow control and trash screen. Watercourse channel design to be informed by Geomorphology report. Refer to Appendix 2.	Low
Potential blockage of trash screen at downstream end of open watercourse (Permanent works)	Existing properties on Mill Road, Lumn Street, Bevis Green, Lancaster Drive and Palatine Drive Woodland area to the south of Mill Road Retained Culvert and open channel of Pigs Lee Brook Tributary	Litter and debris causing a blockage	Flood event could occur at any time	Increased flood risk	High	Trash screen & flow control design to be informed by approved flood risk hydraulic modelling (including 50% trash screen blockage) to ensure that flood risk is not increased. Inspection and maintenance programme to be established for the flood storage area, watercourse, flow control and trash screen.	Low
Potential failure of flow control within flood storage area (Permanent works)	Pigs Lee Brook Public sewerage network Nob End SSSI & Ashclough SSSI (located 16km downstream of site)		Flood event could occur at any time	Increased flood risk	High		Low
Sediment mobilisation during construction	Retained culvert and open channel of Pigs Lee Brook Tributary to the south of the site Pigs Lee Brook Existing public sewerage network	Direct from construction activity including earthworks.	Sediment will be created/mobilised as a result of construction works and washed into Pigs Lee Brook Tributary or enter the public sewerage network via the existing drainage network	Increase in flood risk downstream due to a decrease in channel/pipe capacity	High	An Environmental Management System has been developed by the Contractor for the management of the watercourse realignment works and treatment of silts. Refer to Appendix 1. This will be supported by activity specific Method Statements.	Low - Medium
Removal of unknown existing offsite connections to section of culvert to be diverted	Potential areas (highway/property) currently drained via offsite connections to culvert	If offsite drainage connections are removed floodwater would issue from upstream pipework	Eleven existing connections indicated on CCTV survey undertaken on behalf of EA in 2012. Refer to Appendix 3.	Increased flood risk through removal of drainage outlets to culvert.	Medium - High	Offsite connections to be identified and diverted/retained as necessary Contractor to submit Method Statement.	Low

Bristol & Swindon

Head & Registered Office: Unit 2, York House, Edison Park, Dorcan Way, Swindon, Wiltshire, SN3 3RB
 Incorporated in UK as Cole Easdon Consultants Ltd No. 202 7005
 Page 2 of 6

6155 Bevis Green, Bury - EA Bespoke Permit - Risk Assessment (Issue 1 - February 2021)

Hazard (Refer to CEC Plan 6155/520 for construction activity locations - Appendix 9)	Receptor (Refer to CEC Plan 6155/521 for Receptor locations - Appendix 9)	Pathway	Probability of exposure	Consequence	Severity	Risk Management Techniques	Overall Risk (after implementation of management techniques)
Risk Category: Harm to the Environment							
Deliberate or accidental discharge of polluting materials such as oil, fuel, chemicals, litter, dust and construction debris	Physical habitat including: ▪ Pigs Lee Brook Tributary ▪ Pigs Lee Brook ▪ Nob End SSSI & Ashclough SSSI Existing woodland to the south of Mill Road	Direct from construction activities with pollutants entering the onsite watercourse or existing drainage network	Demolition work has already commenced on site. Watercourse construction works due to commence in 2021	Pollution of the environment either via Pigs Lee Brook Tributary, the underlying aquifer or the sewerage network	High	An Environmental Management System has been developed by the Contractor for the management of the watercourse realignment works and treatment of silts. Refer to Appendix 1. This will be supported by activity specific Method Statements.	Low - Medium
Mobilisation of contaminants during construction works	Existing public sewerage network Underlying Secondary Aquifer	Direct from construction activities	Significant contamination anticipated across the site from former use. Ground investigation in 2014 found 'significant elevated concentration of hydrocarbon within perched groundwater' Outline remediation strategy submitted as part of planning application identified significant contamination across the site from former use	Pollution of the environment	High	Preparation of Method Statements Site remediation to be carried out in accordance with approved remediation strategy including a Site Verification Report to meet the requirements of Planning Conditions 4 & 5. Refer to Appendix 7.	Low - Medium
Spreading non-native invasive species during construction works	Retained landscaping including deciduous woodland Pigs Lee Brook Tributary Pigs Lee Brook	During construction activities. Moving contaminated machinery and personal equipment to a new part of the site	Invasive species identified within the ERAP Ecology report submitted for planning including Japanese Knotweed, Himalayan Balsam, Rhododendron and Montbretia. Refer to Appendix 4.	Contamination of land outside the site causing ecological damage	High	Preparation of an Invasive Species Management Plan for the eradication and/or control of invasive species known to be on site. Refer to Appendix 4. Use of native trees and shrubs in the landscape planting schedule	Low
Changes to habitats arising from alterations to the green corridor provided by watercourses	Retained landscaping including deciduous woodland Pigs Lee Brook Tributary	Direct from construction activities	Some loss from the removal of Mill Reservoir. Existing green corridor to the north of Mill Reservoir retained thus conserving the Priority Habitats (woodland) connectivity function	Loss of existing habitat	Low	New channel will provide betterment over the existing situation by skylighting the existing culvert and creating a green corridor the length of the site. Proposed flood storage area & watercourse scheme will provide a high-quality ecological system	Proposals are beneficial as a blue/green corridor will be created the length of the site where one does not currently exist
Noise, dust, vibration and light affecting species during construction. Streetlighting	Priority species	Direct from construction activities and from permanent street lighting	Demolition work has already commenced on site. Watercourse construction works due to commence in 2021	Loss of Priority Species	High	An Environmental Management System has been developed by the Contractor for the management of the watercourse realignment works and treatment of silts. Refer to Appendix 1. This will be supported by activity specific Method Statements. The street lighting scheme has been designed in accordance with current guidance and use appropriate products and screening to ensure no excessive artificial lighting shines over habitats identified to be of value for use by foraging bats and flora such as the new open channel and flood storage area in accordance with the requirements of Planning Condition 19. Refer to Appendix 5.	Low

Bristol & Swindon

Head & Registered Office: Unit 2, York House, Edison Park, Dorcan Way, Swindon, Wiltshire, SN3 3RB
 Incorporated in UK as Cole Easdon Consultants Ltd No. 202 7005
 Page 3 of 6

6155 Bevis Green, Bury - EA Bespoke Permit - Risk Assessment (Issue 1 - February 2021)

Hazard (Refer to CEC Plan 6155/520 for construction activity locations - Appendix 9)	Receptor (Refer to CEC Plan 6155/521 for Receptor locations - Appendix 9)	Pathway	Probability of exposure	Consequence	Severity	Risk Management Techniques	Overall Risk (after implementation of management techniques)
Impact on dissolved oxygen, ammonia and phosphorus levels	Physical habitat including: ▪ Pigs Lee Brook Tributary ▪ Pigs Lee Brook ▪ Nob End SSSI & Ashclough SSSI (located 16km downstream of site)	Skylighting of existing culvert and new channel reach	No existing information available but physico-chemical aspects likely to be poor, due to presence of water contamination within existing site and depth of Mill Reservoir (in excess of 3m)	Creation of open channel and flood storage area will create appropriate conditions for the aeration of flow and colonisation of aquatic vegetation long term	Low	Remediation works to reduce onsite contamination Creation of flood storage area (less than 3m deep) and new open channel watercourse	Proposals are beneficial as the ecological quality of the proposed flood storage area and open watercourse will provide betterment over the existing situation
Mobilisation of sediment during construction works		Direct from earthworks & construction activities	Sediment will be created/mobilised as a result of construction works and washed into Pigs Lee Brook Tributary	Loss of habitat	High	An Environmental Management System has been developed by the Contractor for the management of the watercourse realignment works and treatment of silts. Refer to Appendix 1. This will be supported by activity specific Method Statements.	Low
Arboricultural impact	Deciduous woodland (retained) classified as Priority Habitat Established trees onsite	Direct from construction activity Existing trees on site - 5 trees and 11 tree groups are to be removed to facilitate the development. Refer to Appendix 6.	Arboriculture Survey as part of planning application identified trees and tree groups affected	Loss of existing habitat to facilitate development	Medium	Erection of protective fencing in advance of commencement to safeguard roots systems. Planting of trees and shrubs as part of a comprehensive landscape scheme to replace lost trees as required by Planning Condition 11. Refer to Appendix 8. Planting of native hedges where possible to provide linear habitats that link to habitat offsite Use of a mixture of native and ornamental species within planting schemes Works within root protection areas to be in accordance with an Arboricultural Method Statement	Low Strengthening of green/blue corridor through site will provide betterment over existing situation
Disturbance of badgers and setts	Protected Species	Removal of Mill Reservoir (Priority Habitat) Skylighting of existing culvert Creation of flood storage area	Badger Survey and Assessment report undertaken by ERAP to support planning application	Loss of sett and fresh source of drinking water as a result of infilling of Mill Reservoir	High	Badger Mitigation Strategy and works to be licensed by Natural England as per ERAP Ecology Assessment. Refer to Appendix 4. Existing badger sett to be closed under license and a new sett provided Ensure fresh source of drinking water is retained in the long term via new flood storage area and open watercourse	Low - Medium
Removal of carp habitat	Species listed as Vulnerable on the global IUCN Red List of Threatened Species		Mill Reservoir previously used for coarse fishing and had been stocked with carp	Loss of habitat	Medium	Preparation of a Lodge Drainage and Fish Rescue Strategy. Update fish removal permit. Refer to Appendix 4.	Proposals are beneficial as the ecological quality of the proposed open watercourse will provide betterment over the existing Situation
Damage to common toad priority habitat	Protected Species	Removal of Mill Reservoir (Priority Habitat)	Ecological survey submitted as part of planning application indicated that Mill Reservoir supports the breeding habitat of a common toad population. Refer to ecology report in Appendix 4.	While there will be a temporary loss in open water habitat, in the long-term development proposal will ensure that open water suitable for use by breeding common toad is retained at the site	Medium	Preparation of a reasonable avoidance method statement for amphibians in accordance with the requirements of Planning Condition 17 (Refer to Appendix 4) Ensure the retention of a permanent area of open water for breeding habitat via implementation of open watercourse, 300m long.	

Bristol & Swindon

Head & Registered Office: Unit 2, York House, Edison Park, Dorcan Way, Swindon, Wiltshire, SN3 3RB
 Incorporated in UK as Cole Easdon Consultants Ltd No. 202 7005
 Page 4 of 6

6155 Bevis Green, Bury - EA Bespoke Permit - Risk Assessment (Issue 1 - February 2021)

Hazard (Refer to CEC Plan 6155/520 for construction activity locations - Appendix 9)	Receptor (Refer to CEC Plan 6155/521 for Receptor locations - Appendix 9)	Pathway	Probability of exposure	Consequence	Severity	Risk Management Techniques	Overall Risk (after implementation of management techniques)
Disturbance of invertebrate population	Invertebrates	Removal of Mill Reservoir (Priority Habitat)	Sixty species of aquatic invertebrates surveyed as part of ERAP Ecology Assessment for planning purposes. Refer to Appendix 4. Limited diversity of macroinvertebrate fauna attributed to low habitat diversity within Mill Reservoir	Significant deterioration risk to existing riverine populations. The construction of a new lotic system from an originally lentic habitat is likely to support a different invertebrate community than currently associated with site. While there will be a temporary loss in open water habitat, in the long-term the open watercourse scheme will ensure that open water suitable for use by breeding invertebrates is retained at the site	Low - medium	Ensure the retention of a permanent area of open water via new flood storage area and open watercourse	Proposals are beneficial as the ecological quality of the proposed open watercourse will provide betterment over the existing Situation
Disturbance of macrophytes population	Macrophytes		Ecological survey submitted as part of planning application indicated that Mill Reservoir supports limited vegetation. Refer to ecology report in Appendix 4.	Temporary impact on population during construction but in the long term creation of a larger area (flood storage area and open watercourse) which could support the growth of macrophytes	Low	Construction of flood storage area and open watercourse	
Disturbance of diatoms population	Diatoms		No survey undertaken but Mill Reservoir depth (greater than 3m) unlikely to support their establishment	Limited impact during construction. Proposed flood storage area and open channel will facilitate growth of diatoms in the long term	Low		
Disturbance of roosting birds	Nesting birds (Protected Species) including Priority Species (Song Thrush, Dunnock and Bullfinch)	Removal of Mill Reservoir Removal of existing trees	35 Bird species recorded over two survey periods including three breeding priority species at the woodland/scrub bordering Mill Reservoir. Refer to ecology report in Appendix 4.	Loss of habitat	Medium	No works to trees or shrubs to occur between 1 st March - 31 August unless a detailed bird nest survey is carried out prior to tree clearance in accordance with the requirements of Planning Condition 14. Preparation of Method Statements	Low

 Sent to Client: ☒

Date: February 2021

Author: Jess Pockett

Authorised for Issue: Dean Frosoni

Bristol & Swindon

Head & Registered Office: Unit 2, York House, Edison Park, Dorcan Way, Swindon, Wiltshire, SN3 3RB
 Incorporated in UK as Cole Easdon Consultants Ltd No. 202 7005
 Page 5 of 6

Appendix 1

Environmental Management System

Environmental management system for the realignment/diversion of the un-named tributary of Pigs Lee Brook and the treatment of associated silts.



**Former Tetrosyl Works,
Walmersley Old Road,
Bury.
BL9 6RG**

Author D J Woodrow	Position Project Manager	Signed	Date 29/05/20
Approved G Owen	Position Contract Manager	Signed	Date 29/05/20

Contents

1.0	Introduction	5
2.0	Site background information	7
3.0	Realignment/diversion works to the un-named tributary of Pigs Lee Brook	8
3.1	Programming	
4.0	Environmental pollution/nuisance sources, receptors, and potential impacts	10
4.1	Environmental pollution/nuisance sources	
4.1.1	Pollution/nuisance sources (direct)	
4.1.2	Pollution/nuisance sources (indirect)	
4.2	Environmental receptors	
4.3	Potential environmental impacts	
4.3.1	Dust	
4.3.1.1	Demolition operations	
4.3.1.2	Bulk earthworks	
4.3.1.3	Silt stabilisation works	
4.3.1.4	Importation of materials	
4.3.1.5	On-site vehicle/plant movements	
4.3.2	Noise	
4.3.2.1	General public	
4.3.2.2	Fauna	
4.3.3	Vibration	
4.3.3.1	General public	
4.3.3.2	Fauna	
4.3.3.3	Structures/landform	
4.3.4	Odour	
4.3.4.1	Disturbance of lodge/reservoir silts	
4.3.4.2	Contaminated soils	
4.3.5	Surface water	
4.3.5.1	General surface run-off	
4.3.5.2	Demolition	
4.3.5.3	Bulk earthworks/remediation	
4.3.5.4	Silt stabilisation works	
4.3.5.5	Spillages	
4.3.5.6	Flooding of the un-named tributary of Pigs Lee Brook	

5.0	Environmental impact control measures	17
5.1	Site Management responsibilities	
5.2	Operational control measures	
5.2.1	Dust	
5.2.2	Noise/vibration	
5.2.3	Odour	
5.2.4	Surface water	
6.0	Environmental monitoring/measurement	24
6.1	Dust	
6.2	Noise and vibration	
6.2.1	Noise measurement	
6.2.2	Vibration measurement	
6.2.3	Monitoring	
6.3	Odour	
6.4	Surface water	
7.0	Environmental mitigation measures	31
8.0	Complaints procedure	33
9.0	Personnel, plant, and equipment	34
9.1	Personnel	
9.1.1	Training records	
9.2	Plant and equipment	
10.0	Contingency plans	37
10.1	Breakdowns	
10.2	Enforced shutdowns	
10.3	Unexpected conditions	
10.4	Changes to normal operations	
11.0	Emergency procedure	40
12.0	Quality, compliance, and review	42
13.0	Record keeping	43

Appendices

Appendix A	Site layout plan (including design)
Appendix B	Watercourse realignment overview
Appendix C	Works programme
Appendix D	Monitoring points location plan
Appendix E	Dust inspection/investigation/complaint forms
Appendix F	Noise and vibration inspection/investigation/complaint forms
Appendix G	Odour inspection/investigation/complaint forms
Appendix H	Surface water inspection/investigation/complaint forms
Appendix I	Urban Regen Ltd. training matrix
Appendix J	Contingency plan
Appendix K	Policies, manuals, and certification

1.0 Introduction

Urban Regen Ltd. have been contracted, as Principal Contractor, by Barratt Homes (Manchester), to carry out the site preparatory works associated with the residential redevelopment of the former Tetrosyl Works, Bury. These preparatory works include the demolition of all above ground structures, site wide in-ground remediation, and the realignment/diversion of the un-named tributary of Pigs Lee Brook watercourse/culvert.

This '*Environmental Management System*' outlines the methods to be employed by Urban Regen Ltd. to systematically assess, reduce and prevent any environmental impact to the un-named tributary of Pigs Lee Brook, and the wider environment, during the '*flood risk activity*' to realign/divert the '*Main River*' watercourse. This '*Environmental Management System*' is a working document with the aim of ensuring that:

- The potential environmental impact caused by the '*flood risk activity*' and any associated contamination, is considered as part of the site inspection regime.
- Any potential environmental impact caused by the '*flood risk activity*' is controlled by considered operational practices, which include physical and management control measures.
- All appropriate measures are taken to prevent, or, where not reasonably practicable, reduce, any potential environmental impact to the un-named tributary of Pigs Lee Brook and the wider environment.

This '*Environmental Management System*' details the potential environmental impact of the '*flood risk activity*' and the control measures to be employed to mitigate the risk. This is supported through monitoring procedures and the review of documented complaints.

The methodologies detailed in this '*Environmental Management System*' have been prepared in accordance with the following documents:

- Environment Agency online guidance '*Develop a management system: environmental permits for a flood risk activity*'

The information in this '*Environmental Management System*' is to be supplement with the following site-specific documents:

- Dust Management Plan
- Noise and Vibration Management Plan
- Odour Management Plan
- Surface Water Management Plan

This '*Environmental Management System*' is to be held on site within the relevant register of the '*Construction Phase Health and Safety Plan*' at all times; being readily available for consultation by all parties.

2.0 Site background information

Located off Walmersley Old Road, the site covers an area of approximately 10.8 ha (26.7 acres) which falls generally north to south. Formerly known as the Tetrosyl Works, the site comprises of a mixture of buildings which include a 19th century cotton mill together with more recent warehouses and offices. Hardstanding surrounds many of the buildings to the south and west with undeveloped open land present in the north.

The former mill lodge is present to the centre east of the site; constructed on the alignment of the un-named tributary of the Pigs Lee Brook (which passes through site in a generally north south direction). To the north, the waters flow into the mill lodge through an open watercourse, to the south they pass through a weir/spillway structure and through a culverted section of watercourse, exiting into an open channel circa 175m beyond the southern site boundary.

The site occupies the valley of the un-named tributary of Pigs Lee Brook. Historically, this valley was backfilled to form the main mill lodge which previously discharged to two other lodges on site, and the culvert which allowed the watercourse to discharged off-site to the south. In addition to the mills, coal mining was present on-site, with adits located to the south east corner to access the Sand Rock coal seam. A rock quarry is also identified.

Latterly, the site was occupied by Tetrosyl Ltd. for the manufacture, packaging, storage, and distribution of car care products inc' antifreeze, waxes and paints. A solvent recovery process was also carried out on the site under an Industrial Pollution Control (IPC) permit.

Residential properties bound the site to the south and east, with open fields and the M66 being present to the north and east.

The existing layout of the site and the new alignment/diversion of the un-named tributary of Pigs Lee Brook is detailed on drawing '*333-20-002 Site layout plan (including design)*' contained in Appendix A.

3.0 Realignment/diversion works to the un-named tributary of Pigs Lee Brook

Currently, the un-named tributary of the Pigs Lee Brook runs from north to south through the centre east of the site. To the north, the watercourse enters site as an open channel before it flows into the former mill lodge/reservoir. The lodge/reservoir is controlled by a weir/spillway structure located to the south west which discharges waters into a culverted section of the watercourse. This culverted watercourse flows predominantly in a south/southwest direction, under the buildings located to the south east of the site. Upon reaching the southern site boundary it turns west and gradually south before becoming an open channel again. To enable redevelopment for a residential end land use, it is necessary to remove the lodge/reservoir and realign the watercourse along the eastern boundary of the site, carrying out remediation of the underlying made ground, as necessary. These works are to include:

- Suspended solids control measures.
- Maintaining flows to the un-named tributary of Pigs Lee Brook at all times.
- De-watering of the existing lodge/reservoir.
- Removal of fish from the existing lodge reservoir.
- Installation of temporary impermeable barriers to protect the existing watercourse.
- Physical and chemical treatment of lodge/reservoir silts.
- Installation of silt traps to protect the existing watercourse.
- Excavation of a new watercourse channel along the eastern boundary.
- Excavation of a new flood attenuation pond along the new alignment of the watercourse.
- Installation of a new length of culvert and associated headwall to connect the new watercourse to the existing culvert (towards the southern boundary).
- Installation of a flow control structure to the southern end of the new flood attenuation pond.

To facilitate the realignment/diversion of the un-named tributary of Pigs Lee Brook enabling works are required. These works include:

- Ecological mitigation works.
- Asbestos removal.
- Demolition.
- Break out of hardstanding and relict foundations.
- Site wide remediation/ground preparation.

A comprehensive overview of all tasks associated with the realignment/diversion of the un-named tributary of Pigs Lee Brook is detailed in document '*Watercourse realignment overview – Overview of the watercourse realignment/diversion works to the un-named tributary of Pigs Lee Brook and the treatment of associated silts*' contained in Appendix B.

3.1 Programming

All works associated with the realignment of the un-named tributary of Pigs Lee Brook are to be scheduled to ensure that any impact on the local environment (including all flora and fauna) is minimised at all times taking into consideration likely weather conditions, breeding/nesting, and hibernating. The current programme of works is detailed in Appendix C

4.0 Environmental pollution/nuisance sources, receptors, and potential impacts

4.1 Environmental pollution/nuisance sources

Works directly/indirectly associated with the realignment/diversion of the un-named tributary of Pigs Lee Brook, have the potential to generate environmental pollution/nuisance which may impact on the watercourse or the wider environment.

4.1.1 Pollution/nuisance sources (direct)

- Excavation (of the new alignment/diversion watercourse/channel).
- De-watering (of the lodge/reservoir).
- Over pumping (of the un-named tributary of Pigs Lee Brook to maintain flows during the works and any other pumping required).
- Civils construction (of the new culvert and associated structures).
- Silt stabilisation (of the exposed silts from the de-watering of the lodge/reservoir inc' materials).
- Plant (used across site to carry out the works).
- Deliveries (of materials).

4.1.2 Pollution/nuisance sources (indirect)

- Demolition (of all buildings across the site).
- Remediation (of all on-site contamination).
- Earthworks (of all turnover of made ground and removal of hardstanding and relict foundation).
- Processing (of all hard materials generated on-site for re-use).
- Waste (recovery and disposal of all wastes on-site).
- Plant (used across site to carry out the works).
- Deliveries (of materials).

4.2 Environmental receptors

The site is located in Walmersley, being part of the northern extent of the Bury conurbation. The '*Landscape Classification*' for this area is '*Built up areas*'. The main receptors in and around the site are:

- The un-named tributary of Pigs Lee Brook (which runs generally north south through the east of the site).
- Priority habitat – Deciduous woodland (predominantly located to the north east of the site around the upstream un-named tributary of Pigs Lee Brook and the lodge/reservoir).
- Priority habitat – Broadleaved woodland (predominantly located to the north east of the site around the upstream un-named tributary of Pigs Lee Brook and the lodge/reservoir).
- Badgers (located on the site to the north west of the lodge/reservoir).
- Bats (located in and around the on-site buildings).
- Aquatic life (inc' fish, common toads and potentially amphibians).
- Upland breeding bird area (located off-site to the north and east of the adjacent M66 motorway).
- Flora (other plants/habitat in and around the site).
- Fauna (other wildlife in and around the site).
- Residential properties (located to the south and west).
- General public (around the site but predominantly to the south and west).

4.3 Potential environmental impacts

4.3.1 Dust

4.3.1.1 Demolition operations

Dust will be generated during the controlled demolition of buildings located on the site. This has the potential to cause a physical and/or chemical impact on environmental receptors across the site, including siltation of the un-named tributary of Pigs Lee Brook if not sufficiently suppressed.

4.3.1.2 Bulk earthworks

Dust will be generated during the excavation/deposition of materials necessary to carry out the remediation of the site and achieve the proposed developable landform. This has the potential to cause a physical and/or chemical impact on environmental receptors across the site, including siltation of the un-named tributary of Pigs Lee Brook if not sufficiently suppressed.

4.3.1.3 Silt stabilisation works

Stabilisation of the silts associated with the lodge/reservoir, will cause cement dust to become airborne during the mixing process. This has the potential to cause a physical and/or chemical impact on environmental receptors across the site, including effects to the pH of the un-named tributary of Pigs Lee Brook if not sufficiently suppressed.

4.3.1.4 Importation of materials

Dependent upon road conditions any bulk import (cement/civils materials) and export (scrap metal and general waste) operations have the potential to generate dust on and off-site. Any dust generation will only be during the movement of road vehicles. This has the potential to cause a physical and/or chemical impact on environmental receptors across the site, including siltation of the un-named tributary of Pigs Lee Brook if not sufficiently suppressed.

4.3.1.5 On-site vehicle/plant movements

All works on site are to be carried out by heavy plant. Due to the size of the site and scope of works there is potential for dust to be generated. This has the potential to cause a physical and/or chemical impact on environmental receptors across the site, including siltation of the un-named tributary of Pigs Lee Brook if not sufficiently suppressed.

4.3.2 Noise

The majority of noise generation on-site will be from the movement/use of heavy plant, either directly or indirectly, the common impacts being:

4.3.2.1 General public

Dependent upon the proximity and exposure duration, excessive noise may have the following effects:

- Annoyance and irritation
- Concentration and efficiency
- Fatigue and likelihood of accident-proneness
- Mask out other sounds including instructions and warning sounds
- Temporary/permanent hearing loss

4.3.2.2 Fauna

Dependent upon the proximity and exposure duration, excessive noise may have the following consequences for both terrestrial and marine fauna:

- Interference with communication/hunting
- Auditory damage
- Physiological stress
- Anti-predator responses

4.3.3 Vibration

The majority of vibration generation on-site will be from the movement/use of heavy plant, either directly or indirectly, the common impacts being:

4.3.3.1 General public

Dependent upon the proximity and exposure duration, excessive vibration may have the following effects:

- Annoyance and irritation
- Concentration and efficiency
- Fatigue and likelihood of accident-proneness

4.3.3.2 Fauna

Dependent upon the proximity and exposure duration, excessive vibration may have the following consequences for both terrestrial and marine fauna:

- Interference with communication/hunting
- Physiological stress
- Anti-predator responses

4.3.3.3 Structures/landform

Dependent upon the proximity and exposure duration, excessive vibration may have the following effects:

- Cosmetic damage to structures
- Structural damage to structures potentially leading to failure
- Cause instability to landforms potentially leading to failure

4.3.4 Odour

4.3.4.1 Disturbance of lodge/reservoir silts

Although the lodge/reservoir is not a stagnant body of water, being continually charged/discharged by the un-named tributary of Pigs Lee Brook, general detritus may be

present in the base/silts causing an anaerobic environment. Post de-watering and during any disturbance a 'moderately offensive' odour as classified on the Hedonic Scale is anticipated to be present immediately adjacent to any works. However, low emission rates will mean that the odour will be rapidly dispersed and is not expected to cause nuisance beyond the site boundaries.

4.3.4.2 Contaminated soils

Several 'hotspots' of contaminated soils have been identified on site which are to be excavated/treated/disposed of during remediation works. Although an odour will be associated with these works is anticipated that it will be transitory at worst being diluted prior to any dispersal beyond the site boundary.

4.3.5 Surface water

4.3.5.1 General surface run-off

Due to the site being located in a valley (albeit modified to enable the former mill etc), surface run-off through site caused by rainfall occurs naturally. Generally, the waters flow in a southerly direction passing into the on-site drainage system the majority of which is assumed to drain into the culvert of the un-named tributary of Pigs Lee Brook.

4.3.5.2 Demolition

Dust and light-weight materials generated during demolition has the potential to be washed away by surface water run-off in the immediate area, leading to sedimentation of the un-named tributary of Pigs Lee Brook as well as littering from deleterious materials.

4.3.5.3 Bulk earthworks/remediation

Much of the developable area of the site requires earthworks to be carried out. These works necessitate the removal of hard standings and vegetation which will expose the underlying soils (which may be contaminated e.g. hydrocarbons/solvents etc) which will be susceptible to erosion

from surface run-off. Potentially this surface run-off will accumulate sediments which may cause sedimentation/pollution of the un-named tributary of Pigs Lee Brook

4.3.5.4 Silt stabilisation works

Any surface run-off passing through the area of silt stabilisation has the potential to cause a physical and/or chemical impact on the un-named tributary of Pigs Lee Brook.

4.3.5.5 Spillages

If exposed to surface run-off, spillages can be transported on site causing contamination to soils, as well as to the watercourses and possibly groundwater. Spillages are generally associated with leaks from heavy plant inc' diesel and hydraulic oil.

4.3.5.6 Flooding of the un-named tributary of Pigs Lee Brook

During prolonged periods of heavy rainfall there is the potential that a flood situation on-site may occur. The Environment Agency '*Flood Zone Map*' for the area identifies that the site is located within '*Flood Zone 1*' (low risk), with minor flooding of the site possible (mainly contained to the site roads) directly from the watercourse (and associated lodge/reservoir). In the event of a flood situation arising from the reservoirs to the north; there is the potential for the whole of the site to be flooded.

Any flooding on site has the potential to cause physical and/or chemical impact on environmental receptors across the site, including siltation of the un-named tributary of Pigs Lee Brook.

5.0 Environmental impact control measures

Management and physical control measures have been prepared to control any potential environmental impact which may be caused due to the works.

5.1 Site Management responsibilities

The Urban Regen Ltd. Project Manager will have the responsibility for ensuring that any potential sources of pollution/nuisance likely to be caused by site operations are prevented/minimised.

Robust procedures are to be implemented to carry out environmental monitoring with full and complete records held on-site within the relevant section of the '*Construction Phase Health and Safety Plan*'.

Regular 'Progress Meetings' will be carried out to discuss current and proposed site operations. These discussions will include the impact of works with regards to the environment.

5.2 Operational control measures

Operational control measures to mitigate against any potential environmental impact that the works may cause, are to be included within all '*task specific method statements*'.

5.2.1 Dust

Dust generation on site is anticipated, however, works will be planned and carried out in a manner to minimise any potential environmental impact/nuisance:

- Consideration is to be given to weather conditions which may cause dust to pass beyond the site boundary. If working methods and/or mitigation methods cannot control dust generation due to the weather i.e. windy conditions, works with the potential to cause dust are to cease until the weather is suitable/the generation of dust can be controlled.
- Works are to be planned and carried out to prevent/minimise dust passing beyond the site boundary e.g. demolition works to be carried out towards the prevailing wind to maximise the protection provided by the building being demolished.
- Soft strip to buildings is to be carried out as much as is practicable to reduce the volume of materials with the potential to become airborne.

- On-site dust suppression is to be carried out using a tractor/bowser as necessary (using the on-site water supply).
- Cement associated with the treatment of the lodge/reservoir silts is to be delivered to site in sealed 2t bags; being stored on a hardstanding (this area is to be bunded to protect the surrounding environment in the event that the bags become damaged and are subjected to surface run-off).
- Treatment works to the silts are to be carried out to minimise exposure to the wind and minimise the extent of any transitory dust.
- Cement to be used in the silt treatment process, is to be transferred to the work area in sealed 2t bags, immediately prior to being used.
- When mixing the cement, the bag is to be suspended just above the silt. A hole is to be cut in the base of the bag to allow the cement to drain out in a controlled manner over the top of the silt being treated (achieving the correct mixing ratio). Using a mixing bucket, the cement is to be carefully mixed through the silt as necessary ensuring that the generation of any dust is kept to a minimum.
- Treated silt is to be stockpiled in low windrows to minimise exposure to the wind and minimise the extent of any potential transitory dust (dust generation from treated materials that have cured is anticipated to be very low).
- Road vehicles delivering/removing potentially dusty materials to/from site are to be sheeted at all times.
- Road vehicles are to remain on hard standings at all times; being maintained/cleaned by a road sweeper as necessary to minimise dust/trafficking.
- A speed limit of 10mph is to be implemented across the whole of site.

- Site plant haul routes are to be segregated from road going vehicles to ensure that the access routes to/from site remain clean.
- The stockpiling of materials on site is to be minimised. Any stockpiles are to be located in relatively sheltered locations, the height of which are to remain >0.5m below the levels of any adjacent on-site buildings/structures/landforms.

5.2.2 Noise/vibration

Best Practical Means (BPM) of noise and vibration control is to be applied during the works to minimise any environmental impact/nuisance to the local environment. These include:

- Working hours are to be as detailed in the associated planning permission.
- Delivery/collection of plant/materials are to be made during established working hours.
- Vehicles/plant brought to site, are to comply with all statutory requirements; being maintained in a good and effective working order and operated in a manner to minimise noise and vibration emissions.
- Care is to be taken when unloading vehicles to avoid unnecessary noise.
- Plant maintenance operations are to be undertaken with consideration to local receptors i.e. located on hard standing away from the watercourse/culvert.
- The use of noisy plant is to be restricted i.e. not used early in the morning.
- Methods of work are to take into consideration noise and vibration nuisance mitigation techniques where possible.
- HGV's/plant are to be equipped with non-tonal reversing alarms where possible.
- HGV's attending site are not to access site in convoy.

- HGV's/plant movements are to be restricted to 10mph.
- HGV's/vehicles attending site are not to park off-site.
- HGV's/plant are not to wait with their engines running.
- Drop heights are to be minimised when loading.
- Compressor, generator, and engine compartments are to remain closed with plant turned off when not in use.
- Only silent pumps and generators are to be used on site.

5.2.3 Odour

Odour generation on-site is anticipated to be relatively low. However, works will proceed in a manner to minimise any potential environmental impact/nuisance:

- Silt excavation operations are to be carried out in a steady controlled manner causing minimal disturbance to the source material.
- The silts are to be treated with cement. This will stabilise the source material with regards to water and odour.
- If it becomes evident that odours are excessive; passing beyond the site boundary, works are to cease, and Smith Grant LLP (environmental consultants) contacted for advice.
- If necessary, an odour atomiser will be obtained to neutralise/break down any odours being generated.

5.2.4 Surface water

Surface run-off during site works is anticipated, however, works will be planned and carried out in a manner to minimise any potential environmental impact/nuisance:

- Where possible vegetation cover is to be maintained as much as is practicable to control surface run-off and allow natural percolation of waters across site.
- Consideration is to be given to weather conditions at all times. If working methods and/or mitigation methods cannot manage surface run-off on site all works with the potential to cause pollution are to cease until the weather is suitable/surface run-off can be controlled.
- Straw bales are to be placed down all surface gullies to act as localised silt traps whilst surface drainage is still live, mitigating suspended solids entering into the culvert of the un-named tributary of Pigs Lee Brook and the local drainage network.
- Works are to be planned and carried out to prevent pollution to the adjacent watercourse at all times. If the agreed working methods and/or mitigation methods cannot manage surface run-off on-site all works with the potential to cause pollution are to cease until the working and/or mitigation methods have been revised to enable the surface run-off to be controlled.
- Soft strip to buildings is to be carried out as much as is practicable to reduce the volume of deleterious materials with the potential to be washed away by surface run-off. Also, flows of surface run-off are to be directed away from immediate work areas.
- Prior to any treatment works to the silt, a temporary impermeable bund is to be constructed to prevent any bulk cement from being washed directly into the adjacent watercourse.
- Treated silts are to be temporarily stockpiled to cure in the immediate work area prior to being used in the treatment area as fills.
- The stockpiling of earthwork materials on site is to be minimised. Any stockpiles are to be located in relatively sheltered locations away from the adjacent water course.

- Where water flows/springs are encountered during the earthworks these are to be managed to direct them away from the works to mitigate against any potential siltation/contamination.
- Road vehicles are to remain on hard standings at all times; being maintained/cleaned by a road sweeper as necessary to prevent a build-up of fines with the potential to be washed away by surface water run-off and cause siltation/pollution to the un-named tributary of Pigs Lee Brook.
- The road sweeper is to discharge its contents at a suitable location where the swept arisings are not going to be impacted by surface waters or flow directly into any adjacent watercourses.
- Site plant haul routes are to be segregated from road going vehicles to ensure that the access routes to/from site remain clean. Preferably, during earthworks, site plant haul routes will be located off hard standings which form preferential routes for surface water run-off.
- Fuel/oil stores are to be located on elevated hard standings greater than 10m from any watercourse. They are also to be located away from any potential surface water run-off flows e.g. sloping roads. Any fuel tanks are to be bunded. Bunded areas are to be established around the re-fuelling facility and any oil storage areas to contain any potential spillages.
- Suitable spill kits are to be located around site and be readily available to clean up/contain any minor spillages.
- An emergency procedure to deal with spillages is to be implemented prior to works commencing.

- Prior to works commencing, sign up to the Environment Agency ‘Floodline’ flood warning system (see <https://www.fws.environment-agency.gov.uk/app/olr/register>). Also monitor the Environment Agency website for additional information on local water levels as recorded at specified monitoring points.
- In the event that a flood event is predicted, works are to cease and all potential sources of pollution, located in and/or around the impact area, are to be relocated out of any likely flow path as much as is practicable, to minimise any impact on the watercourse or adjacent environment. Also, if possible, a temporary route is to be formed e.g. by constructing a temporary bund, to direct any waters on-site to ensure that they do not flow into any potentially exposed contamination or recently cement stabilised silts.
- In the event that a flood is expected from the reservoirs located upstream of the unnamed tributary of Pigs Lee Brook, works are to cease, and all potential sources of pollution located in and/or around the site are to be relocated as much as is practicable, to a safe secure area, to minimise any impact on the watercourse or adjacent environment. The site is then to be evacuated until the flood event has passed.

6.0 Environmental monitoring/measurement

Prior to any works commencing the Urban Regen Ltd. Project Manager is to check and document the weather conditions on the '*Daily Site Diary*'. This enables potential weather associated issues to be predicted, with proactive remedial actions implemented prior to any issues arising. The assessing of the weather conditions should be an ongoing process with the information recorded at regular intervals.

All staff responsible for carrying out monitoring will receive appropriate training arranged by the Urban Regen Ltd. Project Manager.

All on site personnel are responsible for reporting any environmental issues to the Urban Regen Ltd. Project Manager immediately. This will be instructed during the site-specific site induction.

All inspection/monitoring information associated with the works are to be recorded on the designated forms and held on-site in the relevant register of the '*Construction Phase Health and Safety Plan*'.

6.1 Dust

The Urban Regen Ltd. Project Manager (or designated person – 'DP') will carry out visual dust monitoring a minimum of daily, with all information recorded on the '*Daily Dust Inspection Form*' (see Appendix E). If planned works are being carried out which may generate dust these inspections are to be increased, as necessary.

Dust monitoring is to be carried out in the following manner:

- An initial assessment of any dust is to be carried to visually determine any locations of dust generation.

- After the initial assessment has been carried out any suspect locations are to be visited to determine if dust is impacting on any environmental receptors and/or migrating beyond the site boundary.
- If dust is identified as impacting on environmental receptors and/or migrating beyond the site boundary, the source of the dust is to be identified and any corrective/remedial actions carried out to minimise any potential receptor impact.
- To supplement the daily visual dust monitoring, dust monitoring points (sticky pads) are to be established around the site boundary to record the presence of nuisance dust. These are to be analysed by a specialist consultant to provide a formal quantification on a fortnightly basis (see Appendix D).

Any dust issues reported to the Urban Regen Ltd. Project Manager are to be investigated immediately with the information recorded on the '*Dust Investigation Form*' (see Appendix E).

6.2 Noise and vibration

6.2.1 Noise measurement

The measurement of noise and exposure to noise is a specialist activity.

The unit of measurement for noise (unwanted sound) is a decibel (dB). This scale is logarithmic meaning that 90dB is ten times the intensity of 80dB and one hundred times the intensity of 70dB.

An increase of 3dB doubles the energy in the sound. This means that 87dB is actually twice as damaging as 84dB, even though the 3dB difference in sound level is difficult to perceive.

In construction there are various action levels to control exposure to noise. These are:

80dB(A) Employers must assess the risk to worker's health and provide them with relevant information.

85dB(A) Hearing protection must be provided.

87dB(A) Workers must not be exposed to noise levels that exceed this.

The various action levels are meaningless to anyone who does not have an accurate way of calculating noise levels, however, there are two rules of thumb which provide a rough indication of noise levels:

One metre rule If two people standing one metre apart, who are not wearing hearing protection, have to raise their voices to hear each other, the noise level is around or above 90dB.

Two metre rule If two people standing two metres apart have to raise their voices to hear each other, the noise level is around 85dB.

6.2.2 Vibration measurement

The measurement of vibration and exposure to vibration is a specialist activity.

In construction there are specific definitions associated with the measurement of vibration:

Daily exposure the extent of mechanical vibration a worker is exposed to during the working day which takes into account both the magnitude and duration of vibration.

Exposure Action Value (EAV) the level of daily exposure that, if exceeded, requires specific action to be taken to reduce risk.

Exposure Limit Value (ELV) the level of daily exposure for any worker that must not be exceeded.

Dependent upon the type of exposure to vibration being monitored there are different values. In this instance ‘*Whole-body vibration*’ has been considered; the relevant exposure limits being:

Daily exposure action value $0.5\text{m/s}^2 \text{ A}(8)$

Daily exposure limit value $1.15\text{m/s}^2 \text{ A}(8)$

(where A(8) represents a working day of 8 hours)

The impact of vibrations on structures is also to be considered.

6.2.3 Monitoring

Due to the location of the site, it is not anticipated that there should be any issues regarding noise and vibration with regards to the local environment, therefore, no formal monitoring is to be carried out unless it is deemed necessary. Instead, '*observational*' noise and vibration monitoring is to be carried out by Urban Regen Ltd. site personnel. In the event that formal noise and vibration is deemed necessary, a professional consultant is to be contracted to carry out the necessary monitoring.

Prior to any works commencing the Urban Regen Ltd. Project Manager is to carry out an external photographic record of the closest properties to the site to provide a baseline in the event of any reported damage.

The Urban Regen Ltd. Project Manager (or designated person – 'DP') will carry out '*observational*' noise and vibration monitoring a minimum of daily, along the site boundary, generally in line with the point source of noise and vibration and the nearest residential properties. All monitoring information is to be recorded on the '*Daily Noise and Vibration Inspection Form*' (See Appendix F). If planned works are being carried out which may generate potential excessive noise and vibration these inspections are to be increased, as necessary.

'*Observational*' noise and vibration monitoring is to be carried out in the following manner:

- The person carrying out the noise and vibration monitoring is to attend the designated monitoring location. Facing towards the noise and vibration point source, the person is to assess the general level of noise and vibration.
- If the noise is assessed as potentially excessive at this location the person carrying out the monitoring is to try and determine if the noise level is at the 85dB action level by carrying out the 'two metre test', with a site colleague. If the noise value is deemed to be in the region of 85dB works are to cease and any corrective/remedial actions carried out to reduce any potential receptor impact.
- If the vibration is assessed as potentially excessive at this location the source of the vibration is to be identified any corrective/remedial actions carried out to reduce any potential receptor impact.
- If deemed necessary, specialist consultants are to be employed to carry out the necessary tests to confirm noise and vibration levels and assist with modifications to the working methods as required.

Any noise and vibration issues reported to the Urban Regen Ltd. Project Manager are to be investigated immediately with the information recorded on the '*Noise and Vibration Investigation Form*' (See Appendix F).

6.3 Odour

During works associated with silt stabilisation, the Urban Regen Ltd. Project Manager (or designated person – 'DP') will carry out odour monitoring a minimum of daily, along the site boundary, with all information recorded on the '*Daily Odour Inspection Form*' (See Appendix G). If planned works are being carried out which may generate additional odour these inspections are to be increased, as necessary.

Odour monitoring is to be carried out in the following manner:

- The person carrying out the odour monitoring will walk slowly along the boundary breathing normally. If an odour cannot be detected in this way, the person is to periodically stand still, face upwind and inhale deeply.
- If an odour is identified at site boundary, the source of the odour is to be identified and any corrective/remedial actions carried out to minimise any potential receptor impact.

Wherever possible, odour inspection is to be carried out by a person unlikely to suffer from adaptation of odour.

People carrying out the odour inspections will be instructed to avoid strong food or drinks for at least 1 hour prior to inspection.

Personnel who have a cold, sore throat or sinusitis will not be allowed to carry out an odour assessment.

Any odour issues reported to the Urban Regen Ltd. Project Manager are to be investigated immediately with the information recorded on the '*Odour Investigation Form*' (See Appendix G).

6.4 Surface water

The Urban Regen Ltd. Project Manager (or designated person – 'DP') will carry out visual monitoring of surface waters a minimum of daily at the designated monitoring points (see Appendix D) with all information recorded on the '*Daily Surface Water Inspection Form*' (see Appendix H). If planned works are being carried out which may generate surface water issues these inspections are to be increased, with additional monitoring points established, as necessary.

Surface water monitoring is to be carried out in the following manner:

- Prior to any works commencing, the Urban Regen Ltd. Project Manager will carry out initial visual monitoring of the monitoring points, with a photographic record made to provide

a permanent record. This information is to be used to provide a baseline for all future monitoring. These monitoring points are:

- Un-named tributary of Pigs Lee Brook, upstream of the lodge/reservoir (SW1) – *for the duration of the works.*
 - Un-named tributary of Pigs Lee Brook, downstream of the culvert discharge point (SW2) – *for the duration of the works*
 - Un-named tributary of Pigs Lee Brook, lodge/reservoir spillway (SW3) – *for the duration of the lodge/reservoir de-watering works and until the Un-named tributary of Pigs Lee Brook is realigned/diverted.*
 - Additional temporary monitoring points established dependent upon works requirements.
- During the works all of the monitoring points are to be inspected a minimum of daily with images taken as a permanent record.
 - If necessary, Smith Grant LLP (environmental consultants) are to attend site and take samples for analysis at the monitoring points.

In addition to monitoring points detailed above, a graduated marker post is to be established within the upstream confines of the un-named tributary of pigs Lee Brook channel. This marker post is to be monitored regularly to identify the current water level and determine if it is rising – which may indicate that a flood event on site is imminent.

Any surface water issues reported to the Urban Regen Ltd. Project Manager are to be investigated immediately with the information recorded on the ‘*Surface Water Investigation Form*’ (See Appendix H).

7.0 Environmental mitigation procedure

Any environmental issues can be identified by either:

- On-site reporting of environmental issues by site personnel.
- Detection of environmental issues as part of the monitoring procedure.
- By receipt of an environmental complaint from a third party.

Any environmental issues are to be mitigated as follows:

- If surface water run-off is contaminating the un-named tributary of Pigs Lee Brook or the lodge/reservoir, it is to be diverted/stopped immediately and/or contained.
- Any chemical/pH impacted waters are to be tested to determine management/disposal requirements. It may also be necessary to sample the associated soils to determine contamination level and any methods of remediation that may be necessary.
- The Urban Regen Ltd. Project Manager will carry out an assessment of the works causing the environmental issue to ensure that they are being carried out as detailed in the relevant '*Method Statement*'.
- If works are found to be being carried out incorrectly all associated personnel are to be re-briefed on the associated '*Method Statement*' to ensure correct procedures are followed.
- If the works are identified as being carried out as detailed in the relevant '*Method Statement*', and environmental issues are still evident, works are to be modified to prevent the issue.

- If works cannot be modified sufficiently to prevent environmental issues, works are to cease until additional methods are implemented which can prevent the environmental issue.
- Any outcome of the environmental mitigation is to be documented and discussed at the following '*Progress Meeting*'.
- Operational procedures will be reviewed by the relevant Director to confirm compliance.

8.0 Complaints procedure

Any environmental complaint is to be reported to the Urban Regen Ltd. head office immediately.

Any environmental complaint is to be entered onto the relevant complaints form (see Appendix E/F/G and H) by the Urban Regen Ltd. Project Manager; being entered into the relevant section of the '*Construction Phase Health and Safety Plan*'.

The Urban Regen Ltd. Project Manager is to ensure that:

- The environmental complaint is investigated to identify the cause of the complaint.
- Any abnormal on-site activity is to be assessed, and if necessary, preventative action taken to prevent a reoccurrence of the same problem. Any actions are to be documented.
- The investigation is to be forwarded to the relevant Director for review/comment.
- The Complainant is to be contacted and updated on the investigation and the actions taken.
- The complaint is to be discussed at the following '*Progress Meeting*' identifying the cause and the measures implemented to prevent any reoccurrence.
- Any changes to site procedures to prevent reoccurrence are to be documented and conveyed to site personnel in a '*toolbox talk*'.
- If the investigation indicates that the complaint has not been justified this will also be recorded on the relevant complaint form.

9.0 Personnel, plant, and equipment

9.1 Site personnel

All personnel associated with the works are to be suitably trained, competent, and certificated.

These personnel include:

- Project Manager
- WAMITAB technically competent Manager (provided by Urban Soil Solutions Ltd)
- Site Engineer
- Qualified Plant Operators
- Labourers

All personnel are to be in possession of a valid and suitable CPCS/CCDO/CSCS/NPORS card or similar. Project Managers and Supervisors must also be possession of an SMSTS or SSSTS certificate, respectively. Copies of all certification are to be kept in the relevant section of the '*Construction Phase Health and Safety Plan*'; being recorded on the relevant register. Random certification checks are to be carried out, as necessary.

Site personnel are only to use plant and equipment that they are trained and authorised to use.

All site personnel are to receive a site specific '*Safety Induction*' and be briefed on task specific '*Risk Assessments*' and '*Method Statements*' prior to commencing any works on site. They are also to be briefed on the items held on the COSHH register which they are likely to encounter. These briefings are to be signed for and entered into the relevant register of the '*Construction Phase Health and Safety Plan*'.

Dependent upon the works to be carried out, site personnel will may also be briefed on various permits e.g. Permit to Work, Permit to Dig, Hot Works Permit etc. These briefing will also be signed for and entered into the relevant register of the '*Construction Phase Health and Safety Plan*'.

All personnel are to sign in and out of site daily using the relevant register of the '*Construction Phase Health and Safety Plan*'.

NOTE: All works associated with the treatment of the silts in the lodge/reservoir are to be directly managed by the WAMITAB technically competent manager provided by Urban Soil Solutions Ltd.

9.1.1 Training records

Personnel training is on-going, being structured to provide continual development in general site health and safety as well as their chosen discipline. Training is carried out both internally and externally with obtained certification entered onto the Urban Regen Ltd. '*Training Matrix*' (at the head office), which is used to determine staff competency for specific tasks (see Appendix I).

9.2 Plant and equipment

All plant will be accompanied with the relevant certification in accordance with '*PUWER Regulations 1998*' and provided to the Principal Contractor for entry into the relevant register of the '*Construction Phase Health and Safety Plan*'.

All machines must allow the operator to have a minimum of 1m visibility around the full perimeter of the machine at all times.

All self-propelled mobile plant operated on site must have an amber warning beacon to alert pedestrians and other plant users of operational equipment in the immediate vicinity.

All plant (inc' attachments) must be inspected and maintained daily in accordance with the manufacturer's recommendations prior to use (or post re-configuration); a written report made weekly and provided to the Principal Contractor for entry into the relevant register of the '*Construction Phase Health and Safety Plan*'.

In the event that an item of plant is faulty/damaged, it is to be taken out of service until a suitable repair has been completed or it has been replaced.

Any maintenance of plant and equipment must only be carried out by suitably trained and authorised personnel.

When not in use, all plant and equipment are to be stored securely in the plant compound located to the south of the site adjacent to the welfare facilities.

10.0 Contingency plans

To minimise any environmental impact from unforeseen events, the following contingency plans are to be implemented (see also Appendix J):

10.1 Breakdowns

In the event that an item of plant is faulty/damaged, it is to be taken out of service until a suitable repair has been completed or it has been replaced.

In the event of a total breakdown, the plant operator is to inform the Urban Regen Ltd. Project Manager immediately. The item of plant is then to be made safe by turning it off, removing the keys, isolating it, and establishing an exclusion zone around it.

Dependent upon the type of breakdown e.g. oil/fuel leak, it may be necessary to use spill kits to clean up any small leaks. For larger spillages it may be necessary to bund the area to contain any oil/fuel within the immediate area, minimising the extent of any contamination. The area can then be remediated as necessary, with the contaminated materials disposed of at a suitably licensed facility.

Any maintenance of plant and equipment must only be carried out by suitably trained and authorised personnel.

10.2 Enforced shutdowns

In the event of an enforced shutdown, all work areas are to be made safe, and all plant and equipment relocated to the secure plant compound for storage until further notice.

If, during the enforced shutdown period, critical tasks are being carried out which are required to remain live for health and safety and/or environmental reasons, this is to be agreed with senior Urban Regen Ltd. Management. If agreed, only the specific operation is to be maintained.

10.3 Unexpected conditions

Urban Regen Ltd. are carrying out the site wide remediation and preparatory works as well as the realignment/diversion of the un-named tributary of Pigs Lee Brook watercourse/culvert to enable the area to be redeveloped. As such, extensive site investigation has been carried out to identify potential areas of contamination.

The majority of the site is covered with made ground which varies between 0.5m – 11m deep. This is impacted with inorganic heavy metals, asbestos fibres, and non-volatile PAH's. Initial monitoring has also identified the presence of marginally elevated methane (CH₄) and carbon dioxide (CO₂) within the deep made ground. Monitoring is to continue through the works.

Elevated volatile (aliphatic and aromatic) petroleum range (BTEX) compounds have been identified within the shallow soil and groundwater adjacent to the above ground storage tanks (AST's) used for the storage/recovery of bulk solvents and the underground storage tanks (UST's) used to store petrol, diesel, and white spirit. Upon decommissioning/demolition of the tanks, additional site investigation is to be carried out in this area to develop the 'Remediation Strategy' to the satisfaction of the Local Authority and the Environment Agency.

Further post demolition site investigation is also necessary to further characterise the nature of the deep fills associated with the former reservoirs on-site.

Soil concentrations for the identified contaminants have been compared against accepted limits and categorised as having no significant impact to human health or controlled waters.

If during the works any additional suspected contamination/pollution is encountered or site conditions suddenly change, all associated works are to cease, and the Urban Regen Ltd. Project Manager informed immediately. The work area is then to be reassessed (by Smith Grant LLP if necessary – environmental consultants), and documentation updated/revised as necessary prior to works recommencing.

If the work area is to remain '*quarantined*' for a prolonged period, it is to be made safe and a suitable exclusion zone established around it to prevent unauthorised access.

10.4 Changes in normal operations

In the event that a flood event is predicted, works are to cease and all potential sources of pollution, located in and/or around the impact area, are to be relocated out of any likely flow path as much as is practicable, to minimise any impact on the watercourse or adjacent environment. Also, if possible, a temporary route is to be formed e.g. by constructing a temporary bund, to direct any waters on-site to ensure that they do not flow into any potentially exposed contamination or recently cement stabilised silts.

In the event that a flood event is expected from the reservoirs located upstream of the un-named tributary of Pigs Lee Brook, works are to cease and all potential sources of pollution located in and/or around the site, are to be relocated as much as is practicable, to a safe secure area, to minimise any impact on the watercourse or adjacent environment. The site is then to be evacuated until the flood event has passed.

Upon return to the site, flood damage is to be assessed and all resultant waste removed off-site to a suitably licensed facility.

11.0 Emergency procedure

Should an emergency incident occur all works are to stop, the Urban Regen Ltd. Project Manager is to be informed immediately, and the '*Emergency Plan*' is to be implemented.

The '*Emergency Plan*' is prepared as part of the '*Construction Phase Health and Safety Plan*' and provides information/details the procedures to be followed, in the event of physical injuries, mechanical damage or environmental impact etc.

As a minimum the '*Emergency Plan*' identifies the following:

- Emergency contacts (e.g. emergency services/Environment Agency/Waste Management and Spill Management contractors/water companies etc.)
- Site contact details
- Site specific restrictions (e.g. working hours/noise restrictions/protected and restricted areas etc.)
- Site layout plan detailing the main site features, foul and surface water drainage, waste locations (skips/stockpiles), sensitive receptors (inc' residents), protected or restricted areas, spill response equipment, firefighting equipment, first aid equipment etc.
- Record of fuels/oils/chemicals on site detailing location, quantity/volume, hazard and means of use.
- A flow diagram detailing the procedure to follow in the event of an incident.

All site personnel are to be briefed on the '*Emergency Plan*' during the site induction.

The emergency procedure/plan is to be displayed on the site '*Notice Board*' at all times being updated as necessary as the works progress.

Accident/incident investigation is to be carried out by a Director/external health and safety consultant (or competent delegated person), in conjunction with the Relevant Urban Regen Ltd. Project Manager. If, the accident/incident is notifiable, it is to be reported to the HSE accordingly.

Recommendations following an accident/incident investigation are to be incorporated into the health and safety management process to prevent a re-occurrence of a similar incident.

A record of any accident/incidents and associated investigations, are to be retained on site; being held within the relevant register of the '*Construction Phase Health and Safety Plan*'.

12.0 Quality, compliance, and review (see also Appendix K)

This site specific '*Environmental Management System*' is to be managed in accordance with the Urban Regen Ltd. and Urban Soil Solutions Ltd. quality and environmental management system accreditation to ISO 9001 and 14001, respectively.

It will be the responsibility of the Urban Regen Ltd. Project Manager to ensure that this site specific '*Environmental Management System*' is adhered to.

It will be the responsibility of the relevant Director to carry out monitoring, auditing, and evaluation of site performance to ensure compliance with the ISO 9001 and 14001, standard.

This site specific '*Environmental Management System*' will be reviewed through internal audits as part of the '*Quality and Environmental Management Systems*'.

External audits will be carried out to ensure that the ISO 9001 and 14001 standards are retained.

13.0 Record keeping

All records associated with the site are to be held within the relevant register of the '*Construction Phase Health and Safety Plan*' for the duration of the contract, prior to being archived for a minimum of 7 years. These records include the following information:

- Pre-construction information
- Planning permission
- Regulatory correspondence (inc' notifications and permits)
- Remediation strategy
- Method statements
- Risk assessment
- COSHH assessments
- Environmental management plans
- Engineering drawings
- Certification (personnel/plant, etc)
- Permits
- Monitoring/inspections
- Chemical analysis/validation testing
- Materials management plan
- Material tracking records
- As built plans
- Accident book/incident reporting
- Emergency procedures

Appendix A Site layout plan (including design)

Appendix B Watercourse realignment overview

Appendix C Works programme

Appendix D Monitoring points location plan

Appendix E Dust inspection/investigation/ complaints form

Appendix F Noise and vibration inspection/ investigation/complaints form

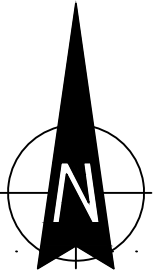
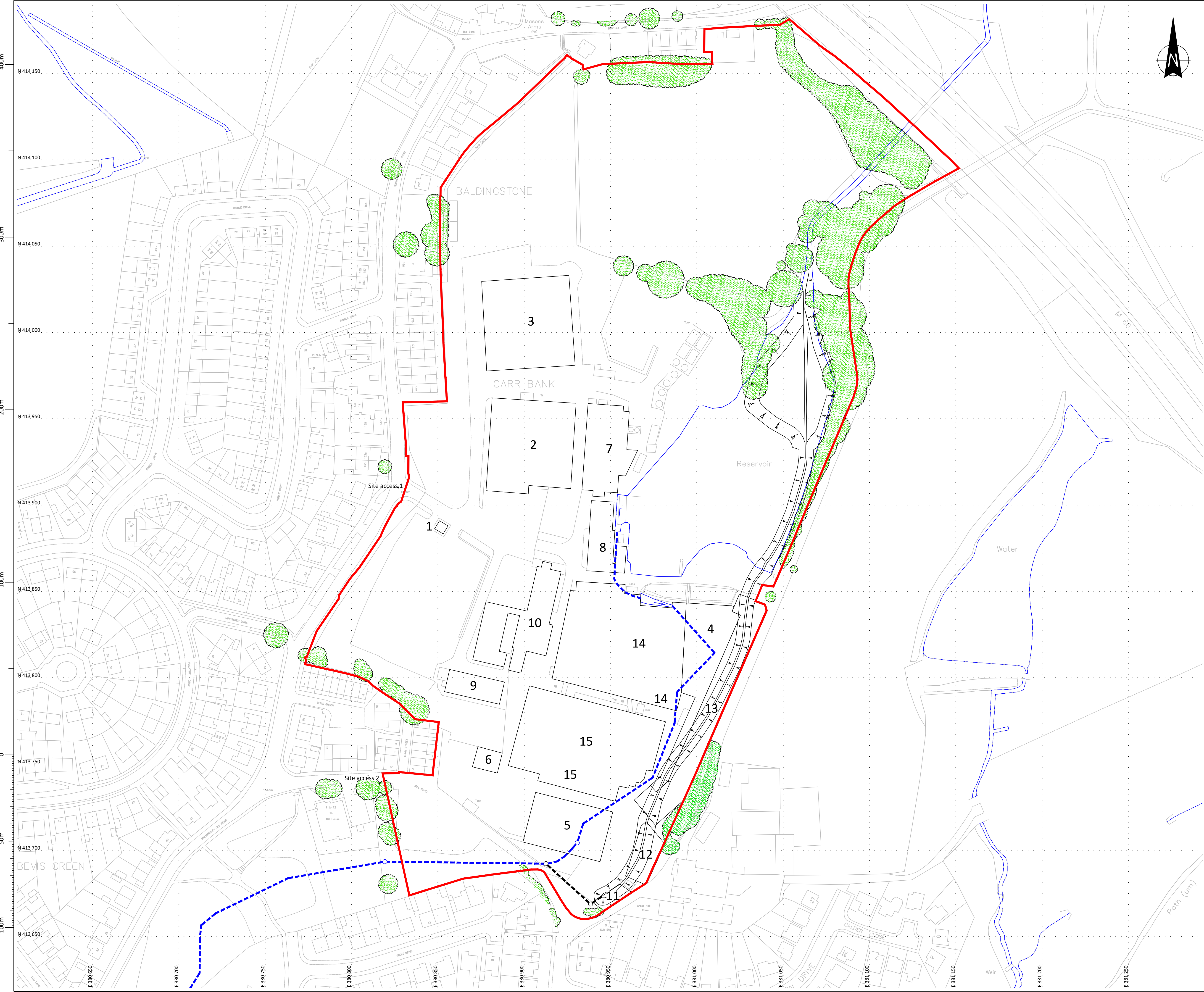
Appendix G Odour inspection/investigation/ complaints form

Appendix H Surface water inspection/ investigation/complaints form

Appendix I Urban Regen Ltd. training matrix

Appendix J Contingency Plan

Appendix K Policies, manuals, and certification



- Legend:**
- Site boundary
 - Buildings to be demolished (see note 5)
 - Un-named tributary of Pigs Lee Brook (see note 7)
 - Other existing watercourses/water bodies
 - Un-named tributary of Pigs Lee Brook realignment (see note 10)
 - Un-named tributary of Pigs Lee Brook culvert - existing
 - Un-named tributary of Pigs Lee Brook culvert - new section
 - Trees/vegetation to be retained (see note 15)

- Notes**
- This plan is to be read in conjunction with all other documentation associated with the re-alignment/diversion of the un-named tributary of Pigs Lee Brook watercourse/culvert.

Survey Information:			
Co-ord System:	Co-ord Type:	Primary Survey Control:	Secondary Survey Control:
OSGB36(15)	Grid	Leica SmartNet	Site

Rev	Date	Amendment	Drawn	Checked



Urban Regen Ltd.
23 Springvale,
Edgworth,
Bolton,
BL7 9PS
Tel: 071204 595 933
Email: info@urbanregen.co.uk
Web: www.urbanregen.co.uk

Client:

Barratt Homes (Manchester)

Project:

Tetrosyl, Bury

Title:

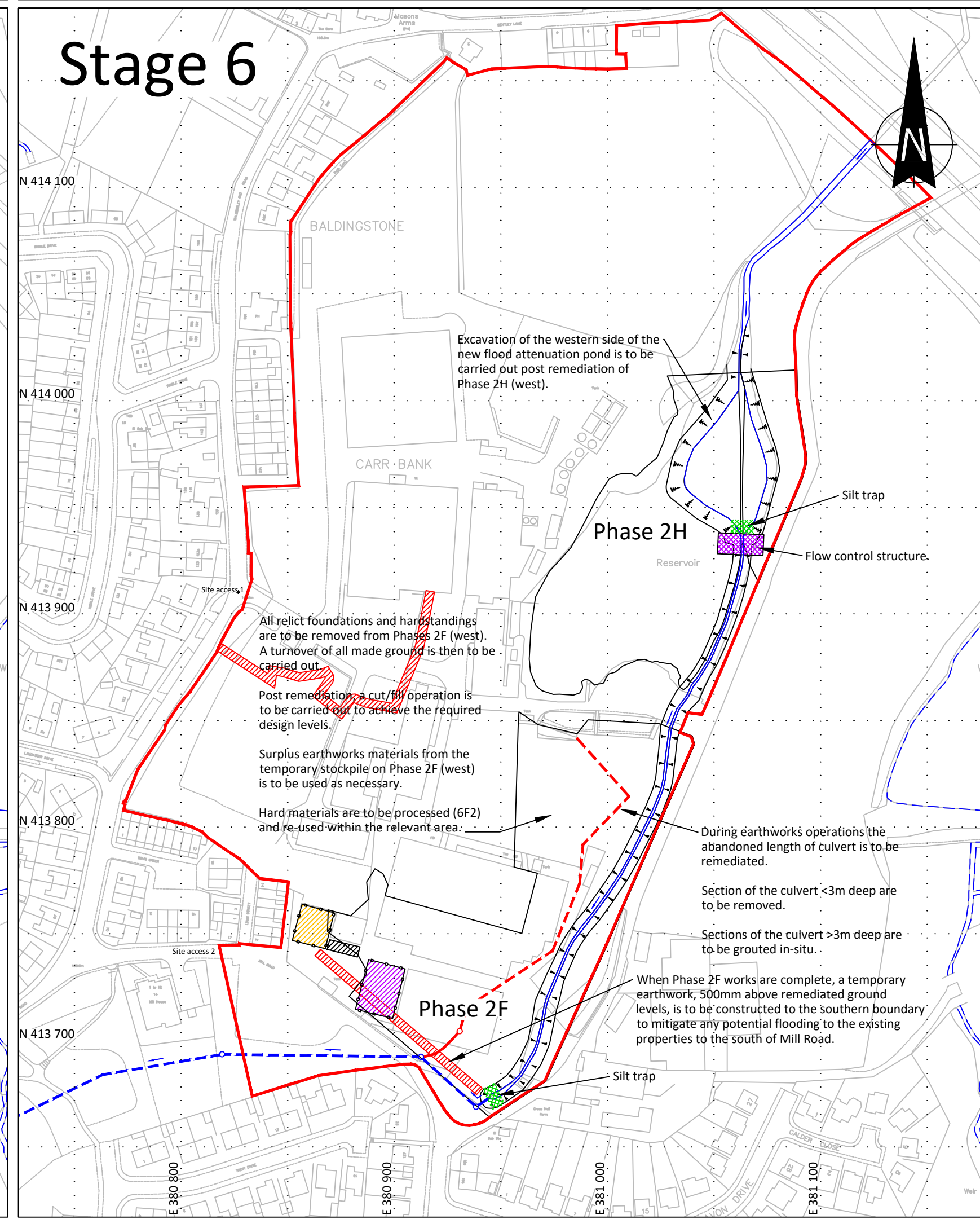
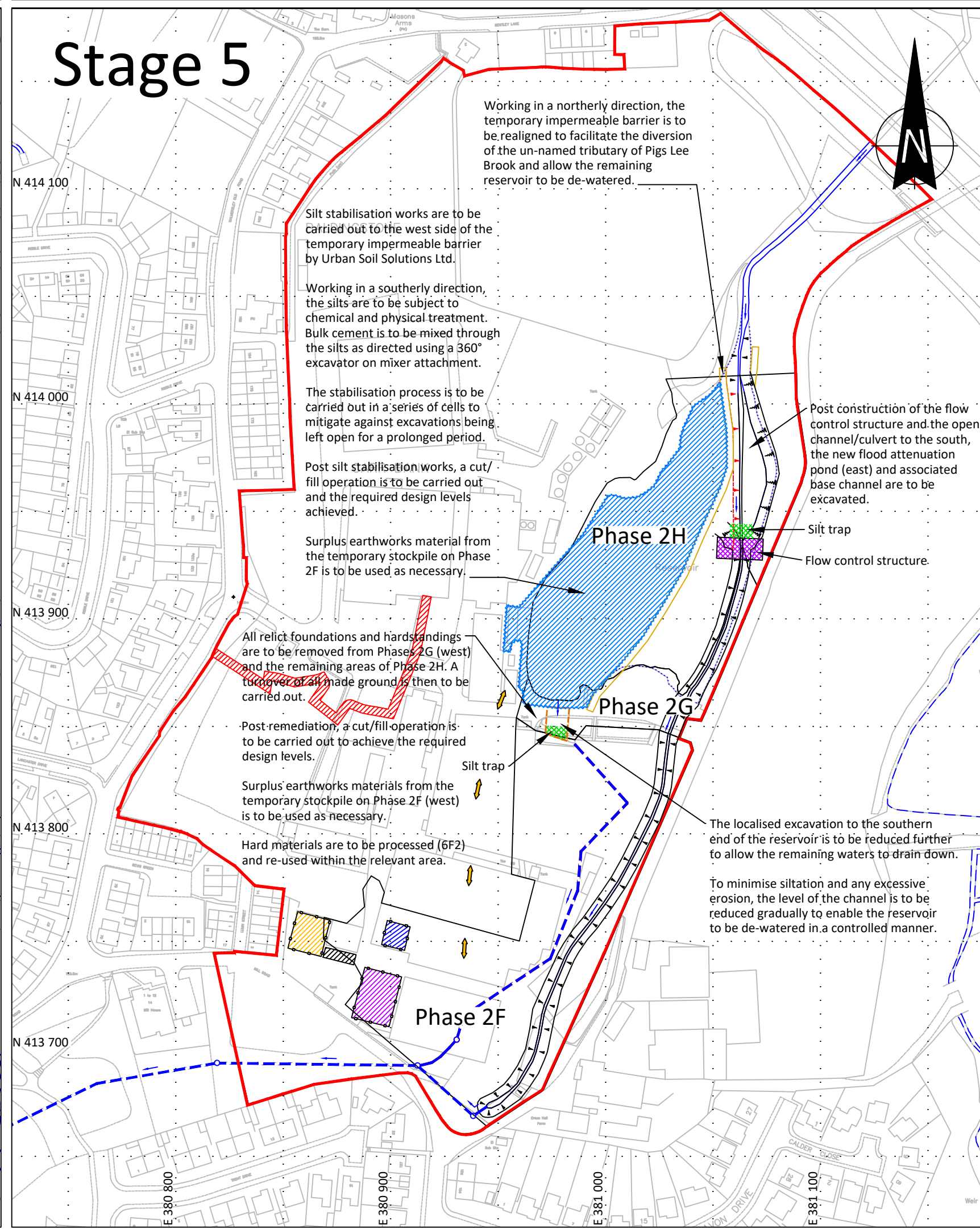
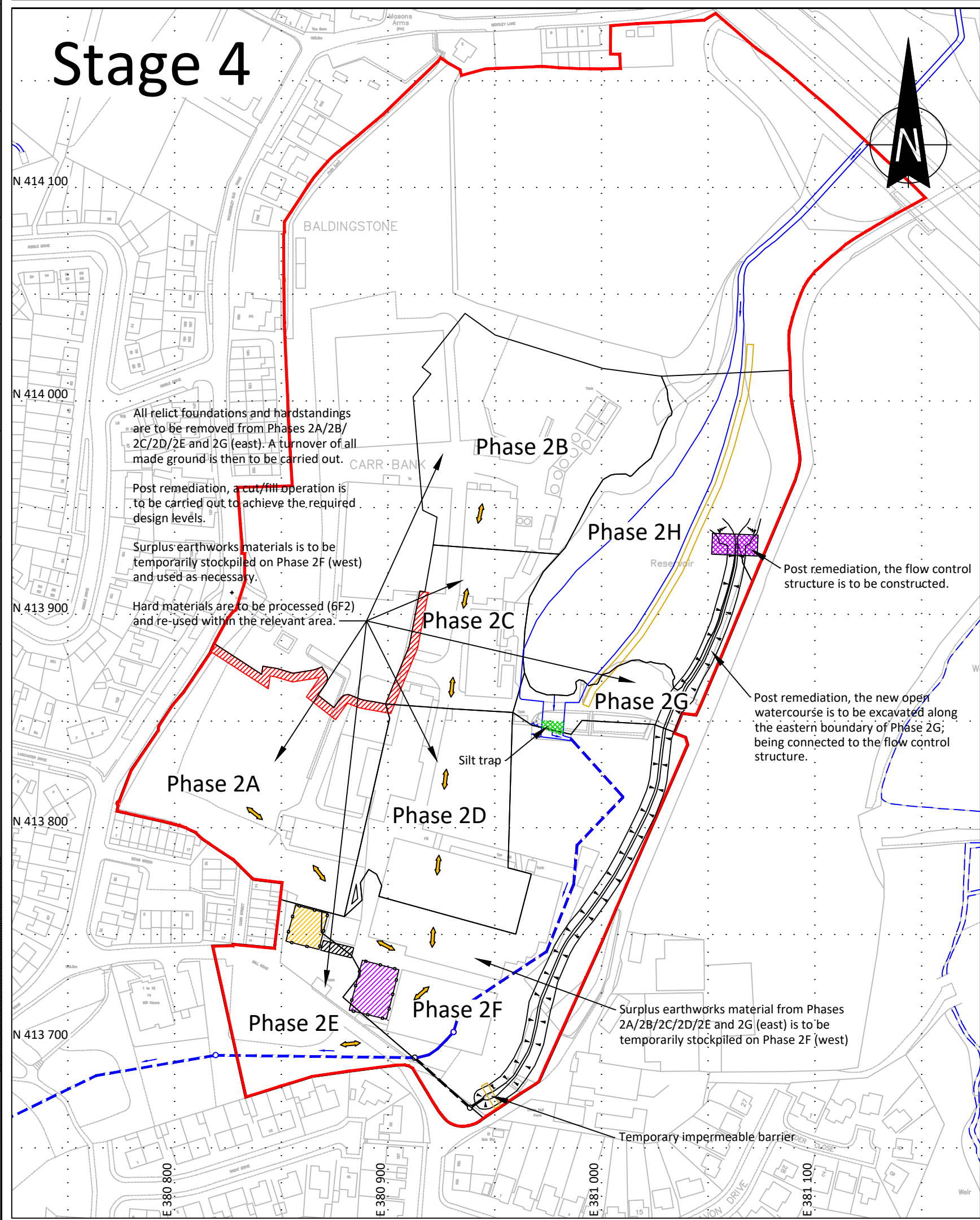
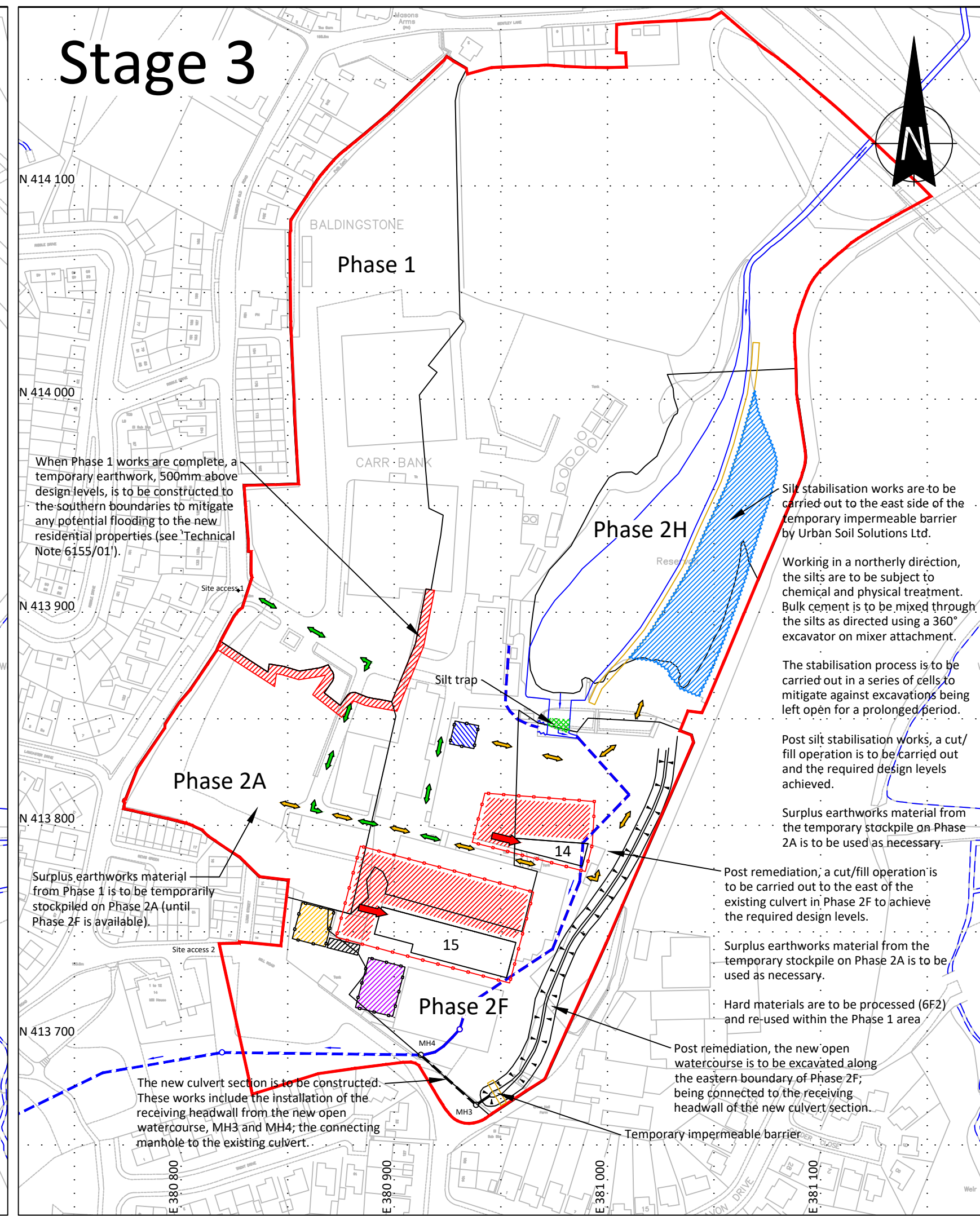
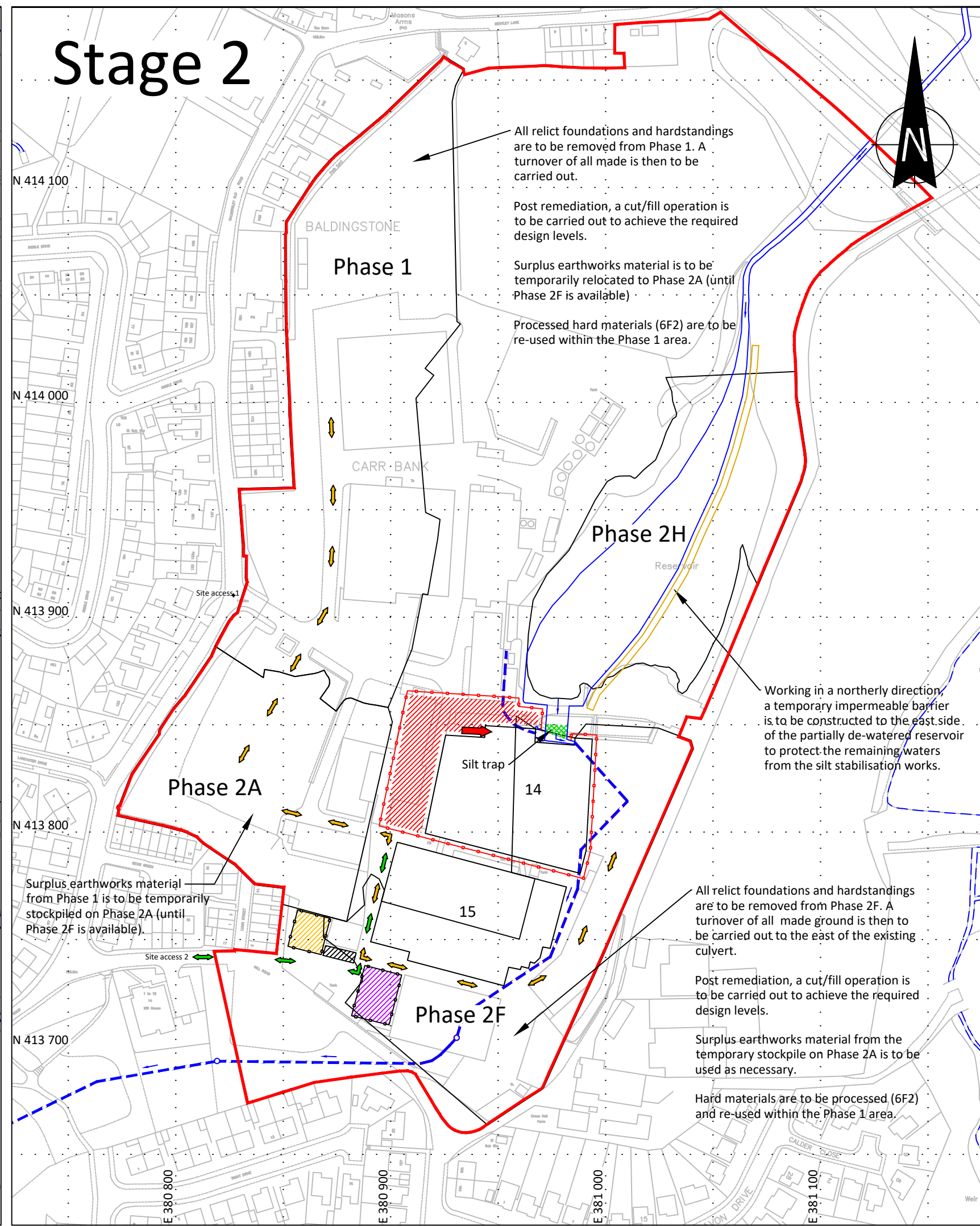
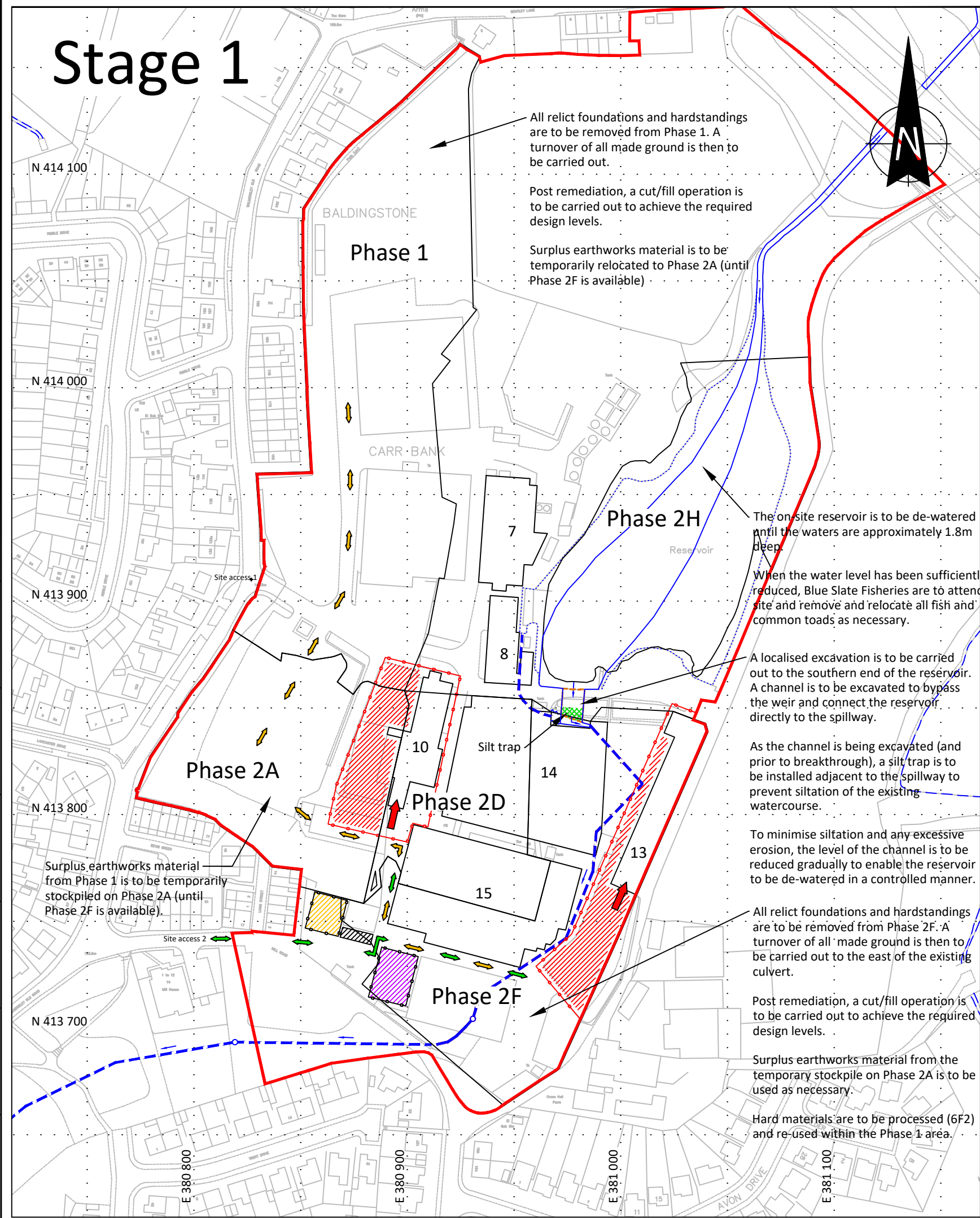
**Site layout plan
(including design)**

Scale:	First Issue:	Drawn:	Checked:
1:1000@A1	18th May 2020	D.J.Woodrow	G.Owen

Drawing No:

333-20-002

Revision:



Legend:

- Site boundary
- Phase boundaries
- Urban Regen Ltd. welfare facilities (see notes 3 and 5)
- Urban Regen Ltd. carpark
- Urban Regen Ltd. plant compound (see notes 4 and 5)
- Haul route - road vehicles (see note 6)
- Haul route - plant (see note 6)
- Buildings to be demolished (see note 7)
- Direction of demolition
- Exclusion zone fencing (see notes 7 and 8)
- Processing area (see note 8)
- Pigs Lee Brook reservoir/watercourse - live (see note 9)
- Other existing watercourses/waterbodies
- Pigs Lee Brook culvert - live
- Direction of flow
- Former extent of reservoir
- Localised excavation
- Silt trap
- Temporary impermeable barrier
- Bulk cement storage
- Silt stabilisation works
- Temporary 500mm flood barrier (see note 10)
- Pigs Lee Brook culvert - to be abandoned
- Pigs Lee Brook realignment/diversion
- Pigs Lee Brook culvert realignment/diversion
- Flow control structure
- Temporary channel

Notes

- This plan is to be read in conjunction with drawing '333-20-001-01 Site infrastructure plan (existing layout and design)', and all other documentation associated with the re-alignment/diversion of the un-named tributary of Pigs Lee Brook watercourse/culvert.
- To aid drawing clarity, the following information has been omitted:
 - Surface water flood zones.
 - Trees/vegetation to be retained.
 - Identified ecology.
- Urban Regen Ltd. welfare facilities contain all necessary welfare provisions including fire fighting equipment and first aid.
- Urban Regen Ltd. plant compound provides:
 - a secure location for all heavy plant to be stored.
 - a secure area for all fuels and oils to be stored (plus spill kits).
 - suitable waste disposal facilities.
- Post demolition, the Urban Regen Ltd. welfare facilities and plant compound are to be relocated to a convenient location to accommodate the necessary earthworks.
- Plant haul routes are to be established on hardstandings as much as is practicable to prevent/minimise trafficking on/off site.
- All buildings on-site are to be demolished. HERAS fencing is to be established around demolition operations to form exclusion zones to contain the works and prevent unauthorised access.
- All processing and storage of demolition arising's is to be carried out within the associated fenced exclusion zone.
- When carrying out works on or adjacent to the 'live' un-named tributary of Pigs Lee Brook watercourse/culvert, any environmental impact is to be prevented/minimised. If direct environmental impact cannot be prevented, suitable mitigation measures are to be implemented to restrict the effects of any works on the wider Pigs Lee Brook watercourse.
- To prevent potential flooding to properties, earthworks (500mm above finished design levels) are to be established to control flood waters for the duration of the residential development works.

Survey information:

Co-ord System:	Co-ord Type:	Primary Survey Control:	Secondary Survey Control:
OSGB36(15)	Grid	Leica SmartNet	Site

A	29/05/20	500mm flood bund detail added.	D.J.W	G.O
Rev	Date	Amendment	Drawn	Checked

urban regen

Urban Regen Ltd.
23 Springdale,
Edgworth,
Bolton,
BL7 0PS
Tel: 071204 595 993
Email: info@urbanregen.co.uk
Web: www.urbanregen.co.uk

Client: **Barratt Homes (Manchester)**

Project: **Tetrosyl, Bury**

Title: **Site infrastructure plan (design installation stages)**

Scale:	First Issue:	Drawn:	Checked:
1:2000@A1	18th May 2020	D.J.Woodrow	G.Owen

Drawing No: **333-20-001-02**

Revision: **A**

Appendix 2

NOTE TO FILE

JBA Project Code	2020s0819
Contract	Bevis Green
Client	Barratt Homes
Day, Date and Time	27/11/2020
Author	Emma Wright
Reviewer / Sign-off	Matt Hemsworth
Subject	Technical Note

1 Introduction

JBA Consulting was commissioned by Barrett Homes in 2020 to undertake a hydromorphology assessment and conceptual design for the watercourse at the Former Tetrosyle site, Bevis Green, Bury.

1.1 Purpose and scope of study

1.2 Study area

Figure 1-1 displays the site location and the catchment area of the watercourse, which is unnamed and is a tributary of Pigs Lee Brook. The watercourse rises on the southern edge of Harden Moor near Nangreaves and flows primarily south towards the site. The outflow from the reservoir is controlled by a weir in which the channel is culverted and then flows into open channel before discharging into Pigs Lee Brook.



Figure 1-1: Site Location

NOTE TO FILE

JBA Project Code	2020s0819
Contract	Bevis Green
Client	Barratt Homes
Day, Date and Time	27/11/2020
Author	Emma Wright
Reviewer / Sign-off	Matt Hemsworth
Subject	Technical Note

2 Desk Based Assessment

2.1 Overview

A desk-based assessment has been undertaken for the catchment of the watercourse. This incorporates nearby main rivers and aims to provide understanding on catchment controls that influence hydromorphology on a local scale. The assessment has utilised available information including historic maps, aerial imagery, and LiDAR data.

2.2 Geology and land use

According to the British Geological Survey (BGS) mapping the watercourse and its upstream catchment is underlain by sandstone and are overlain by till superficial deposits, which are glaciogenic in origin.

The land surrounding to the south-west of the site is heavily urban with residential and commercial buildings. The land use to the north and within the watercourse's catchment is rural with localised areas of small woodland and agricultural land.

2.3 Flow regime

There are no flow gauges present on the watercourse, the closest gauge available is located approximately 3.0km downstream on the River Irwell. The difference in catchment characteristics, namely size, mean the flow gauge (69044 – Irwell at Bury ground) cannot be used to inform the flow regime of the unnamed watercourse.

The watercourse is not gauged; however, in the upper catchment it is characterised with steep topography, which is likely to produce rapid delivery of storm runoff to the watercourse. The urbanised nature of the catchment around the site will further contribute to this. During heavy rainfall events there is the potential for energy to be concentrated over a relatively short time frame, leading to elevated erosion rates in certain reaches.

2.4 Water Framework Directive Status and Water Quality

The unnamed watercourse falls within The Irwell (Rossendale STW to Roch) (ID GB112069064620) which is located within the Croal Irwell Operational Catchment. The waterbody is designated as 'heavily modified'. In the 2016 Cycle 2 assessment, the waterbody was classified as Moderate. There are several reasons why the waterbody is not achieving 'Good' status including both diffuse and point source pollution impacting upon phosphate in the watercourse and local ecology (macrophytes and phytobenthos (combined) and invertebrates).

2.5 Flood Risk

Figure 2-1 displays the Environment Agency Flood Zone Mapping across the site, illustrating that the site is located within Flood Zone 1. Downstream of the site where the watercourse converges with the River Irwell is in Flood Zone 3 which follows the route of the existing watercourse. To the north of the site the Cheesden Brook is within Flood Zone 2 and 3 which follows the route of the watercourse except to the north of the site the is flooding of the floodplain, however, this does not impact upon the unnamed watercourse of the site.

NOTE TO FILE

JBA Project Code 2020s0819
Contract Bevis Green
Client Barratt Homes
Day, Date and Time 27/11/2020
Author Emma Wright
Reviewer / Sign-off Matt Hemsworth
Subject Technical Note



Figure 2-1: Current Flood Risk

2.6 Historic Trend Analysis

A desk-based review of historic maps has been undertaken to develop a historic chronology of the watercourse in response to channel modification over time. This information informs the current state of the channel through the identification of current and historic pressures influencing the watercourse. The assessment can therefore be utilised to predict how the riverine system will potentially develop under different scenarios in the future.

By reviewing the historic Ordnance Survey mapping it is apparent that the watercourse has been altered over time. The first mapping available from 1800, shows the reservoir and several weirs on the watercourse. It is thought the reservoir was originally constructed to supply water to the cotton mill.

Prior to the construction of the M66 the watercourse displayed some sinuosity upstream of the reservoir. The motorway in Bury was constructed between 1973 to 1978, during which the watercourse was straightened. The downstream extent of the watercourse connecting to Pig Lees Brook is entirely culverted, the exact date of which the culverting took place is unknown due to unclear mapping. Upstream of the site the watercourse was modified between 1930 and 1955 with the installation of three ponds controlled by weirs to maintain the water depth. These weirs are still present today.

NOTE TO FILE

JBA Project Code	2020s0819
Contract	Bevis Green
Client	Barratt Homes
Day, Date and Time	27/11/2020
Author	Emma Wright
Reviewer / Sign-off	Matt Hemsworth
Subject	Technical Note

3 Walkover Assessment

3.1 Introduction

A walkover assessment was completed on the 15th July 2020 by Rebecca Thrower (geomorphologist) and Emma Wright (geomorphologist) of the watercourse through the site and upstream of the site boundary. The purpose of surveying the watercourse upstream of the site was to identify analogue reaches to gain an understanding of the geomorphic conditions of the river when not confined to culverts.



Figure 3-1: Survey Locations

NOTE TO FILE

JBA Project Code	2020s0819
Contract	Bevis Green
Client	Barratt Homes
Day, Date and Time	27/11/2020
Author	Emma Wright
Reviewer / Sign-off	Matt Hemsworth
Subject	Technical Note

3.1.1 Upstream of the site: near the source

Upstream of the site (approximately 0.6km) the watercourse is a single thread river that flows through an alluvial channel. At this point in the catchment the watercourse is confined to a steep valley and displays both boulder cascade and cobble step pool morphologies (Figure 3-2). The channel is very narrow, approximately 0.5m wide, and steep with coarse bed material (gravels, cobbles, boulders) indicating an active supply of sediment to the reach. Some bank erosion was evident immediately downstream of the confluence between the two watercourses, where the channel gradient reduces and sediment has been deposited (Figure 3-4). The river is confined by the steep valley and therefore limited floodplain is evident; however, downstream the valley floor widens and this creates some floodplain. The confinement of the valley and lack of floodplain for flows to spill onto concentrates energy in channel and increases the size of the material that can be transported.

The riparian zone consists of a broadleaf woodland providing a large supply woody debris and leaf litter into the channel (Figure 3-4).



Figure 3-2: Upstream steep morphology

NOTE TO FILE

JBA Project Code	2020s0819
Contract	Bevis Green
Client	Barratt Homes
Day, Date and Time	27/11/2020
Author	Emma Wright
Reviewer / Sign-off	Matt Hemsworth
Subject	Technical Note

This reach could be used to define characteristics of the new channel if the gradient is to be of similar steepness. Figure 3-3 depicts the long section throughout the site but specifically the step-pool sequences that occur within the steeper gradient. This can be used as an analogue to determine the in-channel features within an area of steeper gradient.

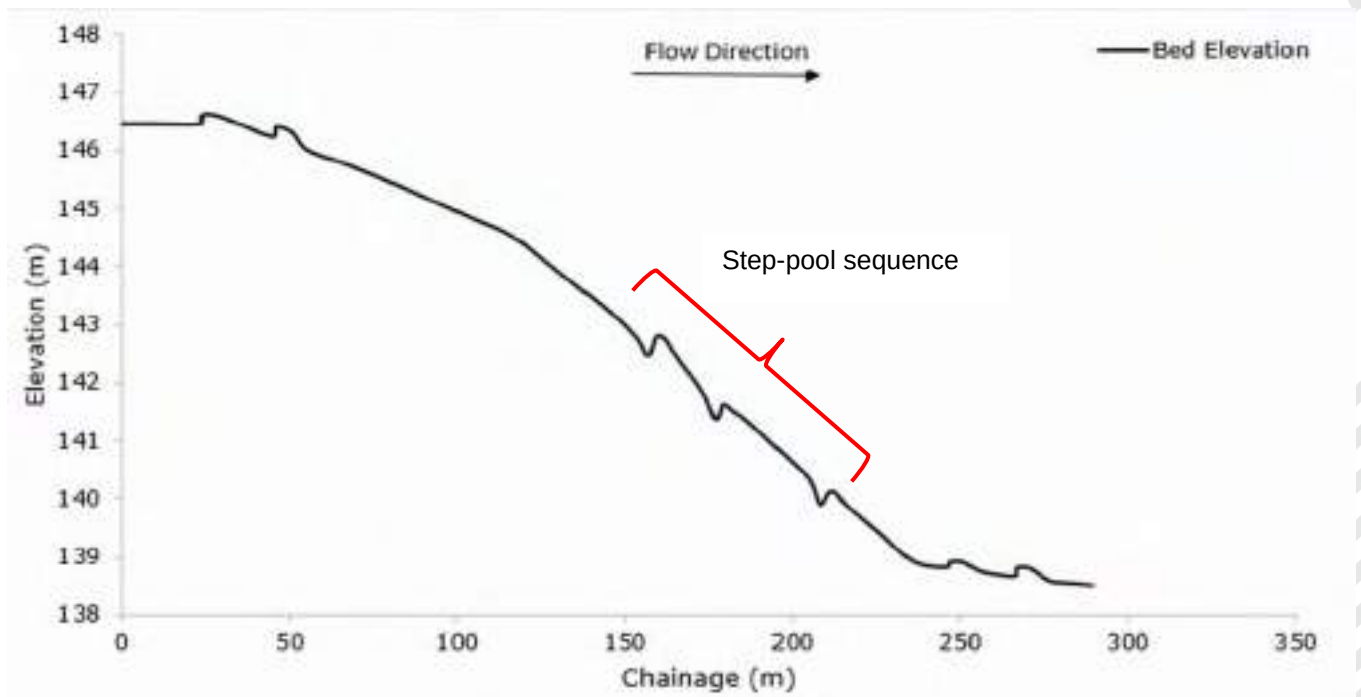


Figure 3-3: Long section to demonstrate the step-pool (step-pool) sequence

NOTE TO FILE

JBA Project Code	2020s0819
Contract	Bevis Green
Client	Barratt Homes
Day, Date and Time	27/11/2020
Author	Emma Wright
Reviewer / Sign-off	Matt Hemsworth
Subject	Technical Note



Figure 3-4: Large woody debris supplied into the channel with bank erosion

3.1.2 Upstream of site: Reduced channel gradient

This reach displayed a distinct change in the morphology from the previous reach due to a notable change in gradient and slight widening of the valley floor. The reduced gradient has allowed for a meandering pool riffle morphology. In-channel velocities have reduced as a result of a shallower gradient and enabled greater sediment deposition. Smaller sized coarse sediment is seen throughout with the presence of fine gravels and small cobbles. Small gravels and cobbles are stored in short exposed gravel bars on alternative sides of the channel. These features are typically 0.5m wide and range in length from 1m to 8m. Immediately downstream of the bars, riffles have formed over the submerged part of the bar. Riffles are associated with shallower water depths, locally steeper gradient and increased in-channel velocities due to increased turbulence. These contrast to the deeper areas of channel that are characterised by slower moving pools, which during low flow conditions are typically low energy areas of the channel. Within this reach the river is well connected to its floodplain with shallow bank gradients and heights, which were typically 0.3-0.5m above bed level and at the time of the walkover 0.2-0.25m above the water level (Table 3-2).

Figure 3-5 shows a basic site sketch with the key hydromorphic processes of the reach illustrated. It was determined that this reach and the upstream reach would be used as analogue sites to inform the key hydromorphic features within the new channel construction at the site, therefore incorporating both the higher and lower gradient channel morphologies.

NOTE TO FILE

JBA Project Code 2020s0819
 Contract Bevis Green
 Client Barratt Homes
 Day, Date and Time 27/11/2020
 Author Emma Wright
 Reviewer / Sign-off Matt Hemsworth
 Subject Technical Note

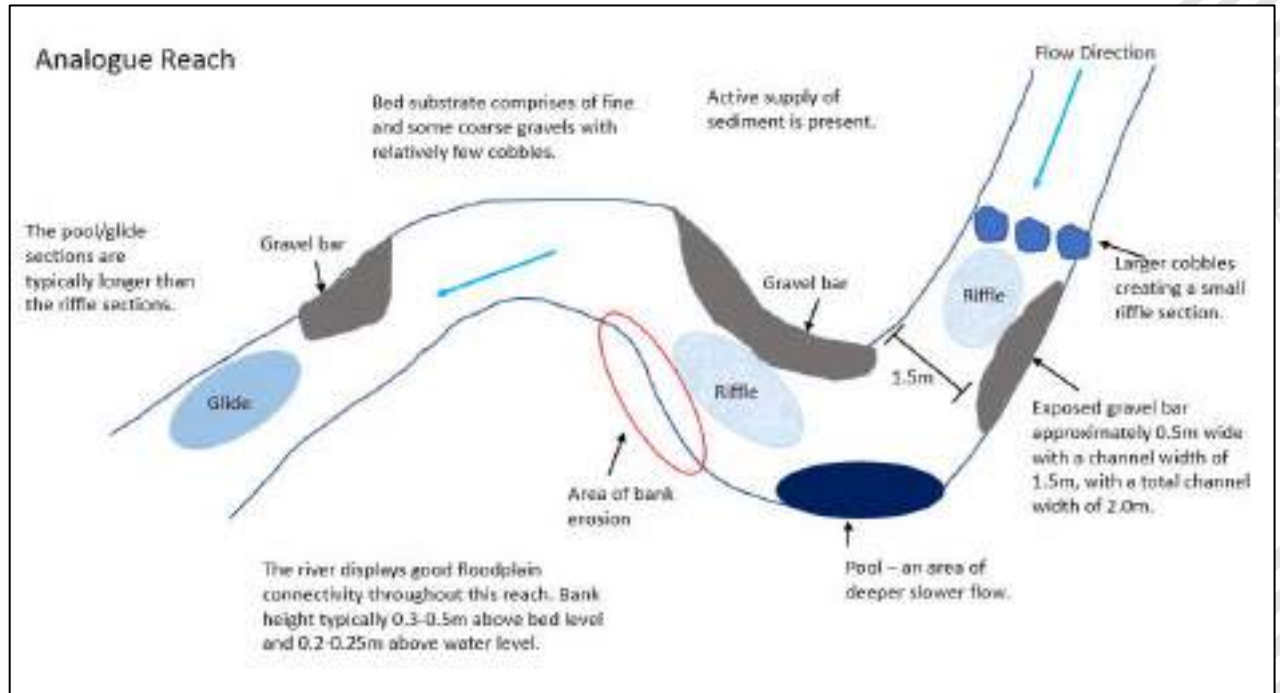


Figure 3-5: Site sketch of the reach to be used as the analogue reach (for lower gradient reaches)

Table 3-1 shows the approximate channel widths, widths and lengths of bar features estimated from the analogue reach, based upon site photographs from Table 3-2 below.

Site Photo	Channel Width (m)	Channel Width (m)	Bar width (m)	Bar length (m)	Riffle length (m)	Bank height from bed (cm)	Height of Bar feature	Connected to floodplain
1	2	0.5	1.5	5	2	0.4	0.2	Yes, particularly on the left-hand bank
2	1	0.5	0.5	1.5	1.5	0.4	0.2	Yes
3	3	0.5	2.5	8	2	0.5	0.3	Yes
4	1	0.5	0.5	1	-	0.7	0.3	No
5	2	0.5	1.5	2	0.75	0.5	0.2	Yes

NOTE TO FILE

JBA Project Code 2020s0819
 Contract Bevis Green
 Client Barratt Homes
 Day, Date and Time 27/11/2020
 Author Emma Wright
 Reviewer / Sign-off Matt Hemsworth
 Subject Technical Note

Table 3-2: Site photographs to be used as an analogue reach (for the lower gradient reaches)

Photograph 1



Photograph 2



Photograph 3



Photograph 4



NOTE TO FILE

JBA Project Code 2020s0819
 Contract Bevis Green
 Client Barratt Homes
 Day, Date and Time 27/11/2020
 Author Emma Wright
 Reviewer / Sign-off Matt Hemsworth
 Subject Technical Note



3.2 Indicative bar features

A series of indicative cross sections were developed from using the channel measurements from the site visit. These sections provide a guide to the development of the cross sections.

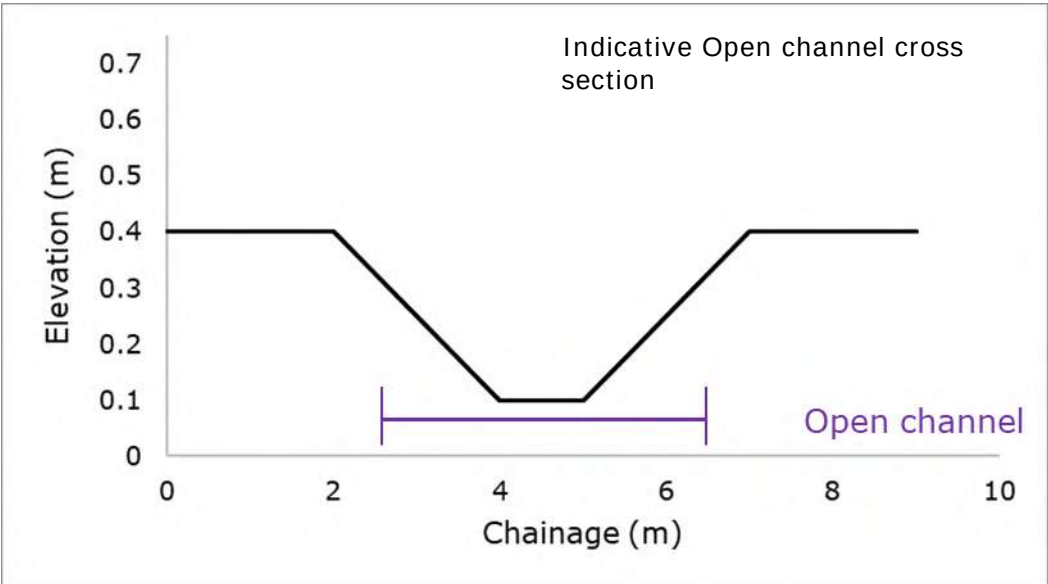


Figure 3-6: Indicative open channel section

NOTE TO FILE

JBA Project Code 2020s0819
 Contract Bevis Green
 Client Barratt Homes
 Day, Date and Time 27/11/2020
 Author Emma Wright
 Reviewer / Sign-off Matt Hemsworth
 Subject Technical Note

Table 3-3: Indicative open channel section			
Open channel - Option 1		Open channel - Option 2	
Chainage (m)	Elevation (m)	Chainage (m)	Elevation (m)
0	0.4	0	0.4
2	0.4	3	0.4
4	0.1	4.25	0.1
5	0.1	5	0.1
7	0.4	6.25	0.4
9	0.4	9.25	0.4

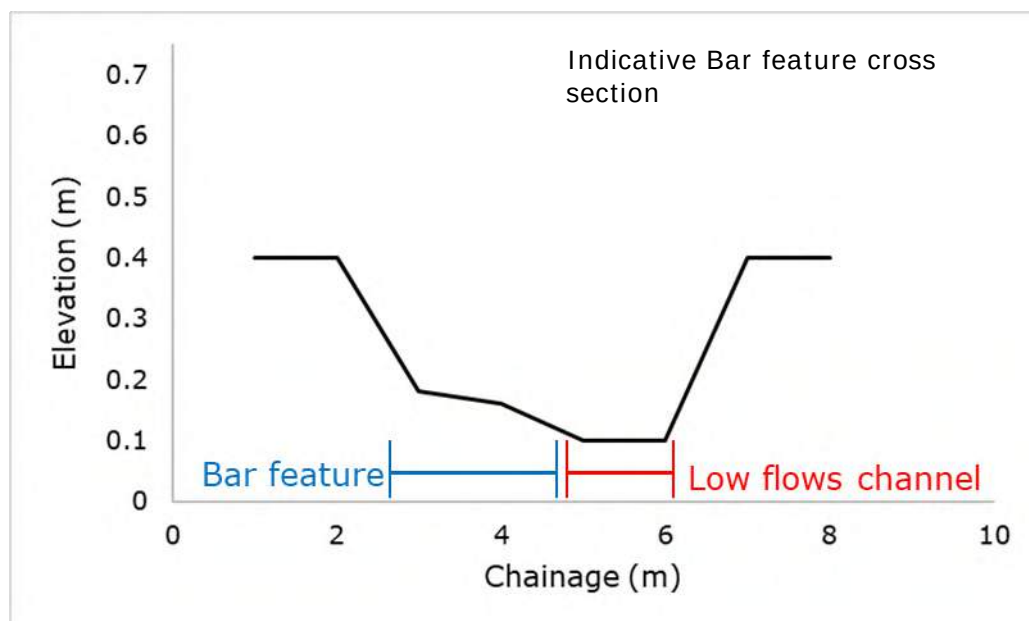


Figure 3-7: Indicative low flows channel section

NOTE TO FILE

JBA Project Code 2020s0819
Contract Bevis Green
Client Barratt Homes
Day, Date and Time 27/11/2020
Author Emma Wright
Reviewer / Sign-off Matt Hemsworth
Subject Technical Note

Table 3-4: Indicative open channel section

Bar feature - Option 1		Bar feature - Option 2	
Chainage (m)	Elevation (m)	Chainage (m)	Elevation (m)
0	0.4	0	0.4
2	0.4	2	0.4
3	0.18	3	0.2
4.5	0.16	5.5	0.15
5.5	0.1	6	0.1
6	0.1	6.75	0.1
7	0.4	7.75	0.4
10	0.4	9.75	0.4

NOTE TO FILE

JBA Project Code 2020s0819
 Contract Bevis Green
 Client Barratt Homes
 Day, Date and Time 27/11/2020
 Author Emma Wright
 Reviewer / Sign-off Matt Hemsworth
 Subject Technical Note

4 Low Flows Modelling

4.1 Introduction

This section of the report describes the modelling approach that was undertaken to represent the in-channel features for the new open channel watercourse. The purpose of this modelling was to determine the function of the morphological features and to understand what influence they will have on sediment transport processes, to inform the concept design for the new channel.

4.2 Methodology

4.2.1 Flow Duration Curve

A catchment for the unnamed watercourse has been delineated from the FEH CD-ROM and run through LowFlows 2 software, developed by Wallingford HydroSolutions (WHS). This software estimated the natural flow regime at the location based on a database of hydrologically similar catchments. A Flow Duration Curve (FDC) was developed and used to determine the low flows for the model, key exceedances are shown in Table 4-1.

Table 4-1: Summary of Flow Duration Curve	
Exceedance	Discharge (m ³ /s)
Q10	0.104
Q20	0.065
Q50	0.027
Q70	0.017
Q95	0.007

4.2.2 Baseline Scenario

An existing hydraulic model, supplied by Cole Easdon, was used to develop the concept design for the new channel. The supplied hydraulic model consists of one of the existing configurations with the watercourse culverted underneath the buildings and a post development model with proposed ideas for an open channel.

4.2.3 Post Development Scenario

The low flows model was developed through using the Cole Easdon post development model. To adapt the model for us, several cross sections were modified to incorporate bar and step-pool sequence to represent similar widths and attributes as observed within the analogue reach.

4.3 Model representation

Table 4-2 below depicts how the features were represented in the model, including bar and step-pool sequences.

NOTE TO FILE

JBA Project Code 2020s0819
Contract Bevis Green
Client Barratt Homes
Day, Date and Time 27/11/2020
Author Emma Wright
Reviewer / Sign-off Matt Hemsworth
Subject Technical Note

Table 4-2: Model Representation	
Feature	Representation
Bar feature	The channel geometry was altered to incorporate bar features into the channel. The length of the bars was determined using similar lengths as observed in the 2nd, pool riffle, analogue reach. The height of the bar features was determined by the water levels, allowing the majority of the bar to be exposed at Q70 whilst submerged at higher flow exceedances, for example Q10.
Step -Pool feature	The channel geometry was altered to incorporate a deeper channel to act as a pool. The depth of the section was increased from the original however the banks remained the same. Whilst immediately downstream of the pool the channel geometry was altered to incorporate a cross section to represent a step, in order to represent some of the features observed in the 1st analogue reach where the gradient is steep. The bed level was raised within this section to provide increased velocities through this section.

4.4 Assumptions and limitations

The hydraulic modelling undertaken for this study is accompanied by some assumptions and limitations, which are discussed below:

- The in-channel roughness values were all set at 0.05, which was considered appropriate to hydraulic conditions observed in the analogue reaches.
- The model was truncated at the weir at Mill Road downstream of the site, as it was anticipated that this structure would not instigate any backflow (due to an 8m drop in bed levels either side of the structure) which may influence on upstream water levels. This was therefore seen as an appropriate location to truncate the model. The model was additionally truncated upstream of the attenuation pond as it was anticipated that this would control the flows downstream into the new channel.

NOTE TO FILE

JBA Project Code 2020s0819
Contract Bevis Green
Client Barratt Homes
Day, Date and Time 27/11/2020
Author Emma Wright
Reviewer / Sign-off Matt Hemsworth
Subject Technical Note

5 Results

5.1 Introduction

Within this section of the report the results outputted from the post developed hydraulic model are discussed. Table 5-1 reports the model node name and whether it is classified as an open channel section or a bar feature (the difference of which are shown in the next section). These node names are used in the sections below to discuss the velocity, entrainment and shear stress.

Table 5-1: Model node labels	
Cross section type	Mode Node Label
PLB352	Open channel
PLB387	Bar feature
PLB427	Open channel
PLB468	Open channel
PLB508	Open channel
PLB508_PO1	Pool (lowered bed level)
PLB508_PO2	Open channel
PLB508_R1	Step (raised bed level)
PLB508_R2	Open channel
PLB548	Open channel
PLB588	Open channel
PLB628	Open channel
PLB641	Open channel

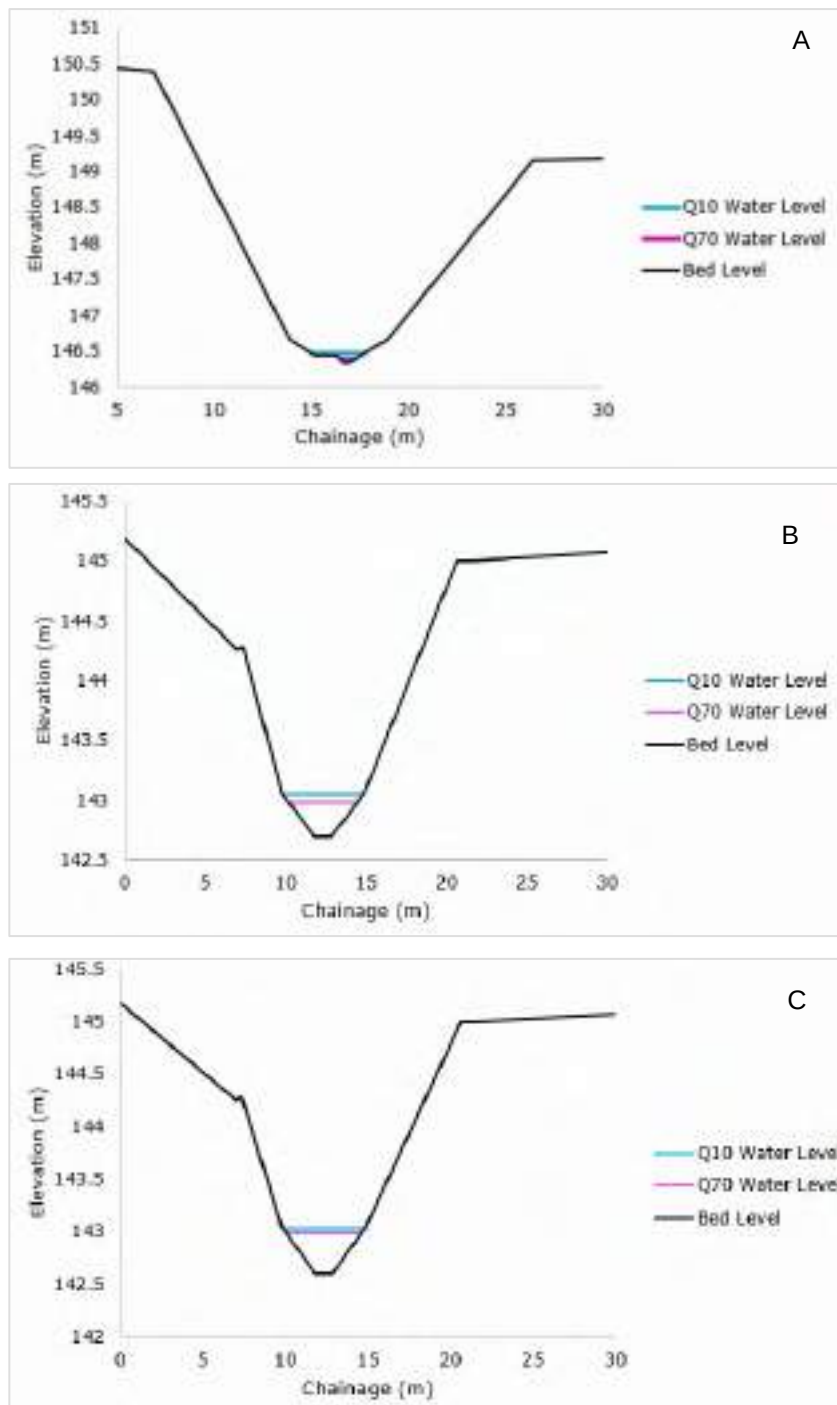
5.2 Water Levels

Table 5-2 depicts a cross sections within the model including both the open channel, with the bar features and in areas of step-pool sequences. The water levels within the bar cross section (A) shows that within a higher flow exceedance (Q10) the bar features are fully submerged, whilst at a lower exceedance they are exposed as per the design criteria. The cross section that contains a pool (B) shows the water levels are greater because the channel is narrower. Cross section (C) depicts the step has raised water levels compared to the open channel sections.

NOTE TO FILE

JBA Project Code	2020s0819
Contract	Bevis Green
Client	Barratt Homes
Day, Date and Time	27/11/2020
Author	Emma Wright
Reviewer / Sign-off	Matt Hemsworth
Subject	Technical Note

Table 5-2: Model water levels



NOTE TO FILE

JBA Project Code 2020s0819
Contract Bevis Green
Client Barratt Homes
Day, Date and Time 27/11/2020
Author Emma Wright
Reviewer / Sign-off Matt Hemsworth
Subject Technical Note

5.3 Channel Velocities

Velocities throughout the site have been extracted from the hydraulic model. Figure 5-1 shows the channel velocities with the open river channel sections without the presence of any in-channel features. The data shows that the gradient steepens, as shown in the long section in Figure 5-2, there is a correlated increase in the in-channel velocities. As the bed gradient become shallower these velocities reduce. It is anticipated to observe erosional process occurring in the steeper sections where the velocities are high, whilst where the gradient becomes shallower it is anticipated to observe a more depositional environment. The Hjulström curve depicts the relationship between the size of the sediment and the velocity that is required to either transport it, erode or deposit it. Within the Q10 flows the velocities range from 0.3-0.7m/s. The calculated entrainment values for the same event would be capable of entraining, transporting and deposition of small gravels between 6-38mm.

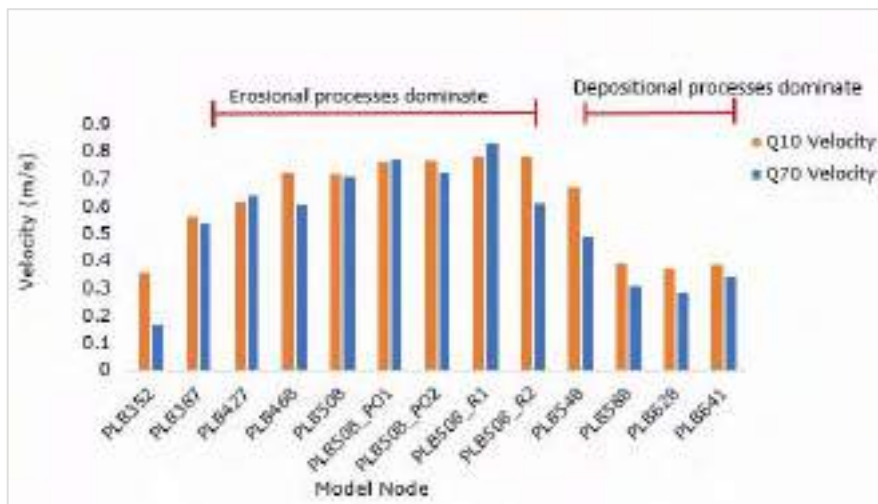
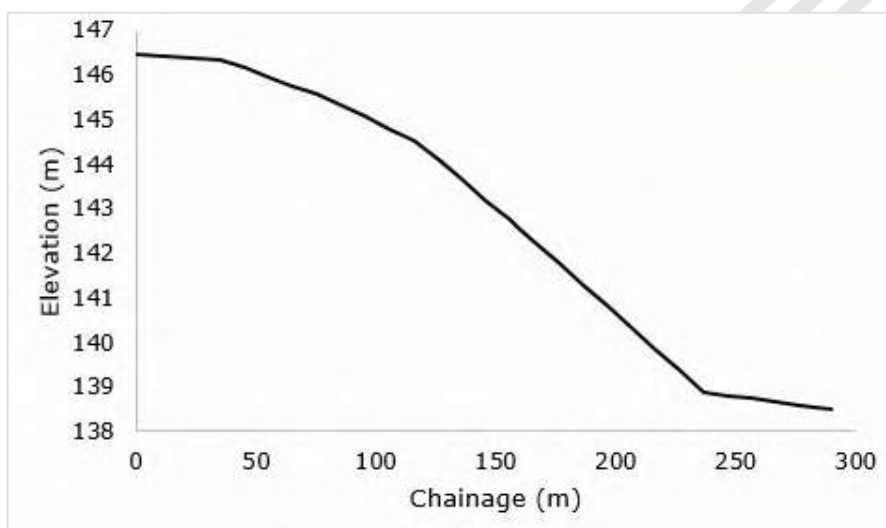


Figure 5-1: Velocities across the site (Baseline) sequence*

* *Note not to scale, total model length is 289m and the distance between the model nodes vary.



NOTE TO FILE

JBA Project Code 2020s0819
Contract Bevis Green
Client Barratt Homes
Day, Date and Time 27/11/2020
Author Emma Wright
Reviewer / Sign-off Matt Hemsworth
Subject Technical Note

Figure 5-2: Long section

5.3.1 In channel features present

The hydraulic model was developed to include the addition of a step-pool sequence within the stepper sections of the long profile to represent the bed conditions observed upstream from the site. These features have also been introduced to manage the high velocities shown in Figure 5-1, which could lead to a highly erosive channel if left designed as a uniform channel. In the shallower gradient areas at the start and end of the reach, a bar feature has been included to determine the influence this would have on the in-channel velocities.

Figure 5-3 shows the results of this scenario in terms of modelled velocities.

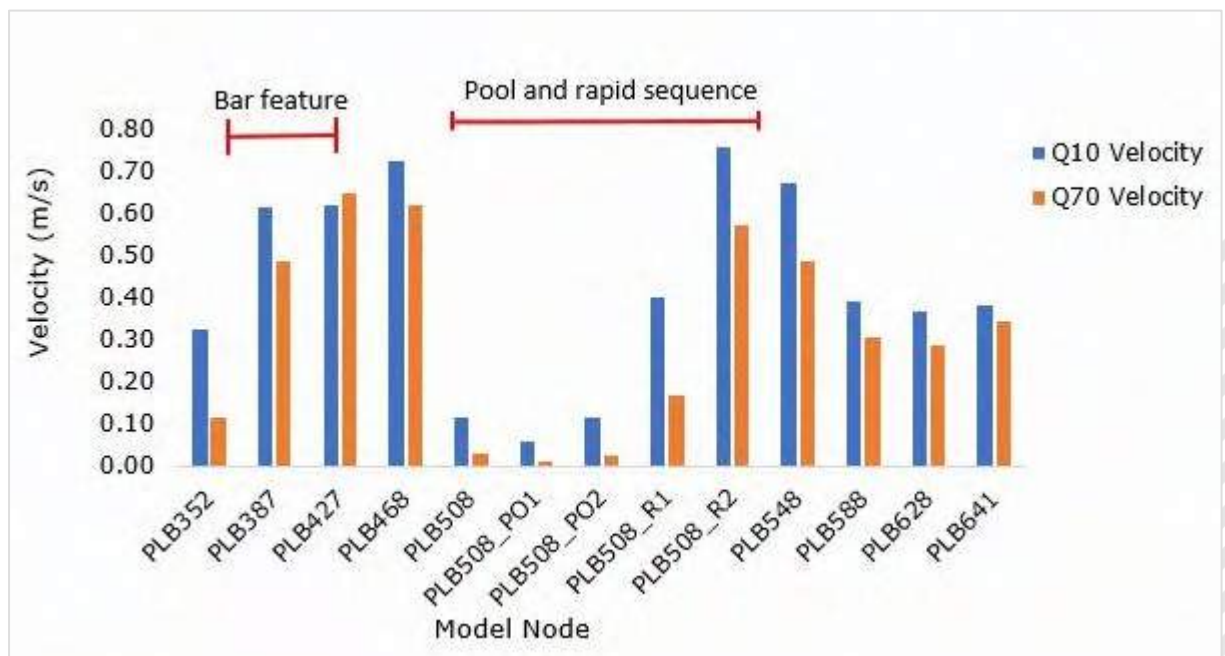


Figure 5-3: Velocities across the site (post development) sequence *

*Note not to scale, total model length is 289m and the distance between the model nodes vary.

Table 5-3: Comparison of velocity's		
	Q10 Velocity	
Model Node	Baseline	Post Development
PLB352	0.35	0.32
PLB387	0.56	0.61
PLB427	0.62	0.62
PLB468	0.72	0.72
PLB508	0.72	0.11
PLB508_PO1	0.76	0.06

NOTE TO FILE

JBA Project Code 2020s0819
Contract Bevis Green
Client Barratt Homes
Day, Date and Time 27/11/2020
Author Emma Wright
Reviewer / Sign-off Matt Hemsworth
Subject Technical Note

PLB508_PO2	0.76	0.11
PLB508_R1	0.78	0.4
PLB508_R2	0.78	0.75
PLB548	0.67	0.67
PLB588	0.39	0.39
PLB628	0.37	0.37
PLB641	0.38	0.38

Velocities throughout the site have been extracted from the hydraulic model. Table 5-3 (red text highlights an in-channel feature) shows a comparison of velocities between the baseline and the post development results during Q10 flows. It shows within the steeper gradient where the pool has been modelled there is a decrease in the in-channel velocities as a result of deeper water, with a substantial increase in velocities through the step-pool due to the steeper gradient associated with these features. For the Q10 flow results around the bar feature in the lower gradient area, the velocities are higher which can be attributed to the way the model calculates an average velocity for the cross section and in bar features, the flow depths over the bar are shallower than then open channel. In addition, there is a narrower flow channel which increases water depth attributing to higher velocities.

The variation in velocity between sections and between different flow events will help to maintain and provide diverse geomorphic conditions, significantly improving upon the existing culverted watercourse.

5.4 Sediment transport

The shear stress and entrainment values were determined for the modelled cross sections for the site, using the Shields equation. Entrainment is the value in which the maximum size of sediment can be transported during a particular flood or low flow event. Figure 5-4 depicts the entrainment values at both Q10 and Q70 flow exceedances for the post development. The graph shows that the typical grain size that is mobilised and entrained during Q10 flows ranges from 6-38mm, which represent flows that are exceeded only 10% of the time and are therefore relatively high flows (compared to other low flows), suggests the new channel would be capable of sustaining bedform development. This is regarded as a positive outcome as bedform development leads to diverse morphology and creates in-channel habitat, such as those observed in the analogue reaches upstream.

Velocity is used in the calculation of shear stress and so the results share similar trends. Figure 5-4 shows that typically there is a greater size of sediment which is entrained within the open channel compared to those with a bar feature present. This indicates that at Q10 flows, larger sediment would be entrained and transported through the open channel sections, which are deeper and slightly narrower than the overall channel with the bar features. Whereas at bar feature cross-section, the slight reduction in maximum grain size entrainment would mean coarser sediment is deposited. This enables bars to form as they are created through depositional processes. Immediately downstream of the bar features there is the potential for riffles to form as an extension of the bar and which would provide flow diversity within the channel.

NOTE TO FILE

JBA Project Code 2020s0819
 Contract Bevis Green
 Client Barratt Homes
 Day, Date and Time 27/11/2020
 Author Emma Wright
 Reviewer / Sign-off Matt Hemsworth
 Subject Technical Note

Immediately upstream of the modelled step-pool on the steeper section, there is a drop in the shear stress and entrainment associated with the pool feature, as a result in the reduced flow velocity. The modelled step-pool sequence is shown to reduce velocities overall when compared to the results without them in. This will help manage velocities in the reach which is seeking to mimic the high gradient slope observed in the headwater streams.

The recorded entrainment values outputted from the hydraulic model, is comparable to observations made on the walkover assessment of the analogue reach. Small gravels were observed typically within the open channel, with larger, coarser gravels identified on the exposed bar features. Whilst, further upstream in areas of steeper gradients step-pool sequences dominated observing very coarse bed material (gravels, cobbles, boulders) indicating an active sediment supply.

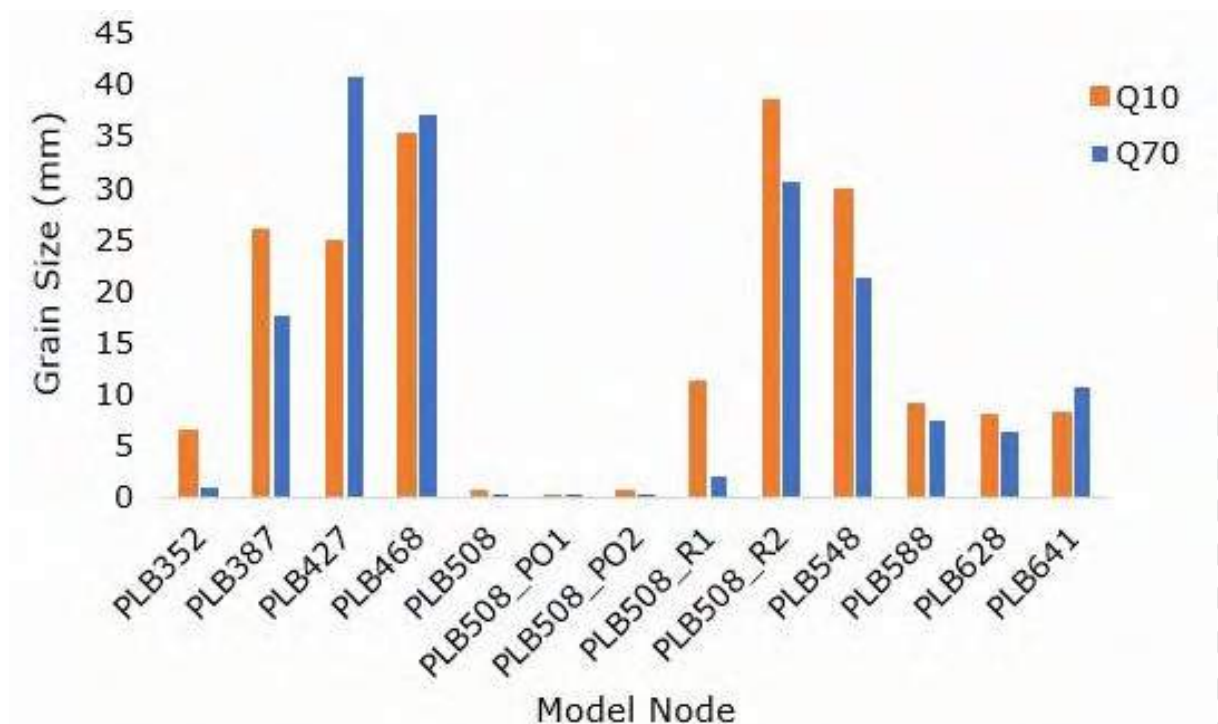


Figure 5-4: Entrainment values across the site*

*Note not to scale, total model length is 289m and the distance between the model nodes vary.

NOTE TO FILE

JBA Project Code	2020s0819
Contract	Bevis Green
Client	Barratt Homes
Day, Date and Time	27/11/2020
Author	Emma Wright
Reviewer / Sign-off	Matt Hemsworth
Subject	Technical Note

5.5 Design risks

When designing a new channel or when considering modifications to an existing channel, there are a number of risks that need to be considered to develop an appropriate design. The following risks have been identified:

- Inappropriate sizing of the channel which could lead to a degraded system that does not support hydromorphic processes: To mitigate this risk analogue sites have been identified and used to inform the shape of the new channel. Hydraulic modelling has been used to test the appropriateness of the channel shape and size under low flow conditions.
- Uncontrolled or excessive erosion that could impact infrastructure or destabilise the bed: The steeper channel profile required by the client has the potential to generate high energy that could lead to instability in the reach, particularly if sediment supply to the reach is limited by the reservoir and modifications upstream. To mitigate this, features are recommended in the concept design to control erosion and mimic morphological units found in steep channels (i.e. rapid and step pools).
- Uncontrolled or excessive erosion that could impact infrastructure through bank erosion: Bank erosion is a residual risk that will need to be considered in future design work. The conceptual design has involved working with natural processes to produce a functioning channel, within the constraints of the site. Some bank erosion may therefore occur on the outside of small bends within the channel; monitoring will be required to ensure bank erosion is not excessive and does not threaten the stability of infrastructure within the development.

NOTE TO FILE

JBA Project Code	2020s0819
Contract	Bevis Green
Client	Barratt Homes
Day, Date and Time	27/11/2020
Author	Emma Wright
Reviewer / Sign-off	Matt Hemsworth
Subject	Technical Note

6 Indicative Drawings

6.1 Introduction

Following on from the hydraulic modelling a series of indicative drawings were developed to demonstrate the in-channel bar features geometry, which met the design criteria of the bars being fully submerged at Q10 and exposed during lower flows for example at Q70, and developing slower in-channel velocities through the pool, but increased velocities over the step-pool sections.

The indicative cross sections are provided within DRV-JBAU-XX-00-DR-EN-0001-S3-P02-Indicative_Cross_Sections. Within the indicative drawings it outlines the long section marked with the locations for the different in-channel features, such as step-pool sequences and bar features. The step-pool sequences are located within areas of steeper bed gradient as these processes are anticipated to be dominated by erosional processes. Whilst in shallower bed gradients it is anticipated to have more depositional environments allowing the formation of bars. River sections where the bar is present the channel is typically wider which encourages deposition during higher flows and develops a varied channel morphology. It additionally displays how the cross sections developed for the hydraulic modelling compare to the original cross sections within the model provided.

6.2 CDM Regulation 2015

This report provides conceptual design parameters and information for the new channel associated with the Bevis Green site. If these are taken forward to detailed design and implementation all work will need to follow the framework and fulfil the obligations outline in the Construction (Design and Management) Regulation 2015 (CDM Regulations). At this early stage, JBA Consulting has not been designated as the Principal Designer but have acted as a designer. When progressing the designs further, the client should assess where the nature and scale of the works are likely to be notifiable under CDM regulations (the criteria for it being notifiable is that the construction phase will last more than 30 working days or shifts and gas more than 20 persons on site, or will involve more than 500 person days or shifts).

NOTE TO FILE

JBA Project Code	2020s0819
Contract	Bevis Green
Client	Barratt Homes
Day, Date and Time	27/11/2020
Author	Emma Wright
Reviewer / Sign-off	Matt Hemsworth
Subject	Technical Note

7 Conclusions

A hydraulic model has been developed to include in-channel features to improve the geomorphic conditions of the watercourse from its existing culvert. A geomorphology assessment was undertaken to understand hydromorphic processes operating in the watercourse and an analogue site was identified upstream. The concept design for the new channel has been based on this analogue site.

Bar features were hydraulically modelled to narrow the channel width and create an area of deeper flow during low flow conditions. Water levels were shown to submerge the bar feature during a Q10 event whilst at a lower flow extent, such as Q70, the bars were exposed with all the flow contained within the low flows channel. The calculated entrainment values showed a Q10 event would be capable of entraining and transporting small gravels (6-38mm), whilst smaller sediment sizes could be transported during a Q70 event.

This sediment mobilisation is similar to observations made during the site walkover. Velocities and shear stress were found to be lower in areas where bar features were present in the model, indicating higher rates of deposition in these parts of the channel. Immediately downstream of the bars, an increase in velocities and entrainment was shown, indicating the potential for riffle features to develop which would encourage greater geomorphic diversity within the channel.

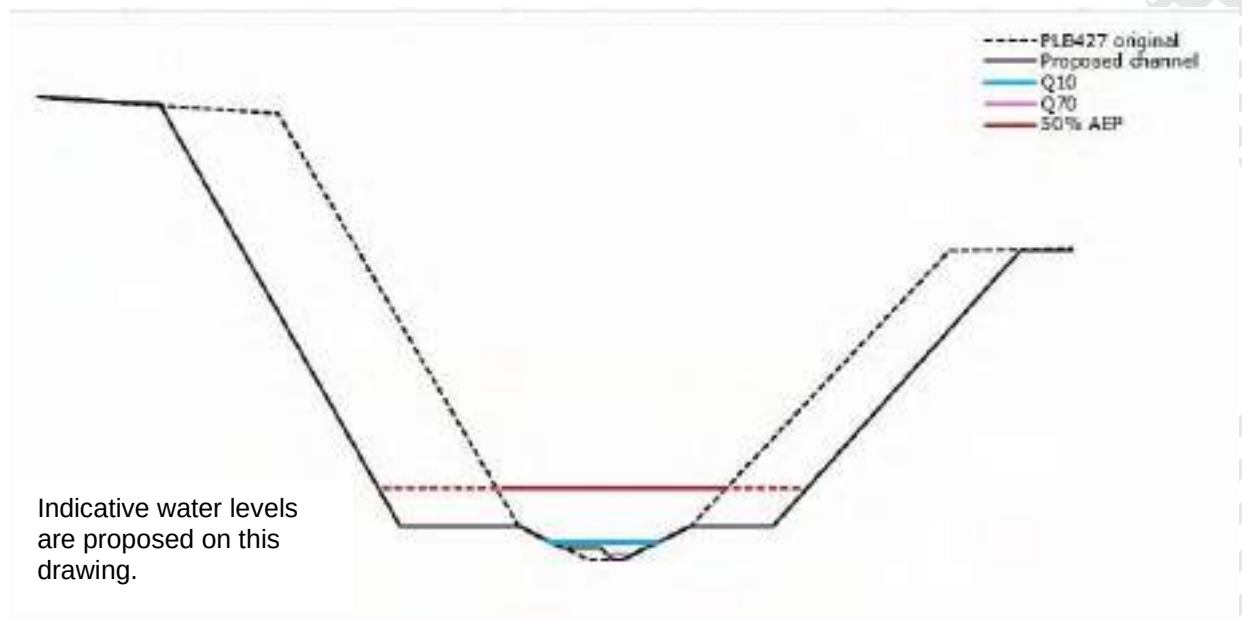
8 Recommendations

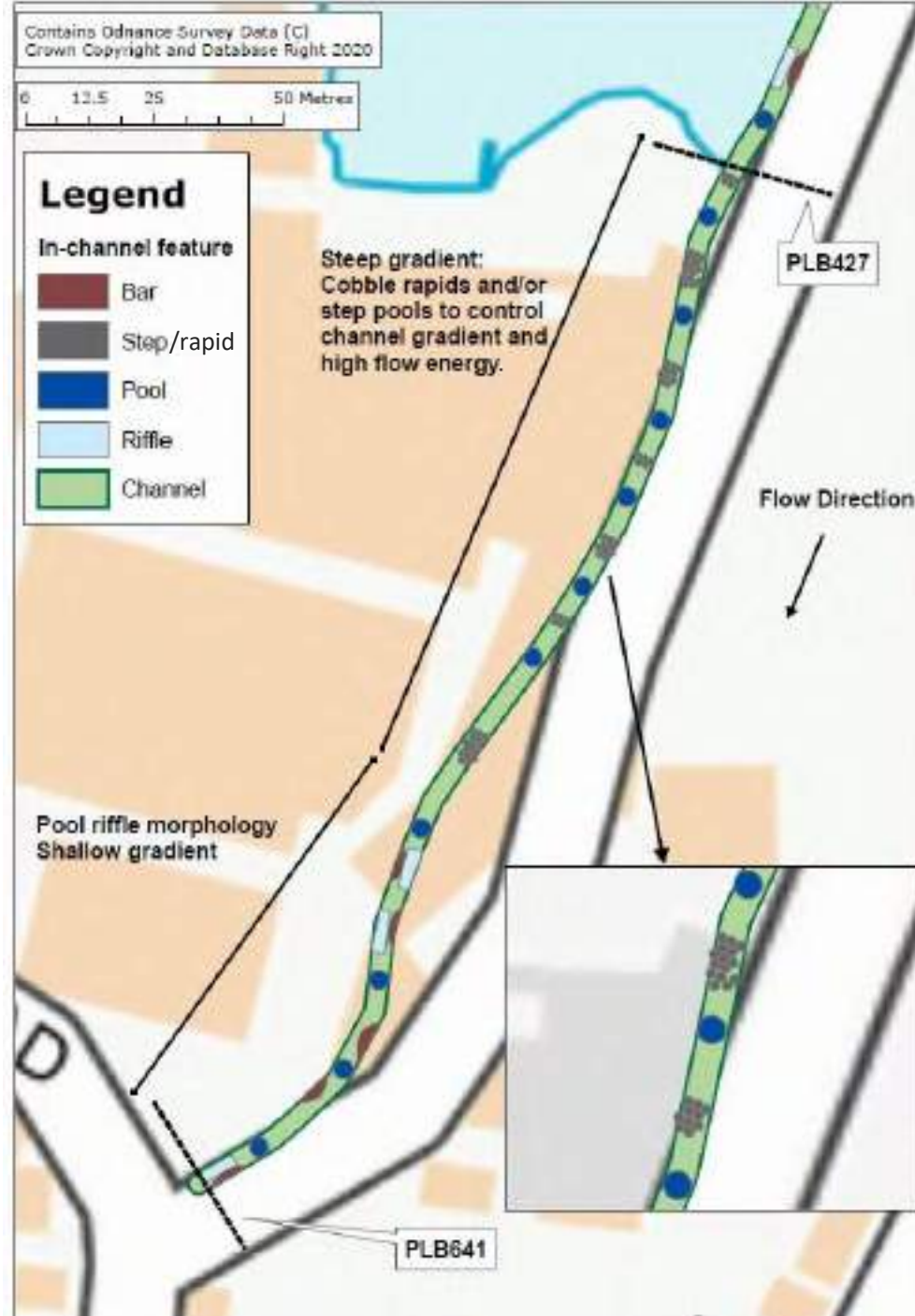
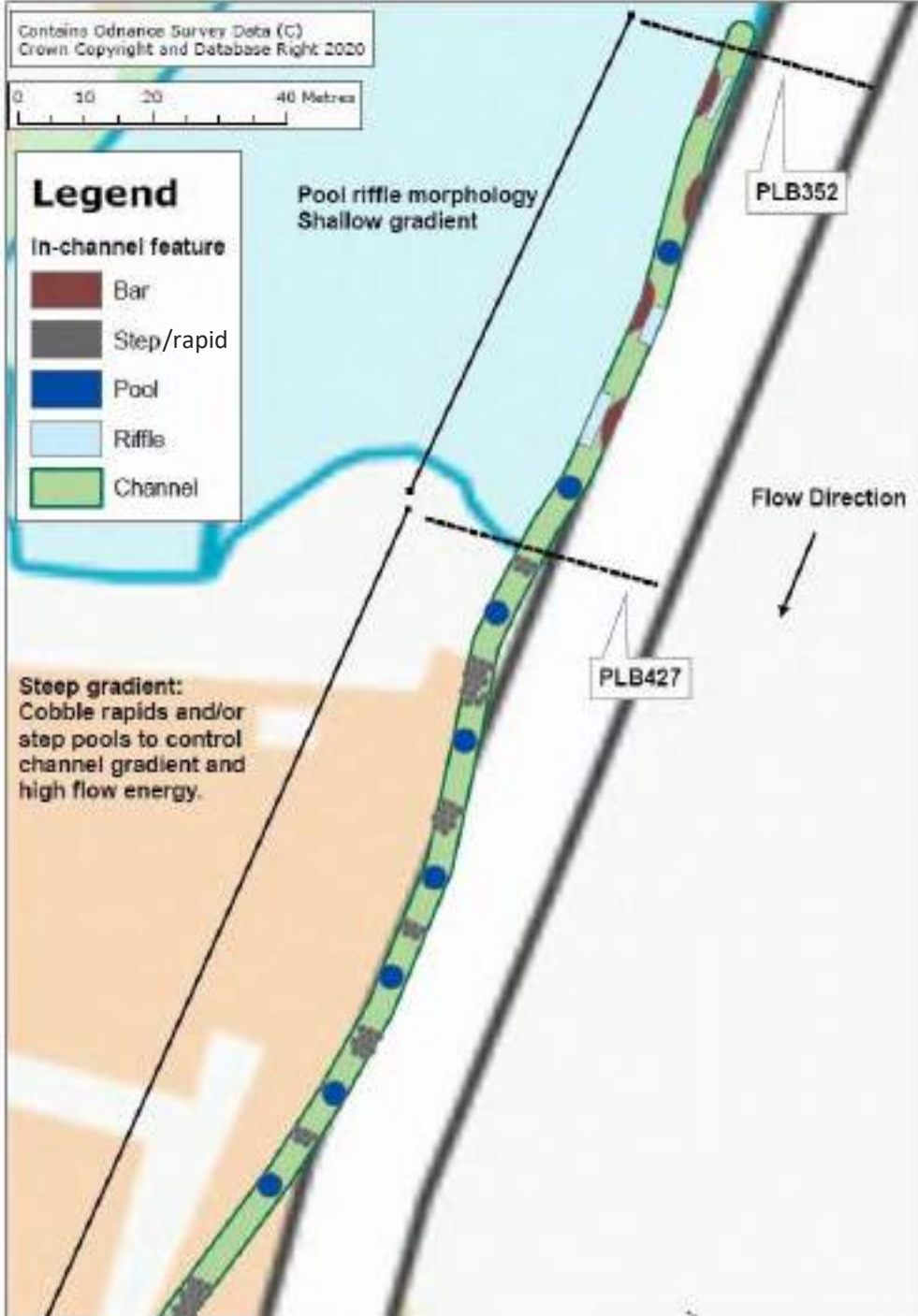
It recommended that the following should be completed at the next stage:

- Advancement of the concept proposals during the detailed design stage - it is assumed this will be undertaken by Barratt Homes.
- It may be required to conduct further flood risk modelling of the new design to ensure the proposed channel does not increase flood risk to adjacent properties.
- A Water Framework Directive assessment would be required to obtain the relevant permits.
- Larger flows (such as the 50% AEP) should not be contained within the channel as this disconnects the channel from its floodplain and concentrates high energy within the channel, which can lead to exacerbated erosion. It is understood that space is limited; however, by designing the channel so that the upper bank profiles are set back and larger flows are able to spill onto a second stage of the channel, would allow for some riparian connectivity within the limited river corridor. This would also provide additional flood storage capacity during flood flows without impacting upon the gradient of slopes on both banks, as the figure below demonstrates.

NOTE TO FILE

JBA Project Code	2020s0819
Contract	Bevis Green
Client	Barratt Homes
Day, Date and Time	27/11/2020
Author	Emma Wright
Reviewer / Sign-off	Matt Hemsworth
Subject	Technical Note





Bevis Green – Conceptual Plan view

This document presents a concept design comprising of an indicative plan for the new channel with example placement of morphological features. Further hydraulic modelling and analysis will be needed as part of a detailed design stage to determine the placement and size of in-channel features (including size of sediment) to progress the design for implementation.

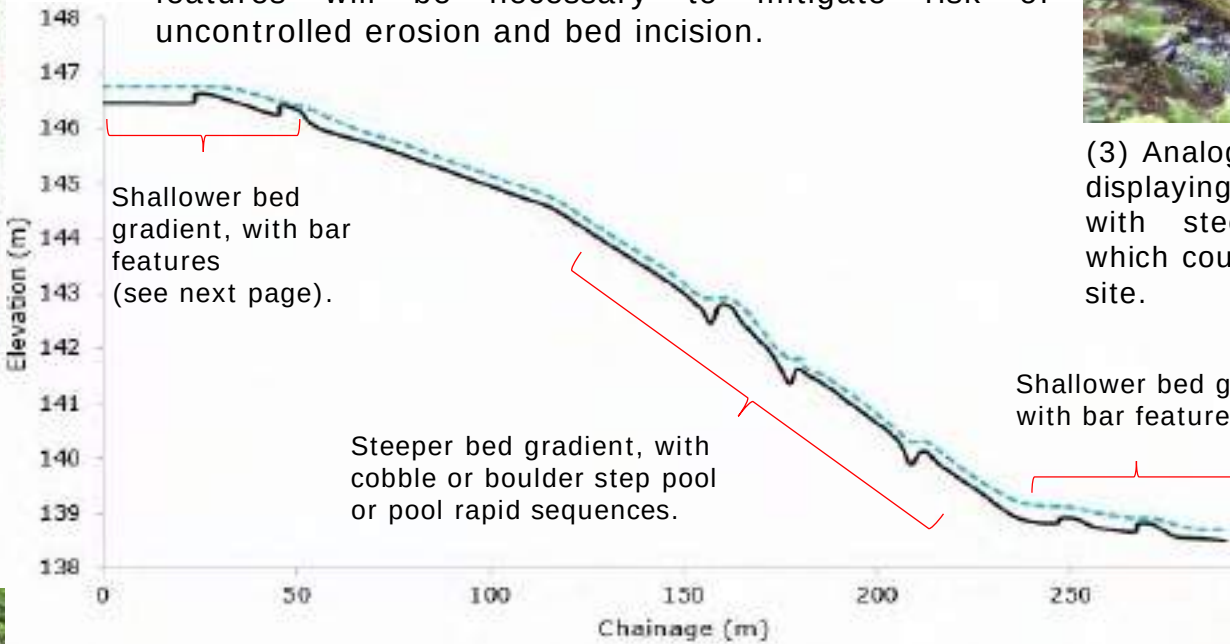
Revision Ref/Date	Amendments
P02 -2 nd December 2020	Draft – Issued for Comment
Drawn: E. Wright 27/11/2020	
Checked: R Thrower 02/12/2020	
Approved: M Hemsworth 02/12/2020	
Project Reference: 2020s0819	



(1) Analogue reach displaying a step-pool morphology with steeper bed gradient. A similar concept could be achieved at the site, but with a wider channel as required.



The shallower bed gradient at either end of the new channel will reduce in-channel velocities and allow for depositional processes to dominate. It is anticipated that bar features will form (2), reducing the channel width and introducing morphological diversity.



Within areas of steeper bed gradient, features mimicking either step pool or cascade morphology should be created along this reach. Coarser bed material will form the step or rapid (areas of raised bed level) whilst material upstream of the rapid will be scoured out to form a pool, with increased water depths and reduced in-channel velocities. It is expected to see sediment deposition within the pool as a result. Erosional processes will dominate throughout this reach. Appropriate placement and sizing of features will be necessary to mitigate risk of uncontrolled erosion and bed incision.



(3) Analogue reach photograph displaying a cascade channel with steeper bed gradient, which could be achieved at the site.



(4) Typical sediment identified downstream of the step pool/ cascade reaches, predominately consisting of coarse gravels.



Bevis Green – Long Section Plan

Indicative long-section plot with example placement of morphological features to control gradient and limit high velocities. To be developed further as part of a detailed design stage.

Revision Ref/Date	Amendments
P02 -2 nd December 2020	Draft – Issued for Comment
Drawn: E. Wright 27/11/2020	
Checked: R Thrower 02/12/2020	
Approved: M Hemsworth 02/12/2020	
Project Reference: 2020s0819	



Bevis Green –
Indicative
Plan of Pool
Riffle sections

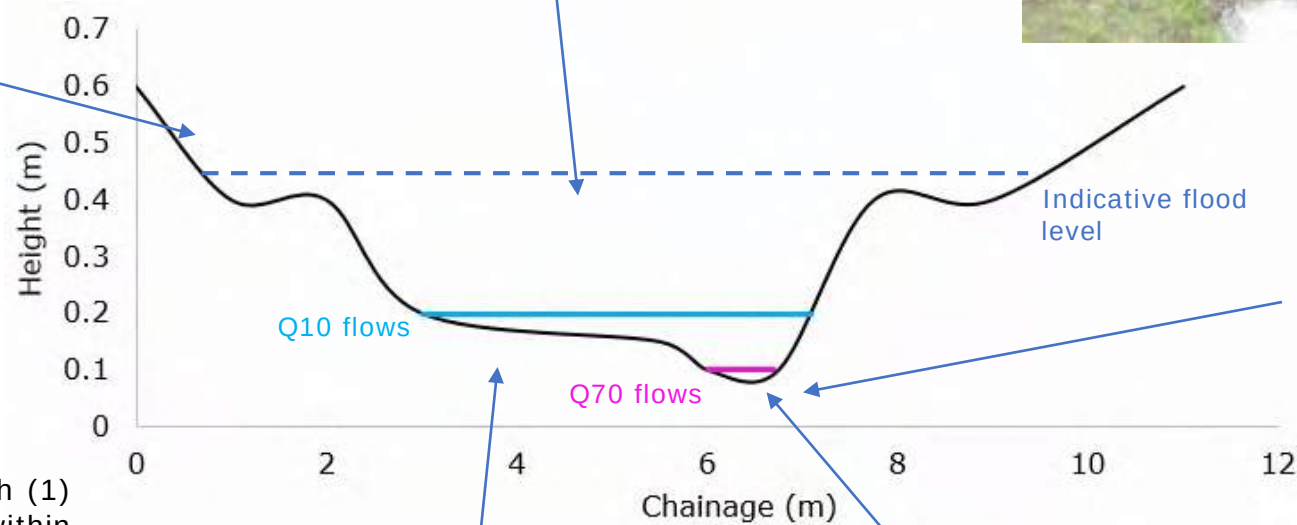
Indicative cross-section showing the typical channel shape within the shallower gradient sections of channel. To be developed further as part of a detailed design stage.

Revision Ref/Date	Amendments
P02 -2 nd December 2020	Draft – Issued for Comment

Drawn: E. Wright 27/11/2020
Checked: R Thrower 02/12/2020
Approved: M Hemsworth 02/12/2020
Project Reference: 2020s0819

In-channel bar features will provide both hydromorphological and ecological benefits. These features will only be submerged during certain low flow conditions and dry during the rest, providing channel complexity and different habitats as observed in the analogue site upstream (1 and 2).

The gradient of this slope will depend on the difference between the desired bed level and proposed site ground levels.



The flows at Q70 will be contained within the low flows channel (pink line), whilst larger flow events such as Q10 will submerge the bar (blue line).

Analogue reach photograph (1) displaying a bar feature within an area of gentler gradient.



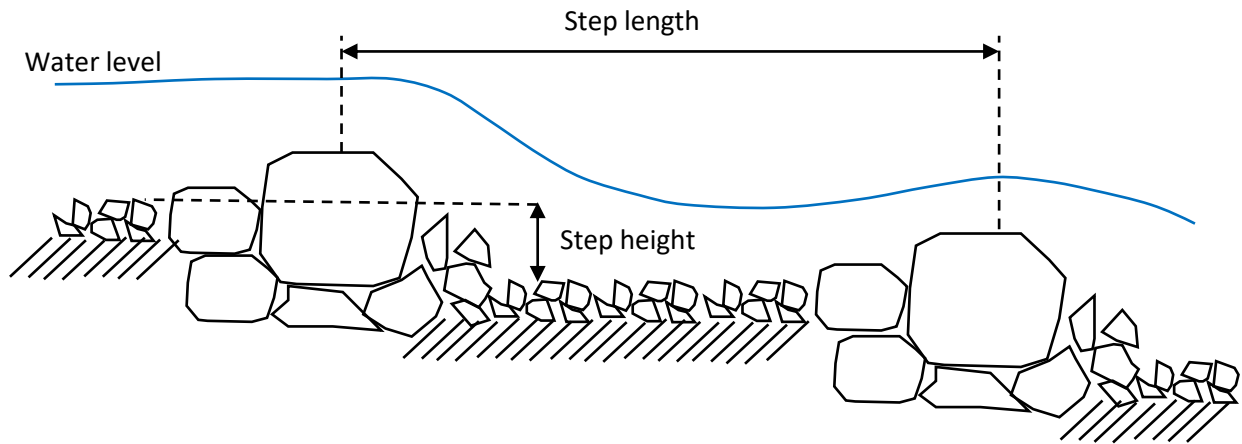
Bank heights are relatively shallow which is representative of the analogue reach and is important for maintaining a hydraulic connection to the riparian zone during larger flows.

Narrower low flows channel adjacent to the bar to encourage fine sediment to be transported downstream, as seen in the analogue reach. Generally, the channel is wider with bar features (compared with 'open channel' section) to encourage deposition during higher flows and varied channel morphology.



Bevis Green – Indicative Step Pool

This document presents a concept design comprising of an indicative plan for the new channel. Further hydraulic modelling and analysis will be needed as part of a detailed design stage to determine the placement and size of in channel features including size of sediment) to progress the design for implementation



The spacing and size of step pools should be variable, in order to maintain a natural sediment flux, particularly during flood flows. Designs should avoid uniform dimensions for the step pools.

Revision Ref/Date	Amendments
VO – December 2020	Draft – Issued for Comment
Drawn: E. Wright	
Checked: R. Thrower	
Approved: M. Hemsworth	
Project Reference: 2020s0819	

Appendix 3

CCTV Culvert Survey

**Pig Lee Tributary,
Off Walmersley Old Road,
Bury**

Job No: SALE1308031

25th October 2012

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

Report Index

	<u>Page</u>
Executive Summary	1 – 3
Area Plan	4
Grade Defect Report	5 - 9
WinCan Inspection Report (3 rd Edition)	10 - 79
Metre Report	80
SRM Scoring	81 - 82
Site coding Sheets	83 - 89
Manhole Surveys	90 - 93
Asset Photograph Index	94
Site Photographs	95 - 98
Silt Analysis	99
1:1250 Plan	

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

Executive Summary

CCTV SURVEY – EXECUTIVE SUMMARY

Client:	Environment Agency	NFCDD Ref:	01313PIGT0101B02
Site Address:	Pig Lee Trib, Off Walmsley Old Road, Bury	Contact:	Mark Whittaker
Date of Report:	25 th October 2012	Job No:	SALE1308031

Objective

A CCTV survey was undertaken by Aquajet (GB) Ltd using Man assisted CCTV techniques. This was conducted on behalf of the Environment Agency.

The purpose of the survey was to determine the route of the culvert and to visually ascertain the condition of the culvert/headwalls.

Location and Description

Pedestrian and vehicle access to the culvert is gained via Tetrosyl for the Inlet (ladders are required), and opposite 27 Walmsley Old Road for the Outlet.

The culvert flows in a North Easterly direction from the Inlet, the direction then changes to Southerly and continues to MH01. The direction then changes to Westerly and continues to MH01 where just after it changes again to South Westerly and continues to flow to the Outlet which is situated opposite 27 Walmsley Old Road.

The Inlet headwall is of concrete and brick construction and appears to be in good condition. The Outlet headwall is of masonry construction but is covered in moss so we are therefore unable to comment on the condition.

The following information should be viewed in conjunction with the CCTV report.

The culvert is made up of the following:

1. Outlet upstream to MH01 – Date of Survey: 17-09-12 - Weather: Dry - Flow Level: Low

- The culvert is 1200mm circular brick construction.
- There is infiltration gushing at 15.9m.
- There is infiltration dripping at 15.9m and 26.9m.
- There is medium encrustation at various points in the length.
- There is medium scale from a connection at 120.2m.
- The survey was completed at 158.8m.

Observations & Anomalies

Service defects have been recorded on this length. We were unable to obtain GPS for the Outlet due to trees. The complete frame of MH01 had to be removed to survey as the cover had seized.

2. MH01 upstream to MH02 – Date of Survey: 17-09-12 - Weather: Dry - Flow Level: Low

- The culvert is 2500mm x 1300mm rectangular masonry in regular courses construction.
- The culvert changes to a 2220mm x 1300mm arched masonry randomly coursed construction at 2.0m.
- There are missing bricks approximately every 1.0m starting at 2.0m through to 95.3m.
- The invert steps up twice at 82.7m.
- The dimensions of the culvert change to 2600mm x 1600mm at 83.7m.
- The invert steps up at 95.3m.
- The survey was abandoned as communication was lost due to step up of invert at 95.3m.

CCTV SURVEY – EXECUTIVE SUMMARY

Client:	Environment Agency	NFCDD Ref:	01313PIGT0101B02
Site Address:	Pig Lee Trib, Off Walmersley Old Road, Bury	Contact:	Mark Whittaker
Date of Report:	25 th October 2012	Job No:	SALE1308031

Observations & Anomalies

Service and structural defects have been recorded on this length. The complete frame of MH01 had to be removed to survey as the cover had seized. We were unable to obtain GPS for MH02.

3. MH02 downstream to MH01 – Date of Survey: 18-09-12 - Weather: Showers - Flow Level: Low

- The culvert is 1700mm x 2800mm rectangular masonry randomly coursed construction.
- There is a metal corrugated soffit at 0.0m.
- There are missing bricks at 2.0m.
- There is a connection with an intrusion of 30mm at 2.0m.
- The culvert changes to an arched 1800mm x 280mm construction at 2.0m.
- The invert steps down twice at 2.0m.
- The invert steps down at 6.9m.
- The dimensions of the culvert change to 2600mm x 1600mm at 10.8m.
- The invert steps down at 27.3m.
- The survey was abandoned as due to the overlap being completed at 27.3m.

Observations & Anomalies

Structural and constructional defects have been recorded on this length. The complete frame of MH01 had to be removed to survey as the cover had seized. We were unable to gain GPS for MH02.

4. MH02 upstream to Inlet – Date of Survey: 18-09-12 - Weather: Showers - Flow Level: Low

- The culvert is 1100mm x 900mm rectangular masonry in regular courses construction.
- There is a flagged soffit at 2.0m.
- There is a small chamber with metal bars visible at 8.3m.
- The culvert changes to a 1000mm x 1100mm masonry randomly coursed construction at 9.1m.
- The dimensions of the culvert change to 1070mm x 900mm at 22.1m.
- The width at 10 o'clock – 2 o'clock is 600mm at 22.1m.
- There is a blind chamber at 34.7m.
- There is an exiting blind chamber at 37.8m.
- There are intruding connections at various points in the length.
- There is a blind chamber at 54.7m.
- The dimensions of the culvert change to 100mm x 900mm at 54.7m.
- The dimensions of the culvert change to 1300mm x 1000mm at 56.7m.
- The material of the culvert changes to brick on the right hand side of the wall at 56.7.
- Benching starts on the right hand side at 56.7m and finishes at 100.8m.
- The culvert changes to a 100mm x 1100mm masonry randomly coursed construction at 60.5m.
- The dimensions of the culvert change to 1750mm x 1100mm at 62.5m.
- There are services across the culvert at 63.2m, 65.5m and 93.4m.
- There is brick 9 o'clock – 3 o'clock at 66.3m.
- There is infiltration gushing at 88.5m and 94.2m.
- The dimensions of the culvert change to 1250mm x 1500mm at 100.8m.
- The brick at 10 o'clock – 2 o'clock stops at 100.8m.
- There are metal brackets attached to the soffit at 104.9m, 107.6m and 136.3m.
- There is a beam across the soffit at 114.4m.

CCTV SURVEY – EXECUTIVE SUMMARY

Client:	Environment Agency	NFCDD Ref:	01313PIGT0101B02
Site Address:	Pig Lee Trib, Off Walmersley Old Road, Bury	Contact:	Mark Whittaker
Date of Report:	25 th October 2012	Job No:	SALE1308031

- The culvert changes to a 1500mm x 1500mm square culvert at 117.8m.
- There is medium encrustation at 153.2m.
- There is infiltration running at 153.2m.
- The survey was completed at 163.7m.

Observations & Anomalies

Service and constructional defects have been recorded on this length. We were unable to gain access to the Inlet as ladders are required. We were unable to obtain GPS at MH02 or the Inlet.

Recommendations

Our survey has highlighted debris, encrustation and scale which need removed using high pressure water removal. Our survey has also highlighted gushing and running infiltrations and also missing bricks which will all require remedial works. There were a number of dripping infiltrations which will require monitoring over the next twelve months. Our survey has also highlighted a number of intruding connections, however as they do not impede the flow no works will be required.

Health & Safety

We were unable to gain access to the Inlet and the Outlet is covered in moss so we are unable to comment on the condition of the headwalls.

Remaining Life

Culvert – Visually assessed in excess as between 3 and 5 years, subject to our recommendations.

Note:

This report is compiled from information provided by our trained and certified CCTV operators.

Thank you for using Aquajet (GB) Ltd

Executive Summary produced by J. Warren

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

Area Plan

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

Grade Defect Report

Grade Defect Report

AquaJet (GB) Ltd, Retford, Nottinghamshire, DN22 6HG, Tel: 01777 701335, Fax: 01777 701344 // E.A, SALE1308031,Pig Lee Trib.mdb

	Place	Road	start MH	Flow	end MH	Position	Observation	grade
1	BURY	OFF MILL ROAD	MH01	u/s	MH02	0	Start of Survey	0
2	BURY	OFF MILL ROAD	MH02	u/s	INLET	0	Start of Survey	0
3	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	0	Start of Survey	0
4	BURY	OFF MILL ROAD	MH02	d/s	MH01	0	Start of Survey	0
5	BURY	OFF MILL ROAD	MH02	u/s	INLET	0	Manhole Remark: MH02	0
6	BURY	OFF MILL ROAD	MH01	u/s	MH02	0	Manhole Remark: MH01	0
7	BURY	OFF MILL ROAD	MH02	d/s	MH01	0	Manhole Remark: MH02	0
8	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	0	Manhole Remark: OUTLET	0
9	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	0	Water level, 10 % height/diameter	0
10	BURY	OFF MILL ROAD	MH02	u/s	INLET	0	Water level, 15 % height/diameter	0
11	BURY	OFF MILL ROAD	MH02	d/s	MH01	0	Water level, 10 % height/diameter	0
12	BURY	OFF MILL ROAD	MH01	u/s	MH02	0	Water level, 05 % height/diameter	0
13	BURY	OFF MILL ROAD	MH02	d/s	MH01	0	General Observation, Remark: METAL CORRAGATED SOFFIT	0
14	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	2	General Condition photograph	0
15	BURY	OFF MILL ROAD	MH02	u/s	INLET	2	General Condition photograph	0
16	BURY	OFF MILL ROAD	MH01	u/s	MH02	0	General Condition photograph	0
17	BURY	OFF MILL ROAD	MH02	d/s	MH01	0	General Condition photograph	0
18	BURY	OFF MILL ROAD	MH02	u/s	INLET	2	General Observation, Remark: FLAGGED SOFFIT	0
19	BURY	OFF MILL ROAD	MH02	u/s	INLET	7.3	General Condition photograph	0
20	BURY	OFF MILL ROAD	MH01	u/s	MH02	2	Dimension of sewer changes, new dimension dia 2220 mm, Remark: X 1300MM	0
21	BURY	OFF MILL ROAD	MH01	u/s	MH02	2	Sewer shape changes at this point, Remark: ARCHED	0
22	BURY	OFF MILL ROAD	MH02	u/s	INLET	8.3	General Observation, Remark: SMALL CHAMBER ON LEFT METAL BARS VISIBLE	0
23	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	14.1	General Condition photograph	0
24	BURY	OFF MILL ROAD	MH02	d/s	MH01	2	Sewer shape changes at this point, Remark: ARCHED	0
25	BURY	OFF MILL ROAD	MH01	u/s	MH02	2	Sewer Material changes at this point, Masonry - rand. coursed	0
26	BURY	OFF MILL ROAD	MH02	u/s	INLET	9.1	Line of Sewer deviates right, Remark: SHARP	0
27	BURY	OFF MILL ROAD	MH02	u/s	INLET	9.1	Dimension of sewer changes, new dimension dia 1000 mm, Remark: X 1100MM	0
28	BURY	OFF MILL ROAD	MH02	d/s	MH01	2	Dimension of sewer changes, new dimension dia 1800 mm, Remark: X 2800MM	0
29	BURY	OFF MILL ROAD	MH02	u/s	INLET	9.1	Sewer Material changes at this point, Masonry - rand. coursed	0
30	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	22.5	Line of Sewer deviates left, Remark: SHARP	0
31	BURY	OFF MILL ROAD	MH02	d/s	MH01	2	General Observation, Remark: INVERT STEPS DOWN X 2	0
32	BURY	OFF MILL ROAD	MH02	u/s	INLET	9.1	General Condition photograph	0
33	BURY	OFF MILL ROAD	MH02	d/s	MH01	6.9	General Observation, Remark: INVERT STEPS DOWN 1.0M APPROX	0
34	BURY	OFF MILL ROAD	MH01	u/s	MH02	16.2	General Condition photograph	0
35	BURY	OFF MILL ROAD	MH02	d/s	MH01	9.9	Connection, at 03 o'clock, dia 450 mm, Remark: X 300MM	0
36	BURY	OFF MILL ROAD	MH01	u/s	MH02	16.2	General Observation, Remark: TIMBER ACROSS CULVERT 10 - 02 O'CLOCK	0
37	BURY	OFF MILL ROAD	MH02	u/s	INLET	20	General Condition photograph	0
38	BURY	OFF MILL ROAD	MH01	u/s	MH02	22.7	Connection, at 02 o'clock, dia 225 mm	0
39	BURY	OFF MILL ROAD	MH02	d/s	MH01	10.8	Line of Sewer deviates right, Remark: GRADUAL	0
40	BURY	OFF MILL ROAD	MH02	u/s	INLET	22.1	Connection, at 11 o'clock, dia 100 mm	0

Grade Defect Report

AquaJet (GB) Ltd, Retford, Nottinghamshire, DN22 6HG, Tel: 01777 701335, Fax: 01777 701344 // E.A, SALE1308031,Pig Lee Trib.mdb

	Place	Road	start MH	Flow	end MH	Position	Observation	grade
41	BURY	OFF MILL ROAD	MH02	u/s	INLET	22.1	Dimension of sewer changes, new dimension dia 1070 mm, Remark: X 900MM	0
42	BURY	OFF MILL ROAD	MH02	d/s	MH01	10.8	Dimension of sewer changes, new dimension dia 2600 mm, Remark: X 1600MM	0
43	BURY	OFF MILL ROAD	MH01	u/s	MH02	26.7	Connection, at 08 o'clock, dia 225 mm, Remark: X 225MM LIVE	0
44	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	32.3	Line of Sewer deviates left, Remark: QUITE SHARP	0
45	BURY	OFF MILL ROAD	MH02	d/s	MH01	10.8	General Condition photograph	0
46	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	32.3	General Condition photograph	0
47	BURY	OFF MILL ROAD	MH01	u/s	MH02	26.7	General Condition photograph	0
48	BURY	OFF MILL ROAD	MH02	u/s	INLET	22.1	General Observation, Remark: 10 - 02 O'CLOCK WIDTH 600MM	0
49	BURY	OFF MILL ROAD	MH02	u/s	INLET	22.1	General Condition photograph	0
50	BURY	OFF MILL ROAD	MH02	d/s	MH01	15	Connection, at 09 o'clock, dia 225 mm	0
51	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	39.5	Line of Sewer deviates right, Remark: QUITE SHARP	0
52	BURY	OFF MILL ROAD	MH01	u/s	MH02	31.8	General Condition photograph	0
53	BURY	OFF MILL ROAD	MH02	u/s	INLET	26.8	Connection, at 11 o'clock, dia 100 mm	0
54	BURY	OFF MILL ROAD	MH02	d/s	MH01	17.5	Connection, at 03 o'clock, dia 225 mm, Remark: X 225MM	0
55	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	39.5	General Condition photograph	0
56	BURY	OFF MILL ROAD	MH01	u/s	MH02	44.7	General Condition photograph	0
57	BURY	OFF MILL ROAD	MH02	u/s	INLET	26.8	General Condition photograph	0
58	BURY	OFF MILL ROAD	MH01	u/s	MH02	52.1	Connection, at 10 o'clock, dia 150 mm	0
59	BURY	OFF MILL ROAD	MH02	d/s	MH01	20	General Condition photograph	0
60	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	44.3	Line of Sewer deviates right, Remark: SHARP	0
61	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	44.3	General Condition photograph	0
62	BURY	OFF MILL ROAD	MH02	u/s	INLET	34.7	General Observation, Remark: BLIND CHAMBER	0
63	BURY	OFF MILL ROAD	MH02	d/s	MH01	20	Line of Sewer deviates right, Remark: GRADUAL	0
64	BURY	OFF MILL ROAD	MH01	u/s	MH02	61.7	General Condition photograph	0
65	BURY	OFF MILL ROAD	MH01	u/s	MH02	69.9	Connection, at 12 o'clock, dia 225 mm, Remark: LIVE	0
66	BURY	OFF MILL ROAD	MH02	d/s	MH01	26.9	Connection, at 02 o'clock, dia 500 mm, Remark: X 300MM	0
67	BURY	OFF MILL ROAD	MH01	u/s	MH02	69.9	Line of Sewer deviates right, Remark: SLIGHT	0
68	BURY	OFF MILL ROAD	MH02	d/s	MH01	27.3	General Observation, Remark: INVERT STEPS DOWN	0
69	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	52.3	General Condition photograph	0
70	BURY	OFF MILL ROAD	MH02	u/s	INLET	37.8	General Observation, Remark: EXITING BLIND CHAMBER	0
71	BURY	OFF MILL ROAD	MH02	u/s	INLET	37.8	General Condition photograph	0
72	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	70.1	General Condition photograph	0
73	BURY	OFF MILL ROAD	MH02	d/s	MH01	27.3	Survey abandoned, Remark: OVERLAP COMPLETED	0
74	BURY	OFF MILL ROAD	MH01	u/s	MH02	73.8	Connection, at 09 o'clock, dia 100 mm	0
75	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	83	General Condition photograph	0
76	BURY	OFF MILL ROAD	MH01	u/s	MH02	80.5	General Condition photograph	0
77	BURY	OFF MILL ROAD	MH01	u/s	MH02	82.7	Connection, at 04 o'clock, dia 600 mm, Remark: X 450MM	0
78	BURY	OFF MILL ROAD	MH02	u/s	INLET	48.6	General Condition photograph	0
79	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	95.4	General Condition photograph	0
80	BURY	OFF MILL ROAD	MH01	u/s	MH02	82.7	General Observation, Remark: INVERT STEPS UP TWICE	0

Grade Defect Report

AquaJet (GB) Ltd, Retford, Nottinghamshire, DN22 6HG, Tel: 01777 701335, Fax: 01777 701344 // E.A, SALE1308031, Pig Lee Trib.mdb

	Place	Road	start MH	Flow	end MH	Position	Observation	grade
81	BURY	OFF MILL ROAD	MH02	u/s	INLET	54.7	General Observation, Remark: BLIND CHAMBER	0
82	BURY	OFF MILL ROAD	MH01	u/s	MH02	83.7	Dimension of sewer changes, new dimension dia 2600 mm, Remark: X 1600MM	0
83	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	103	Line of Sewer deviates right, Remark: SHARP	0
84	BURY	OFF MILL ROAD	MH01	u/s	MH02	87.8	Line of Sewer deviates right, Remark: QUITE SHARP	0
85	BURY	OFF MILL ROAD	MH02	u/s	INLET	54.7	Dimension of sewer changes, new dimension dia 100 mm, Remark: X 900MM	0
86	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	103	General Condition photograph	0
87	BURY	OFF MILL ROAD	MH02	u/s	INLET	56.7	Dimension of sewer changes, new dimension dia 1300 mm, Remark: X 1000MM	0
88	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	116	General Condition photograph	0
89	BURY	OFF MILL ROAD	MH01	u/s	MH02	91.3	General Condition photograph	0
90	BURY	OFF MILL ROAD	MH01	u/s	MH02	95.3	General Observation, Remark: INVERT STEPS UP	0
91	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	120.2	Connection, at 10 o'clock, dia 225 mm	0
92	BURY	OFF MILL ROAD	MH02	u/s	INLET	56.7	General Condition photograph	0
93	BURY	OFF MILL ROAD	MH02	u/s	INLET	56.7	Sewer Material changes at this point, Brick, Remark: RIGHTSIDE WALL	0
94	BURY	OFF MILL ROAD	MH02	u/s	INLET	56.7	General Observation, Remark: BENCHING STARTS ON RIGHTSIDE	0
95	BURY	OFF MILL ROAD	MH02	u/s	INLET	60.5	Sewer Material changes at this point, Masonry - rand. coursed, Remark: RIGHTSIDE WALL	0
96	BURY	OFF MILL ROAD	MH02	u/s	INLET	60.5	Dimension of sewer changes, new dimension dia 100 mm, Remark: X 1100MM	0
97	BURY	OFF MILL ROAD	MH01	u/s	MH02	95.3	Survey abandoned, Remark: LOSS OF COMMUNICATION DUE TO STEP UP OF INVERT	0
98	BURY	OFF MILL ROAD	MH02	u/s	INLET	61.8	Line of Sewer deviates left, Remark: SHARP	0
99	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	124.3	General Condition photograph	0
100	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	138	General Condition photograph	0
101	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	150.9	General Condition photograph	0
102	BURY	OFF MILL ROAD	MH02	u/s	INLET	62.5	Dimension of sewer changes, new dimension dia 1750 mm, Remark: X 1100MM	0
103	BURY	OFF MILL ROAD	MH02	u/s	INLET	63.2	General Observation, Remark: SERVICE ACROSS CULVERT 11 - 01O'CLOCK	0
104	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	158.8	Manhole Remark: MH01	0
105	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	158.8	Finish Survey	0
106	BURY	OFF MILL ROAD	MH02	u/s	INLET	65.5	General Observation, Remark: SERVICE ACROSS CULVERT 10 - 02 O'CLOCK	0
107	BURY	OFF MILL ROAD	MH02	u/s	INLET	66.3	General Observation, Remark: BRICK 09 - 03 O'CLOCK	0
108	BURY	OFF MILL ROAD	MH02	u/s	INLET	70.3	Connection, at 01 o'clock, dia 100 mm	0
109	BURY	OFF MILL ROAD	MH02	u/s	INLET	70.3	General Condition photograph	0
110	BURY	OFF MILL ROAD	MH02	u/s	INLET	82.1	General Condition photograph	0
111	BURY	OFF MILL ROAD	MH02	u/s	INLET	91.1	Connection, at 10 o'clock, dia 150 mm	0
112	BURY	OFF MILL ROAD	MH02	u/s	INLET	91.1	General Condition photograph	0
113	BURY	OFF MILL ROAD	MH02	u/s	INLET	93.4	Connection, at 10 o'clock, dia 100 mm	0
114	BURY	OFF MILL ROAD	MH02	u/s	INLET	93.4	General Observation, Remark: SERVICE ACROSS CULVERT 10 - 02 O'CLOCK	0
115	BURY	OFF MILL ROAD	MH02	u/s	INLET	94.2	General Condition photograph	0
116	BURY	OFF MILL ROAD	MH02	u/s	INLET	96.5	Connection, at 08 o'clock, dia 150 mm, Remark: LIVE	0
117	BURY	OFF MILL ROAD	MH02	u/s	INLET	100.7	Line of Sewer deviates left, Remark: QUITE SHARP	0
118	BURY	OFF MILL ROAD	MH02	u/s	INLET	100.8	General Observation, Remark: BENCHING ON RIGHT STOPS	0
119	BURY	OFF MILL ROAD	MH02	u/s	INLET	100.8	Dimension of sewer changes, new dimension dia 1250 mm, Remark: X 1500MM	0
120	BURY	OFF MILL ROAD	MH02	u/s	INLET	100.8	General Condition photograph	0

Grade Defect Report

AquaJet (GB) Ltd, Retford, Nottinghamshire, DN22 6HG, Tel: 01777 701335, Fax: 01777 701344 // E.A, SALE1308031,Pig Lee Trib.mdb

	Place	Road	start MH	Flow	end MH	Position	Observation	grade
121	BURY	OFF MILL ROAD	MH02	u/s	INLET	100.8	General Observation, Remark: BRICK STOPS 10 - 02 O'CLOCK	0
122	BURY	OFF MILL ROAD	MH02	u/s	INLET	104.1	Connection, at 11 o'clock, dia 150 mm	0
123	BURY	OFF MILL ROAD	MH02	u/s	INLET	104.9	General Observation, Remark: 2 X METAL BRACKETS ATTACHED TO SOFFIT	0
124	BURY	OFF MILL ROAD	MH02	u/s	INLET	107.6	General Observation, Remark: METAL BRACKET ATTACHED TO SOFFIT	0
125	BURY	OFF MILL ROAD	MH02	u/s	INLET	112.2	Line of Sewer deviates left, Remark: SHARP	0
126	BURY	OFF MILL ROAD	MH02	u/s	INLET	112.2	General Condition photograph	0
127	BURY	OFF MILL ROAD	MH02	u/s	INLET	114.4	General Observation, Remark: BEAM ACROSS SOFFIT	0
128	BURY	OFF MILL ROAD	MH02	u/s	INLET	117.8	Line of Sewer deviates right, Remark: SHARP	0
129	BURY	OFF MILL ROAD	MH02	u/s	INLET	117.8	General Condition photograph	0
130	BURY	OFF MILL ROAD	MH02	u/s	INLET	117.8	Dimension of sewer changes, new dimension dia 1500 mm, Remark: X 1500MM	0
131	BURY	OFF MILL ROAD	MH02	u/s	INLET	117.8	Sewer shape changes at this point, Remark: SQUARE	0
132	BURY	OFF MILL ROAD	MH02	u/s	INLET	130	General Condition photograph	0
133	BURY	OFF MILL ROAD	MH02	u/s	INLET	136.3	General Observation, Remark: 3 X METAL BEAMS ACROSS SOFFIT	0
134	BURY	OFF MILL ROAD	MH02	u/s	INLET	141.1	Connection, at 12 o'clock, dia 150 mm	0
135	BURY	OFF MILL ROAD	MH02	u/s	INLET	141.5	Water level, 20 % height/diameter	0
136	BURY	OFF MILL ROAD	MH02	u/s	INLET	141.5	General Condition photograph	0
137	BURY	OFF MILL ROAD	MH02	u/s	INLET	150.4	Line of Sewer deviates left, Remark: SHARP	0
138	BURY	OFF MILL ROAD	MH02	u/s	INLET	150.4	General Condition photograph	0
139	BURY	OFF MILL ROAD	MH02	u/s	INLET	163.3	General Condition photograph	0
140	BURY	OFF MILL ROAD	MH02	u/s	INLET	163.7	Manhole Remark: INLET	0
141	BURY	OFF MILL ROAD	MH02	u/s	INLET	163.7	Finish Survey	0
142	BURY	OFF MILL ROAD	MH01	u/s	MH02	0	Light Scale from 07 to 05 o'clock, Start, Remark: CLOCKS VARY	1
143	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	2	Light Scale from 03 to 05 o'clock, Start, Remark: CLOCKS VARY	1
144	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	2	Light Scale from 07 to 09 o'clock, Start, Remark: CLOCKS VARY	1
145	BURY	OFF MILL ROAD	MH01	u/s	MH02	95.3	Light Scale from 07 to 05 o'clock, Finish, Remark: CLOCKS VARY	1
146	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	124.3	Light Scale from 03 to 05 o'clock, Finish, Remark: CLOCKS VARY	1
147	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	124.3	Light Scale from 07 to 09 o'clock, Finish, Remark: CLOCKS VARY	1
148	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	124.3	Light Scale from 07 to 05 o'clock, Start, Remark: CLOCKS VARY	1
149	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	158.8	Light Scale from 07 to 05 o'clock, Finish, Remark: CLOCKS VARY	1
150	BURY	OFF MILL ROAD	MH02	u/s	INLET	120.4	Debris, 10 % cross-sectional area loss, Start, Remark: RUBBLE	1
151	BURY	OFF MILL ROAD	MH02	u/s	INLET	141.5	Debris, 20 % cross-sectional area loss, Changed, Remark: RUBBLE	1
152	BURY	OFF MILL ROAD	MH02	u/s	INLET	146.6	Debris, 25 % cross-sectional area loss, Remark: ROCKS ON LEFT	1
153	BURY	OFF MILL ROAD	MH02	u/s	INLET	146.6	Debris, 15 % cross-sectional area loss, Changed, Remark: RUBBLE	1
154	BURY	OFF MILL ROAD	MH02	u/s	INLET	156.6	Debris, 25 % cross-sectional area loss, Remark: ROCK	1
155	BURY	OFF MILL ROAD	MH02	u/s	INLET	163.7	Debris, 15 % cross-sectional area loss, Finish, Remark: RUBBLE	1
156	BURY	OFF MILL ROAD	MH02	u/s	INLET	34.7	Obstruction, 50 % height/diameter loss, Remark: SERVICE ACROSS CULVERT	2
157	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	15.9	Infiltration Dripping at 12 o'clock	3
158	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	26.9	Infiltration Dripping at 12 o'clock	3
159	BURY	OFF MILL ROAD	MH02	d/s	MH01	2	Connection, at 11 o'clock, dia 150 mm, intrusion 30 mm	4
160	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	22.5	Encrustation medium, from 03 to 05 o'clock, 15% cross-sectional area loss	4

Grade Defect Report

AquaJet (GB) Ltd, Retford, Nottinghamshire, DN22 6HG, Tel: 01777 701335, Fax: 01777 701344 // E.A, SALE1308031,Pig Lee Trib.mdb

	Place	Road	start MH	Flow	end MH	Position	Observation	grade
161	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	26.9	Encrustation medium, from 10 to 12 o'clock, 10% cross-sectional area loss	4
162	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	52.3	Encrustation medium, from 11 to 12 o'clock, 10% cross-sectional area loss	4
163	BURY	OFF MILL ROAD	MH02	u/s	INLET	40.8	Connection, at 11 o'clock, dia 150 mm, intrusion 80 mm	4
164	BURY	OFF MILL ROAD	MH02	u/s	INLET	41.3	Connection, at 11 o'clock, dia 100 mm, intrusion 50 mm	4
165	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	86.7	Encrustation medium, from 07 to 09 o'clock, 10% cross-sectional area loss	4
166	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	120.2	Medium Scale from 07 to 10 o'clock, 10% cross-sectional area loss, Remark: FROM CONN	4
167	BURY	OFF MILL ROAD	MH02	u/s	INLET	62	Connection, at 01 o'clock, dia 225 mm, intrusion 50 mm	4
168	BURY	OFF MILL ROAD	MH02	u/s	INLET	62.5	Connection, at 10 o'clock, dia 225 mm, intrusion 40 mm	4
169	BURY	OFF MILL ROAD	MH02	u/s	INLET	66.3	Connection, at 02 o'clock, dia 100 mm, intrusion 500 mm	4
170	BURY	OFF MILL ROAD	MH02	u/s	INLET	74	Connection, at 10 o'clock, dia 225 mm, intrusion 60 mm	4
171	BURY	OFF MILL ROAD	MH02	u/s	INLET	77.2	Connection, at 01 o'clock, dia 150 mm, intrusion 60 mm	4
172	BURY	OFF MILL ROAD	MH02	u/s	INLET	78.1	Connection, at 10 o'clock, dia 150 mm, intrusion 40 mm	4
173	BURY	OFF MILL ROAD	MH02	u/s	INLET	82.1	Connection, at 11 o'clock, dia 100 mm, intrusion 60 mm	4
174	BURY	OFF MILL ROAD	MH02	u/s	INLET	85	Connection, at 10 o'clock, dia 150 mm, intrusion 50 mm, Remark: LIVE	4
175	BURY	OFF MILL ROAD	MH02	u/s	INLET	92.4	Connection, at 03 o'clock, dia 150 mm, intrusion 80 mm, Remark: LIVE	4
176	BURY	OFF MILL ROAD	MH02	u/s	INLET	93.4	Infiltration Running from 07 to 10 o'clock	4
177	BURY	OFF MILL ROAD	MH02	u/s	INLET	99.5	Connection, at 09 o'clock, dia 150 mm, intrusion 30 mm	4
178	BURY	OFF MILL ROAD	MH02	u/s	INLET	101.8	Connection, at 01 o'clock, dia 100 mm, intrusion 30 mm, Remark: LIVE	4
179	BURY	OFF MILL ROAD	MH02	u/s	INLET	110.9	Connection, at 03 o'clock, dia 150 mm, intrusion 30 mm	4
180	BURY	OFF MILL ROAD	MH02	u/s	INLET	146.1	Connection, at 11 o'clock, dia 100 mm, intrusion 350 mm	4
181	BURY	OFF MILL ROAD	MH02	u/s	INLET	151.4	Connection, at 02 o'clock, dia 100 mm, intrusion 300 mm	4
182	BURY	OFF MILL ROAD	MH02	u/s	INLET	151.4	Connection, at 03 o'clock, dia 400 mm, intrusion 200 mm	4
183	BURY	OFF MILL ROAD	MH02	u/s	INLET	153.2	Encrustation medium, from 04 to 05 o'clock, 10% cross-sectional area loss	4
184	BURY	OFF MILL ROAD	MH02	u/s	INLET	153.2	Infiltration Running from 04 to 05 o'clock	4
185	BURY	OFF MILL ROAD	MH02	d/s	MH01	2	Missing bricks at 09 o'clock	5
186	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	15.9	Infiltration Gushing at 12 o'clock	5
187	BURY	OFF MILL ROAD	MH01	u/s	MH02	2	Missing bricks at 02 o'clock, Start, Remark: EVERY 1.0M APPROX	5
188	BURY	OFF MILL ROAD	MH01	u/s	MH02	2	Missing bricks at 10 o'clock, Start, Remark: EVERY 1.0M APPROX	5
189	BURY	OFF MILL ROAD	MH01	u/s	MH02	95.3	Missing bricks at 02 o'clock, Finish, Remark: EVERY 1.0M APPROX	5
190	BURY	OFF MILL ROAD	MH01	u/s	MH02	95.3	Missing bricks at 10 o'clock, Finish, Remark: EVERY 1.0M APPROX	5
191	BURY	OFF MILL ROAD	MH02	u/s	INLET	88.5	Infiltration Gushing at 07 o'clock	5
192	BURY	OFF MILL ROAD	MH02	u/s	INLET	94.2	Infiltration Gushing at 10 o'clock	5
193	BURY	OFF MILL ROAD	MH02	u/s	INLET	98.6	Infiltration Gushing at 08 o'clock	5

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

WinCan Report (3rd Edition)



Project-information

Project name: Environment Agency	Contract number: 1308031	Contact: Mark Whittaker	Date: 31/12/2005
-------------------------------------	-----------------------------	----------------------------	---------------------

Client	Environment Agency
Contact:	Mark Whittaker
Position:	Team Leader
Road	Carrington Lane
Town	Sale
County	Cheshire
Telephone:	01925 542828
Fax:	01619 053277
Mobile:	07668 005294
E-Mail:	Mark.Whittaker@environment-agency.gov.uk
Site	NFCDD: 01313PIGT0101B02
Contact:	Mark Whittaker
Position:	Team Leader
Road	Off Walmersley Old Road
Town	Bury
County	Greater Manchester
Telephone:	01925 542828
Fax:	01619 053277
Mobile:	07668 005294
E-Mail:	Mark.Whittaker@environment-agency.gov.uk
Contractor	Aquajet (GB) Ltd
Contact:	Brian Driver
Position:	Contracts Manager
Road	Unit 7, London Road Business Park
Town	Retford
County	Nottinghamshire, DN22 6HG
Telephone:	01777 701335
Fax:	01777 701344
Mobile:	07985 953670
E-Mail:	brian.driver@aquajetgb.co.uk



AquaJet (GB) Ltd

Retford

Nottinghamshire, DN22 6HG

Tel: 01777 701335, Fax: 01777 701344

Inspection report

Date: 17.09.2012	Job N°: 1308031	Weather: Dry	Operator: G.Smith	section number: 1	PLR: MH01 X
Present:	Vehicle: FX08ERY	Camera: Camera assist	Preset:	Cleaned: No	Grade:

Road: OFF WALMERSLEY OLD ROAD	Division: NW	start MH: OUTLET
Place: BURY	District: AQSER	end MH: MH01
Location: Difficult access	Tape No.:	Total length: 158.8 m

Purpose: Asset condition	Shape/Size: Circular 1200
Use: Watercourse	Material: Brick Pipe length:
Catchment:	Lining: Category:

Comment: 01313PIGT0101B02
Location details: Pig Lee Trib

1:527	position	code	observation	MPEG	photo	grade
Depth: 1.60						
	0.00	ST	Start of Survey	00:00:00		(Misc) 0
	0.00	MH	Manhole Remark: OUTLET	00:00:00		(Constr) 0
	0.00	WL	Water level, 10 % height/diameter	00:00:00		(Serv) 0
	2.00	GP	General Condition photograph	00:00:28	4_4a	(Misc) 0
	2.00	S1	ESL Light Scale from 03 to 05 o'clock, Start, Remark: CLOCKS VARY	00:00:34	5_5a	(Serv) 1
	2.00	S2	ESL Light Scale from 07 to 09 o'clock, Start, Remark: CLOCKS VARY	00:00:34	6_6a	(Serv) 1
	14.10	GP	General Condition photograph	00:01:48	7_7a	(Misc) 0
	15.90	IG	Infiltration Gushing at 12 o'clock	00:02:11	8_8a	(Serv) 5
	15.90	ID	Infiltration Dripping at 12 o'clock	00:02:15	9_9a	(Serv) 3
	22.50	LL	Line of Sewer deviates left, Remark: SHARP	00:02:56		(Serv) 0
	22.50	EM	Encrustation medium, from 03 to 05 o'clock, 15% cross-sectional area loss	00:02:57	11_11a	(Serv) 4
	26.90	EM	Encrustation medium, from 10 to 12 o'clock, 10% cross-sectional area loss	00:03:36	12_12a	(Serv) 4
	26.90	ID	Infiltration Dripping at 12 o'clock	00:03:39	13_13a	(Serv) 3
	32.30	LL	Line of Sewer deviates left, Remark: QUITE SHARP	00:04:18		(Serv) 0
	32.30	GP	General Condition photograph	00:04:21	15_15a	(Misc) 0
	39.50	LR	Line of Sewer deviates right, Remark: QUITE SHARP	00:05:05		(Serv) 0
	39.50	GP	General Condition photograph	00:05:05	17_17a	(Misc) 0
	44.30	LR	Line of Sewer deviates right, Remark: SHARP	00:05:45		(Serv) 0
	44.30	GP	General Condition photograph	00:05:45	19_19a, b	(Misc) 0
	52.30	EM	Encrustation medium, from 11 to 12 o'clock, 10% cross-sectional area loss	00:06:42	20_20a	(Serv) 4
	52.30	GP	General Condition photograph	00:06:52	21_21a	(Misc) 0
	70.10	GP	General Condition photograph	00:08:44	22_22a	(Misc) 0



Aquajet (GB) Ltd
 Retford
 Nottinghamshire, DN22 6HG
 Tel: 01777 701335, Fax: 01777 701344

Inspection report

Date: 17.09.2012	Job nr.: 1308031	Weather: Dry	Operator: G.Smith	section number: 1	PLR: MH01 X
Present:	Vehicle: FX08ERY	Camera: Camera assist	Preset:	Cleaned: No	Grade:

1:527	position	code	observation	MPEG	photo	grade
	83.00	GP	General Condition photograph	00:10:13	23_23a	(Misc) 0
	86.70	EM	Encrustation medium, from 07 to 09 o'clock, 10% cross-sectional area loss	00:11:08	24_24a	(Serv) 4
	95.40	GP	General Condition photograph	00:12:14	25_25a	(Misc) 0
	103.00	LR	Line of Sewer deviates right, Remark: SHARP	00:13:18		(Serv) 0
	103.00	GP	General Condition photograph	00:13:18	27_27a	(Misc) 0
	116.00	GP	General Condition photograph	00:14:39	28_28a	(Misc) 0
	120.20	CN	Connection, at 10 o'clock, dia 225 mm	00:15:22		(Constr) 0
	120.20	ESM	Medium Scale from 07 to 10 o'clock, 10% cross-sectional area loss, Remark: FROM CONNECTION	00:15:22	30_30a	(Serv) 4
	124.30	F1	ESL Light Scale from 03 to 05 o'clock, Finish, Remark: CLOCKS VARY	00:16:09		(Serv) 1
	124.30	F2	ESL Light Scale from 07 to 09 o'clock, Finish, Remark: CLOCKS VARY	00:16:09		(Serv) 1
	124.30	S3	ESL Light Scale from 07 to 05 o'clock, Start, Remark: CLOCKS VARY	00:16:09		(Serv) 1
	124.30	GP	General Condition photograph	00:16:10	34_34a	(Misc) 0
	138.00	GP	General Condition photograph	00:17:50	35_35a	(Misc) 0
	150.90	GP	General Condition photograph	00:19:29	36_36a	(Misc) 0
	158.80	F3	ESL Light Scale from 07 to 05 o'clock, Finish, Remark: CLOCKS VARY	00:21:00		(Serv) 1
	158.80	MH	Manhole Remark: MH01	00:21:00	38_38a, b	(Constr) 0
	158.80	FH	Finish Survey	00:21:27		(Misc) 0
Structural Defects			Constructional Features			
Service Defects			Miscellaneous Features			



AquaJet (GB) Ltd

Retford

Nottinghamshire, DN22 6HG

Tel: 01777 701335, Fax: 01777 701344

Inspection report

Date: 17/09/2012	Job N°: 1308031	Weather: Dry	Operator: G. Smith	section number: 2	PLR: MH02 X
Present:	Vehicle: FX08ERY	Camera: Camera assist	Preset:	Cleaned: No	Grade:

Road: OFF MILL ROAD	Division: NW	start MH: MH01
Place: BURY	District: AQSER	end MH: MH02
Location: Difficult access	Tape No.:	Total length: 122.6 m

Purpose: Asset condition	Shape/Size: Rectangular 2500/1300
Use: Watercourse	Material: Masonry - in reg. courses
Catchment:	Lining: Category:

Comment: 01313PIGT0101B02
Location details: Pig Lee Trib

1:465	position	code	observation	MPEG	photo	grade
Depth: 13.36						
		MH01				
	0.00	ST	Start of Survey	00:00:00		(Misc) 0
	0.00	MH	Manhole Remark: MH01	00:00:00		(Constr) 0
	0.00	WL	Water level, 05 % height/diameter	00:00:00		(Serv) 0
	0.00	S1	ESL Light Scale from 07 to 05 o'clock, Start, Remark: CLOCKS VARY	00:00:00		(Serv) 1
	0.00	GP	General Condition photograph	00:00:24	76_5a	(Misc) 0
	2.00	DC	Dimension of sewer changes, new dimension dia 2220 mm, Remark: X 1300MM	00:00:55		(Misc) 0
	2.00	SC	Sewer shape changes at this point, Remark: ARCHED	00:01:03		(Misc) 0
	2.00	MC	Sewer Material changes at this point, Masonry - rand. coursed	00:01:04		(Misc) 0
	2.00	S2	MB Missing bricks at 02 o'clock, Start, Remark: EVERY 1.0M APPROX	00:01:05	80_9a	(Struct) 5
	2.00	S3	MB Missing bricks at 10 o'clock, Start, Remark: EVERY 1.0M APPROX	00:01:05	81_10a	(Struct) 5
	16.20	GP	General Condition photograph	00:02:07	82_11a	(Misc) 0
	16.20	GO	General Observation, Remark: TIMBER ACROSS CULVERT 10 - 02 O'CLOCK	00:02:20	83_12a	(Misc) 0
	22.70	CN	Connection, at 02 o'clock, dia 225 mm	00:02:52		(Constr) 0
	26.70	CN	Connection, at 08 o'clock, dia 225 mm, Remark: X 225MM LIVE	00:03:13		(Constr) 0
	26.70	GP	General Condition photograph	00:03:19	86_15a	(Misc) 0
	31.80	GP	General Condition photograph	00:03:49	87_16a	(Misc) 0
	44.70	GP	General Condition photograph	00:04:41	88_17a	(Misc) 0
	52.10	CN	Connection, at 10 o'clock, dia 150 mm	00:05:38		(Constr) 0
	61.70	GP	General Condition photograph	00:06:20	90_19a	(Misc) 0



AquaJet (GB) Ltd

Retford

Nottinghamshire, DN22 6HG

Tel: 01777 701335, Fax: 01777 701344

Inspection report

Date: 17/09/2012	Job nr.: 1308031	Weather: Dry	Operator: G.Smith	section number: 2	PLR: MH02 X
Present:	Vehicle: FX08ERY	Camera: Camera assist	Preset:	Cleaned: No	Grade:

1:465	position	code	observation	MPEG	photo	grade
	69.90	CN	Connection, at 12 o'clock, dia 225 mm, Remark: LIVE	00:06:56		(Constr) 0
	69.90	LR	Line of Sewer deviates right, Remark: SLIGHT	00:06:56		(Serv) 0
	73.80	CN	Connection, at 09 o'clock, dia 100 mm	00:07:19		(Constr) 0
	80.50	GP	General Condition photograph	00:07:56	94_23a	(Misc) 0
	82.70	CN	Connection, at 04 o'clock, dia 600 mm, Remark: X 450MM	00:08:33		(Constr) 0
	82.70	GO	General Observation, Remark: INVERT STEPS UP TWICE	00:08:47	96_25a, b	(Misc) 0
	83.70	DC	Dimension of sewer changes, new dimension dia 2600 mm, Remark: X 1600MM	00:08:00		(Misc) 0
	87.80	LR	Line of Sewer deviates right, Remark: QUITE SHARP	00:10:26	2_27a	(Serv) 0
	91.30	GP	General Condition photograph	00:11:06	2_28a	(Misc) 0
	95.30	GO	General Observation, Remark: INVERT STEPS UP	00:11:44		(Misc) 0
	95.30	F1	ESL Light Scale from 07 to 05 o'clock, Finish, Remark: CLOCKS VARY	00:11:45		(Serv) 1
	95.30	F2	MB Missing bricks at 02 o'clock, Finish, Remark: EVERY 1.0M APPROX	00:11:47		(Struct) 5
	95.30	F3	MB Missing bricks at 10 o'clock, Finish, Remark: EVERY 1.0M APPROX	00:11:47		(Struct) 5
	95.30	SA	Survey abandoned, Remark: LOSS OF COMMUNICATION DUE TO STEP UP OF INVERT	00:11:55	2_33a	(Misc) 0
Structural Defects			Constructional Features			
Service Defects			Miscellaneous Features			



AquaJet (GB) Ltd

Retford

Nottinghamshire, DN22 6HG

Tel: 01777 701335, Fax: 01777 701344

Inspection report

Date: 18/09/2012	Job N°: 1308031	Weather: Showers	Operator: G.Smith	section number: 3	PLR: MH02 X
Present:	Vehicle: FX08ERY	Camera: Camera assist	Preset:	Cleaned: No	Grade:

Road: OFF MILL ROAD	Division: NW	start MH: MH02
Place: BURY	District: AQSER	end MH: MH01
Location: Warehouse	Tape No.:	Total length: 122.6 m

Purpose: Asset condition	Shape/Size: Rectangular 1700/2800
Use: Watercourse	Material: Masonry - rand. coursed
Catchment:	Pipe length:
	Lining:
	Category:

Comment: 01313PIGT0101B02

Location details: Pig Lee Trib

1:200	position	code	observation	MPEG	photo	grade
Depth: 2.22						
		MH02				
	0.00	ST	Start of Survey	00:00:00		(Misc) 0
	0.00	MH	Manhole Remark: MH02	00:00:00		(Constr) 0
	0.00	WL	Water level, 10 % height/diameter	00:00:00		(Serv) 0
	0.00	GO	General Observation, Remark: METAL CORRAGATED SOFFIT	00:00:24	108_4a	(Misc) 0
	0.00	GP	General Condition photograph	00:00:35	109_5a	(Misc) 0
	2.00	MB	Missing bricks at 09 o'clock	00:01:08	110_6a	(Struct) 5
	2.00	CNI	Connection, at 11 o'clock, dia 150 mm, intrusion 30 mm	00:01:20	111_7a	(Constr) 4
	2.00	SC	Sewer shape changes at this point, Remark: ARCHED	00:01:44		(Misc) 0
	2.00	DC	Dimension of sewer changes, new dimension dia 1800 mm, Remark: X 2800MM	00:01:45	113_9a	(Misc) 0
	2.00	GO	General Observation, Remark: INVERT STEPS DOWN X 2	00:01:57	114_10a	(Misc) 0
	6.90	GO	General Observation, Remark: INVERT STEPS DOWN 1.0M APPROX	00:03:39	115_11a	(Misc) 0
	9.90	CN	Connection, at 03 o'clock, dia 450 mm, Remark: X 300MM	00:04:11		(Constr) 0
	10.80	S1 LR	Line of Sewer deviates right, Remark: GRADUAL	00:04:46		(Serv) 0
	10.80	DC	Dimension of sewer changes, new dimension dia 2600 mm, Remark: X 1600MM	00:04:46		(Misc) 0
	10.80	GP	General Condition photograph	00:04:54	119_15a	(Misc) 0
	15.00	CN	Connection, at 09 o'clock, dia 225 mm	00:05:32		(Constr) 0
	17.50	CN	Connection, at 03 o'clock, dia 225 mm, Remark: X 225MM	00:05:51		(Constr) 0
	20.00	GP	General Condition photograph	00:06:19	122_18a	(Misc) 0
	20.00	F1 LR	Line of Sewer deviates right, Remark: GRADUAL	00:06:22		(Serv) 0
	26.90	CN	Connection, at 02 o'clock, dia 500 mm, Remark: X 300MM	00:07:04		(Constr) 0
	27.30	GO	General Observation, Remark: INVERT STEPS DOWN	00:07:25		(Misc) 0
	27.30	SA	Survey abandoned, Remark: OVERLAP COMPLETED	00:07:31	126_22a	(Misc) 0

Structural Defects

Constructional Features

Service Defects

Miscellaneous Features



AquaJet (GB) Ltd

Retford

Nottinghamshire, DN22 6HG

Tel: 01777 701335, Fax: 01777 701344

Inspection report

Date: 18/09/2012	Job N°: 1308031	Weather: Showers	Operator: G.Smith	section number: 4	PLR: INLET X
Present:	Vehicle: FX08ERY	Camera: Camera assist	Preset:	Cleaned: No	Grade:

Road: OFF MILL ROAD	Division: NW	start MH: MH02
Place: BURY	District: NW	end MH: INLET
Location: Warehouse	Tape No.: AQSER	Total length: 163.7 m

Purpose: Asset condition	Shape/Size: Rectangular 1100/900
Use: Watercourse	Material: Masonry - in reg. courses Pipe length:
Catchment:	Lining: Category:

Comment: **01313PIGT0101B02**Location details: **Pig Lee Trib**

1:310	position	code	observation	MPEG	photo	grade
Depth: 2.22						
	0.00	ST	Start of Survey	00:00:00		(Misc) 0
	0.00	MH	Manhole Remark: MH02	00:00:00		(Constr) 0
	0.00	WL	Water level, 15 % height/diameter	00:00:00		(Serv) 0
	2.00	GP	General Condition photograph	00:00:21	130_4a	(Misc) 0
	2.00	GO	General Observation, Remark: FLAGGED SOFFIT	00:00:30	131_5a	(Misc) 0
	7.30	GP	General Condition photograph	00:01:16	132_6a	(Misc) 0
	8.30	GO	General Observation, Remark: SMALL CHAMBER ON LEFT METAL BARS VISIBLE	00:02:09	133_7a	(Misc) 0
	9.10	LR	Line of Sewer deviates right, Remark: SHARP	00:02:47		(Serv) 0
	9.10	DC	Dimension of sewer changes, new dimension dia 1000 mm, Remark: X 1100MM	00:02:48		(Misc) 0
	9.10	MC	Sewer Material changes at this point, Masonry - rand. coursed	00:02:49		(Misc) 0
	9.10	GP	General Condition photograph	00:02:50	137_11a	(Misc) 0
	20.00	GP	General Condition photograph	00:03:43	138_12a	(Misc) 0
	22.10	CN	Connection, at 11 o'clock, dia 100 mm	00:04:08		(Constr) 0
	22.10	DC	Dimension of sewer changes, new dimension dia 1070 mm, Remark: X 900MM	00:04:16		(Misc) 0
	22.10	GO	General Observation, Remark: 10 - 02 O'CLOCK WIDTH 600MM	00:04:25		(Misc) 0
	22.10	GP	General Condition photograph	00:04:27	142_16a	(Misc) 0
	26.80	CN	Connection, at 11 o'clock, dia 100 mm	00:04:58		(Constr) 0
	26.80	GP	General Condition photograph	00:05:13	144_18a	(Misc) 0
	34.70	GO	General Observation, Remark: BLIND CHAMBER	00:05:55	145_19a	(Misc) 0
	34.70	OB	Obstruction, 50 % height/diameter loss, Remark: SERVICE ACROSS CULVERT	00:06:04	146_20a	(Serv) 2
	37.80	GO	General Observation, Remark: EXITING BLIND CHAMBER	00:06:40		(Misc) 0
	37.80	GP	General Condition photograph	00:06:41	148_22a	(Misc) 0
	40.80	CNI	Connection, at 11 o'clock, dia 150 mm, intrusion 80 mm	00:07:09	149_23a	(Constr) 4
	41.30	CNI	Connection, at 11 o'clock, dia 100 mm, intrusion 50 mm	00:07:19	150_24a	(Constr) 4



AquaJet (GB) Ltd

Retford

Nottinghamshire, DN22 6HG

Tel: 01777 701335, Fax: 01777 701344

Inspection report

Date: 18/09/2012	Job nr.: 1308031	Weather: Showers	Operator: G.Smith	section number: 4	PLR: INLET X
Present:	Vehicle: FX08ERY	Camera: Camera assist	Preset:	Cleaned: No	Grade:

1:310	position	code	observation	MPEG	photo	grade
	48.60	GP	General Condition photograph	00:08:10	151_25a	(Misc) 0
	54.70	GO	General Observation, Remark: BLIND CHAMBER	00:09:12	152_26a	(Misc) 0
	54.70	DC	Dimension of sewer changes, new dimension dia 100 mm, Remark: X 900MM	00:09:35		(Misc) 0
	56.70	DC	Dimension of sewer changes, new dimension dia 1300 mm, Remark: X 1000MM	00:11:10		(Misc) 0
	56.70	GP	General Condition photograph	00:11:12	4_29a	(Misc) 0
	56.70	MC	Sewer Material changes at this point, Brick, Remark: RIGHTSIDE WALL	00:11:21	4_30a	(Misc) 0
	56.70	GO	General Observation, Remark: BENCHING STARTS ON RIGHTSIDE	00:11:21		(Misc) 0
	60.50	MC	Sewer Material changes at this point, Masonry - rand. coursed, Remark: RIGHTSIDE WALL	00:11:59	4_32a	(Misc) 0
	60.50	DC	Dimension of sewer changes, new dimension dia 100 mm, Remark: X 1100MM	00:11:59		(Misc) 0
	61.80	LL	Line of Sewer deviates left, Remark: SHARP	00:12:26	4_34a	(Serv) 0
	62.00	CNI	Connection, at 01 o'clock, dia 225 mm, intrusion 50 mm	00:12:47	4_35a	(Constr) 4
	62.50	CNI	Connection, at 10 o'clock, dia 225 mm, intrusion 40 mm	00:13:12	4_36a	(Constr) 4
	62.50	DC	Dimension of sewer changes, new dimension dia 1750 mm, Remark: X 1100MM	00:13:12		(Misc) 0
	63.20	GO	General Observation, Remark: SERVICE ACROSS CULVERT 11 - 01O'CLOCK	00:13:26	4_38a	(Misc) 0
	65.50	GO	General Observation, Remark: SERVICE ACROSS CULVERT 10 - 02 O'CLOCK	00:13:50	4_39a	(Misc) 0
	66.30	CNI	Connection, at 02 o'clock, dia 100 mm, intrusion 500 mm	00:14:05	4_40a	(Constr) 4
	66.30	GO	General Observation, Remark: BRICK 09 - 03 O'CLOCK	00:14:18	4_41a	(Misc) 0
	70.30	CN	Connection, at 01 o'clock, dia 100 mm	00:14:44		(Constr) 0
	70.30	GP	General Condition photograph	00:14:56	4_43a	(Misc) 0
	74.00	CNI	Connection, at 10 o'clock, dia 225 mm, intrusion 60 mm	00:15:16	4_44a	(Constr) 4
	77.20	CNI	Connection, at 01 o'clock, dia 150 mm, intrusion 60 mm	00:16:02	4_45a	(Constr) 4
	78.10	CNI	Connection, at 10 o'clock, dia 150 mm, intrusion 40 mm	00:16:31	4_46a	(Constr) 4
	82.10	CNI	Connection, at 11 o'clock, dia 100 mm, intrusion 60 mm	00:16:55	4_47a	(Constr) 4
	82.10	GP	General Condition photograph	00:17:02	4_48a	(Misc) 0
	85.00	CNI	Connection, at 10 o'clock, dia 150 mm, intrusion 50 mm, Remark: LIVE	00:17:21	4_49a	(Constr) 4
	88.50	IG	Infiltration Gushing at 07 o'clock	00:17:45	4_50a	(Serv) 5
	91.10	CN	Connection, at 10 o'clock, dia 150 mm	00:18:12		(Constr) 0
	91.10	GP	General Condition photograph	00:18:16	4_52a	(Misc) 0
	92.40	CNI	Connection, at 03 o'clock, dia 150 mm, intrusion 80 mm, Remark: LIVE	00:18:31	4_53a	(Constr) 4



AquaJet (GB) Ltd

Retford

Nottinghamshire, DN22 6HG

Tel: 01777 701335, Fax: 01777 701344

Inspection report

Date: 18/09/2012	Job nr.: 1308031	Weather: Showers	Operator: G.Smith	section number: 4	PLR: INLET X
Present:	Vehicle: FX08ERY	Camera: Camera assist	Preset:	Cleaned: No	Grade:

1:310	position	code	observation	MPEG	photo	grade
	93.40	CN	Connection, at 10 o'clock, dia 100 mm	00:18:54		(Constr) 0
	93.40	IR	Infiltration Running from 07 to 10 o'clock	00:18:55	4_55a	(Serv) 4
	93.40	GO	General Observation, Remark: SERVICE ACROSS CULVERT 10 - 02 O'CLOCK	00:19:11	4_56a	(Misc) 0
	94.20	IG	Infiltration Gushing at 10 o'clock	00:19:35	4_57a	(Serv) 5
	94.20	GP	General Condition photograph	00:19:47	4_58a	(Misc) 0
	96.50	CN	Connection, at 08 o'clock, dia 150 mm, Remark: LIVE	00:20:04		(Constr) 0
	98.60	IG	Infiltration Gushing at 08 o'clock	00:20:36	4_60a	(Serv) 5
	99.50	CNI	Connection, at 09 o'clock, dia 150 mm, intrusion 30 mm	00:20:56	4_61a	(Constr) 4
	100.70	LL	Line of Sewer deviates left, Remark: QUITE SHARP	00:21:14		(Serv) 0
	100.80	GO	General Observation, Remark: BENCHING ON RIGHT STOPS	00:21:16		(Misc) 0
	100.80	DC	Dimension of sewer changes, new dimension dia 1250 mm, Remark: X 1500MM	00:21:17		(Misc) 0
	100.80	GP	General Condition photograph	00:21:17	4_65a	(Misc) 0
	100.80	GO	General Observation, Remark: BRICK STOPS 10 - 02 O'CLOCK	00:21:24		(Misc) 0
	101.80	CNI	Connection, at 01 o'clock, dia 100 mm, intrusion 30 mm, Remark: LIVE	00:21:57	4_67a	(Constr) 4
	104.10	CN	Connection, at 11 o'clock, dia 150 mm	00:22:26		(Constr) 0
	104.90	GO	General Observation, Remark: 2 X METAL BRACKETS ATTACHED TO SOFFIT	00:22:53	4_69a, b	(Misc) 0
	107.60	GO	General Observation, Remark: METAL BRACKET ATTACHED TO SOFFIT	00:23:33	4_70a	(Misc) 0
	110.90	CNI	Connection, at 03 o'clock, dia 150 mm, intrusion 30 mm	00:23:58	4_71a	(Constr) 4
	112.20	LL	Line of Sewer deviates left, Remark: SHARP	00:24:17		(Serv) 0
	112.20	GP	General Condition photograph	00:24:20	4_73a	(Misc) 0
	114.40	GO	General Observation, Remark: BEAM ACROSS SOFFIT	00:24:43	4_74a	(Misc) 0
	117.80	LR	Line of Sewer deviates right, Remark: SHARP	00:25:30		(Serv) 0
	117.80	GP	General Condition photograph	00:25:30	4_76a	(Misc) 0
	117.80	DC	Dimension of sewer changes, new dimension dia 1500 mm, Remark: X 1500MM	00:25:36		(Misc) 0
	117.80	SC	Sewer shape changes at this point, Remark: SQUARE	00:25:36		(Misc) 0
	120.40	S1 DE	Debris, 10 % cross-sectional area loss, Start, Remark: RUBBLE	00:26:06	4_79a	(Serv) 1
	130.00	GP	General Condition photograph	00:27:18	4_80a	(Misc) 0
	136.30	GO	General Observation, Remark: 3 X METAL BEAMS ACROSS SOFFIT	00:27:53	4_81a	(Misc) 0
	141.10	CN	Connection, at 12 o'clock, dia 150 mm	00:28:47		(Constr) 0
	141.50	C1 DE	Debris, 20 % cross-sectional area loss, Changed, Remark: RUBBLE	00:29:04	4_83a	(Serv) 1
	141.50	WL	Water level, 20 % height/diameter	00:29:04		(Serv) 0
	141.50	GP	General Condition photograph	00:29:10	4_85a	(Misc) 0



Aquajet (GB) Ltd

Retford

Nottinghamshire, DN22 6HG

Tel: 01777 701335, Fax: 01777 701344

Inspection report

Date: 18/09/2012	Job nr.: 1308031	Weather: Showers	Operator: G.Smith	section number: 4	PLR: INLET X
Present:	Vehicle: FX08ERY	Camera: Camera assist	Preset:	Cleaned: No	Grade:

1:310	position	code	observation	MPEG	photo	grade
	146.10	CNI	Connection, at 11 o'clock, dia 100 mm, intrusion 350 mm	00:30:25	4_86a	(Constr) 4
	146.60	DE	Debris, 25 % cross-sectional area loss, Remark: ROCKS ON LEFT	00:30:41	4_87a	(Serv) 1
	146.60	C1 DE	Debris, 15 % cross-sectional area loss, Changed, Remark: RUBBLE	00:30:44		(Serv) 1
	150.40	LL	Line of Sewer deviates left, Remark: SHARP	00:31:07		(Serv) 0
	150.40	GP	General Condition photograph	00:31:09	4_90a	(Misc) 0
	151.40	CNI	Connection, at 02 o'clock, dia 100 mm, intrusion 300 mm	00:31:54	4_91a	(Constr) 4
	151.40	CNI	Connection, at 03 o'clock, dia 400 mm, intrusion 200 mm	00:31:54	4_92a	(Constr) 4
	153.20	EM	Encrustation medium, from 04 to 05 o'clock, 10% cross-sectional area loss	00:32:21	4_93a	(Serv) 4
	153.20	IR	Infiltration Running from 04 to 05 o'clock	00:32:24	4_94a	(Serv) 4
	156.60	DE	Debris, 25 % cross-sectional area loss, Remark: ROCK	00:32:58	4_95a	(Serv) 1
	163.30	GP	General Condition photograph	00:34:48	4_96a	(Misc) 0
	163.70	F1 DE	Debris, 15 % cross-sectional area loss, Finish, Remark: RUBBLE	00:35:54		(Serv) 1
	163.70	MH	Manhole Remark: INLET	00:35:56	4_98a	(Constr) 0
	163.70	FH	Finish Survey	00:36:02		(Misc) 0

U.T.G.A TO INLET LADDERS REQUIRED

Structural Defects

Constructional Features

Service Defects

Miscellaneous Features

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

Metre Report



Aquajet (GB) Ltd
 Retford
 Nottinghamshire, DN22 6HG
 Tel: 01777 701335, Fax: 01777 701344

 $\Sigma \emptyset$

Project name:
Environment Agency

Contract number:
1308031

Contact:
Mark Whittaker

Date:
31/12/2005

No.	start MH	end MH	Date	Road	Tape No.	Material	m	(m)
1	OUTLET	MH01	17.09.2012	OFF WALMERSLEY OLD ROAD	AQSER	Brick	158.8	158.8

Profile: CIRCULAR 1200 = 158.8 m (158.8 m)

No.	start MH	end MH	Date	Road	Tape No.	Material	m	(m)
4	MH02	INLET	18/09/2012	OFF MILL ROAD	AQSER	Masonry - in reg. courses	163.7	163.7

Profile: RECTANGULAR 1100/900 = 163.7 m (163.7 m)

No.	start MH	end MH	Date	Road	Tape No.	Material	m	(m)
3	MH02	MH01	18/09/2012	OFF MILL ROAD	AQSER	Masonry - rand. coursed	122.6	27.3

Profile: RECTANGULAR 1700/2800 = 122.6 m (27.3 m)

No.	start MH	end MH	Date	Road	Tape No.	Material	m	(m)
2	MH01	MH02	17/09/2012	OFF MILL ROAD	AQSER	Masonry - in reg. courses	122.6	95.3

Profile: RECTANGULAR 2500/1300 = 122.6 m (95.3 m)

all sections = 567.7 m (445.1 m)

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

SRM Scoring Report



AquaJet (GB) Ltd

Retford

Nottinghamshire, DN22 6HG

Tel: 01777 701335, Fax: 01777 701344

Service / Operational Defects (SRM 4)

Project name:
Environment Agency

Contract number:
1308031

Contact:
Mark Whittaker

Date:
31/12/2005

No.	PLR	Dir.	Use	Shape / Size	Date	Mat.	Total Length	Insp. Length	Peak HWG	Cat.	Peak Score	Grade	Mean Score	Total Score
1	MH01 X	U	W	C 1200	17/09/2012	BR	158.8	158.8	5	-	3	3	1.8	288
2	MH02 X	U	W	R 2500/1300	17/09/2012	MAC	122.6	95.3	1	-	1	2	1.0	95
3	MH02 X	D	W	R 1700/2800	18/09/2012	MAR	122.6	27.3	-	-	5	4	0.2	5
4	INLET X	U	W	R 1100/900	18/09/2012	MAC	163.7	163.7	5	-	20	5	1.4	236



AquaJet (GB) Ltd

Retford

Nottinghamshire, DN22 6HG

Tel: 01777 701335, Fax: 01777 701344

Structural Defects (SRM 4)

Project name:
Environment Agency

Contract number:
1308031

Contact:
Mark Whittaker

Date:
31/12/2005

No.	PLR	Dir.	Use	Shape / Size	Date	Mat.	Total Length	Insp. Length	Peak HWG	Cat.	Peak Score	Grade	Mean Score	Total Score
1	MH01 X	U	W	C 1200	17/09/2012	BR	158.8	158.8	-	-	0	1	0	0
2	MH02 X	U	W	R 2500/1300	17/09/2012	MAC	122.6	95.3	5	-	0	1	0	0
3	MH02 X	D	W	R 1700/2800	18/09/2012	MAR	122.6	27.3	5	-	0	1	0	0
4	INLET X	U	W	R 1100/900	18/09/2012	MAC	163.7	163.7	-	-	0	1	0	0

Site Coding Report

Pages 83 - 89

Surveyed by (Operator) **G.Smith** Contract no. **1308031** Job no. **1308031** Catchment (Drainage area) Div. District **NW** Pipe length reference **MH01 X**
 Date **170912** Time Location - Road name **OFF WALMERSLEY OLD ROAD** Location - Place name **BURY**
 Start manhole no. **OUTLET** Depth **1.60** Cover level Invert level Finish manhole no. **MH01** Depth Cover level Invert level
 Use **W** Direction **U** Size (dia) **1200** x Size Shape **C** Material **BR** Lining Pipe length Total length **158.8** Year laid
 Video recording Index no. **AQSER** Cleaned Flow Control Comments - general **01313PIGT0101B02**
 Purpose **F** Cat. Pre-cleaning **N** Weather **1** Loc. code **X** Further location details **Pig Lee Trib**

Video no.	Photo no.	Distance (m)	Cont. def.	Letters	Diameter / Dimension	Numbers		Intrusion % mm	Remarks
				Code		Clock at /to			
0000		0.0		ST					
0000		0.0		MH					OUTLET
0000		0.0		WL				10	
0002	4_4a	2.0		GP					
0003	5_5a	2.0	S1	ESL		03 - 05			CLOCKS VARY
0003	6_6a	2.0	S2	ESL		07 - 09			CLOCKS VARY
0014	7_7a	14.1		GP					
0021	8_8a	15.9		IG		12			
0021	9_9a	15.9		ID		12			
0025		22.5		LL					SHARP
0025	11_11a	22.5		EM		03 - 05		15	
0033	12_12a	26.9		EM		10 - 12		10	
0033	13_13a	26.9		ID		12			
0041		32.3		LL					QUITE SHARP
0042	15_15a	32.3		GP					
0050		39.5		LR					QUITE SHARP
0050	17_17a	39.5		GP					
0054		44.3		LR					SHARP
0054	19_19a	44.3		GP					
0064	20_20a	52.3		EM		11 - 12		10	
0065	21_21a	52.3		GP					
0084	22_22a	70.1		GP					
0101	23_23a	83.0		GP					
0110	24_24a	86.7		EM		07 - 09		10	
0121	25_25a	95.4		GP					
0131		103.0		LR					SHARP
0131	27_27a	103.0		GP					
0143	28_28a	116.0		GP					
0152		120.2		CN	225	10			
0152	30_30a	120.2		ESM		07 - 10		10	FROM CONNECTION
0160		124.3	F1	ESL		03 - 05			CLOCKS VARY
0160		124.3	F2	ESL		07 - 09			CLOCKS VARY
0160		124.3	S3	ESL		07 - 05			CLOCKS VARY

[illegible]

Surveyed by (Operator) **G.Smith** Contract no. **1308031** Job no. **1308031** Catchment (Drainage area) Div. District **NW** Pipe length reference **MH02 X**
 Date **170912** Time Location - Road name **OFF MILL ROAD** Location - Place name **BURY**
 Start manhole no. **MH01** Depth **13.36** Cover level Invert level Finish manhole no. **MH02** Depth **02.22** Cover level Invert level
 Use **W** Direction **U** Size (dia) **2500** x Size **1300** Shape **R** Material **MAC** Lining Pipe length Total length **122.6** Year laid
 Video recording Index no. **AQSER** Cleaned Flow Control Comments - general **01313PIGT0101B02**
 Purpose **F** Cat. Pre-cleaning **N** Weather **1** Loc. code **X** Further location details **Pig Lee Trib**

Video no.	Photo no.	Distance (m)	Cont. def.	Letters	Diameter / Dimension	Numbers		Intrusion % mm	Remarks
				Code		Clock at /to			
0000		0.0		ST					
0000		0.0		MH					MH01
0000		0.0		WL				10	
0000		0.0	S1	ESL		07 - 05			CLOCKS VARY
0002	76_5a	0.0		GP					
0005		2.0		DC				200	X 1300MM
0010		2.0		SC					ARCHED
0010		2.0		MC					Masonry - rand. coursed
0010	80_9a	2.0	S2	MB		02			EVERY 1.0M APPROX
0010	81_10a	2.0	S3	MB		10			EVERY 1.0M APPROX
0020	82_11a	16.2		GP					
0022	83_12a	16.2		GO					TIMBER ACROSS CULVERT 10 - 02 O'CLOCK
0025		22.7		CN	225	02			
0031		26.7		CN	225	08			X 225MM LIVE
0031	86_15a	26.7		GP					
0034	87_16a	31.8		GP					
0044	88_17a	44.7		GP					
0053		52.1		CN	150	10			
0062	90_19a	61.7		GP					
0065		69.9		CN	225	12			LIVE
0065		69.9		LR					SLIGHT
0071		73.8		CN	100	09			
0075	94_23a	80.5		GP					
0083		82.7		CN	600	04			X 450MM
0084	96_25a	82.7		GO					INVERT STEPS UP TWICE
0080		83.7		DC				600	X 1600MM
0102	2_27a	87.8		LR					QUITE SHARP
0110	2_28a	91.3		GP					
0114		95.3		GO					INVERT STEPS UP
0114		95.3	F1	ESL		07 - 05			CLOCKS VARY
0114		95.3	F2	MB		02			EVERY 1.0M APPROX
0114		95.3	F3	MB		10			EVERY 1.0M APPROX
0115	2_33a	95.3		SA					LOSS OF COMMUNICATION DUE TO STEP UP OF INVERT

Video no.	Photo no.		Distance (m)		Cont. def.	Letters	Numbers			Remarks
						Code	Diameter / Dimension	Clock at /to	Intrusion % mm	
0000			0.0			ST				
0000			0.0			MH				MH02
0000			0.0			WL			10	
0002	108_4a		0.0		X	GO				METAL CORRAGATED SOFFIT
0003	109_5a		0.0			GP				
0010	110_6a		2.0			MB		09		
0012	111_7a		2.0			CNI	150	11	0030	
0014			2.0			SC				ARCHED
0014	113_9a		2.0		X	DC			800	X 2800MM
0015	114_10		2.0			GO				INVERT STEPS DOWN X 2
0033	115_11		6.9			GO				INVERT STEPS DOWN 1.0M APPROX
0041	a		9.9			CN	450	03		X 300MM
0044			10.8		S1	LR				GRADUAL
0044			10.8		X	DC			600	X 1600MM
0045	119_15		10.8			GP				
0053	a		15.0			CN	225	09		
0055			17.5			CN	225	03		X 225MM
0061	122_18		20.0		X	GP				
0062	a		20.0		F1	LR				GRADUAL
0070			26.9			CN	500	02		X 300MM
0072			27.3			GO				INVERT STEPS DOWN
0073	126_22		27.3		X	SA				OVERLAP COMPLETED
	a									
					X					
					X					

Surveyed by (Operator) G.Smith		Contract no. 1308031		Job no. 1308031		Catchment (Drainage area) 		Div. 		District NW		Pipe length reference INLET X	
Date 180912		Time 		Location - Road name OFF MILL ROAD				Location - Place name BURY					
Start manhole no. MH02		Depth 2.22		Cover level 		Invert level 		Finish manhole no. INLET		Depth 		Cover level 	
Use W		Direction U		Size (dia) 1100		x Size 900		Shape R		Material MAC		Lining 	
										Pipe length 		Total length 163.7	
												Year laid 	
Video recording													
Index no. AQSER		Cleaned 		Flow Control 		Comments - general 01313PIGT0101B02							
Purpose F		Cat. 		Pre-cleaning N		Weather 4		Loc. code 		Further location details Pig Lee Trib			

Video no.	Photo no.	Distance (m)	Cont. def.	Letters	Diameter / Dimension	Numbers		Intrusion % mm	Remarks
				Code		Clock at /to			
0000		0.0		ST					
0000		0.0		MH					MH02
0000		0.0		WL				10	
0002	130_4a	2.0		GP					
0003	131_5a	2.0		GO					FLAGGED SOFFIT
0011	132_6a	7.3		GP					
0020	133_7a	8.3		GO					SMALL CHAMBER ON LEFT METAL BARS VISIBLE
0024		9.1		LR					SHARP
0024		9.1		DC				1000	X 1100MM
0024		9.1		MC					Masonry - rand. coursed
0025	137_11	9.1		GP					
0034	138_12	20.0		GP					
0040	a	22.1		CN	100	11			
0041		22.1		DC				1000	X 900MM
0042		22.1		GO					10 - 02 O'CLOCK WIDTH 600MM
0042	142_16	22.1		GP					
0045	a	26.8		CN	100	11			
0051	144_18	26.8		GP					
0055	145_19	34.7		GO					BLIND CHAMBER
0060	146_20	34.7		OB				50	SERVICE ACROSS CULVERT
0064	a	37.8		GO					EXITING BLIND CHAMBER
0064	148_22	37.8		GP					
0070	149_23	40.8		CNI	150	11		0080	
0071	150_24	41.3		CNI	100	11		0050	
0081	151_25	48.6		GP					
0091	152_26	54.7		GO					BLIND CHAMBER
0093	a	54.7		DC				100	X 900MM
0111		56.7		DC				1300	X 1000MM
0111	4_29a	56.7		GP					
0112	4_30a	56.7		MC					Brick, RIGHTSIDE WALL
0112		56.7		GO					BENCHING STARTS ON RIGHTSIDE
0115	4_32a	60.5		MC					Masonry - rand. coursed, RIGHTSIDE WALL
0115		60.5		DC				100	X 1100MM

Surveyed by (Operator) **G.Smith** Contract no. **1308031** Job no. **1308031** Catchment (Drainage area) Div. District **NW** Pipe length reference **INLET X**
 Date **180912** Time Location - Road name **OFF MILL ROAD** Location - Place name **BURY**
 Start manhole no. **MH02** Depth **2.22** Cover level Invert level Finish manhole no. **INLET** Depth Cover level Invert level
 Use **W** Direction **U** Size (dia) **1100** x Size **900** Shape **R** Material **MAC** Lining Pipe length Total length **163.7** Year laid
 Video recording Index no. **AQSER** Cleaned Flow Control Comments - general **01313PIGT0101B02**
 Purpose **F** Cat. Pre-cleaning **N** Weather **4** Loc. code Further location details **Pig Lee Trib**

Video no.	Photo no.	Distance (m)	Cont. def.	Letters	Numbers			Remarks
				Code	Diameter / Dimension	Clock at /to	Intrusion % mm	
0122	4_34a	61.8		LL				SHARP
0124	4_35a	62.0		CNI	225	01	0050	
0131	4_36a	62.5		CNI	225	10	0040	
0131		62.5		DC			700	X 1100MM
0132	4_38a	63.2		GO				SERVICE ACROSS CULVERT 11 - 01O'CLOCK
0135	4_39a	65.5		GO				SERVICE ACROSS CULVERT 10 - 02 O'CLOCK
0140	4_40a	66.3		CNI	100	02	0500	
0141	4_41a	66.3		GO				BRICK 09 - 03 O'CLOCK
0144		70.3		CN	100	01		
0145	4_43a	70.3		GP				
0151	4_44a	74.0		CNI	225	10	0060	
0160	4_45a	77.2		CNI	150	01	0060	
0163	4_46a	78.1		CNI	150	10	0040	
0165	4_47a	82.1		CNI	100	11	0060	
0170	4_48a	82.1		GP				
0172	4_49a	85.0		CNI	150	10	0050	LIVE
0174	4_50a	88.5		IG		07		
0181		91.1		CN	150	10		
0181	4_52a	91.1		GP				
0183	4_53a	92.4		CNI	150	03	0080	LIVE
0185		93.4		CN	100	10		
0185	4_55a	93.4		IR		07 - 10		
0191	4_56a	93.4		GO				SERVICE ACROSS CULVERT 10 - 02 O'CLOCK
0193	4_57a	94.2		IG		10		
0194	4_58a	94.2		GP				
0200		96.5		CN	150	08		LIVE
0203	4_60a	98.6		IG		08		
0205	4_61a	99.5		CNI	150	09	0030	
0211		100.7		LL				QUITE SHARP
0211		100.8		GO				BENCHING ON RIGHT STOPS
0211		100.8		DC			1100	X 1500MM
0211	4_65a	100.8		GP				
0212		100.8		GO				BRICK STOPS 10 - 02 O'CLOCK

Surveyed by (Operator) G.Smith		Contract no. 1308031		Job no. 1308031		Catchment (Drainage area) 		Div. 		District NW		Pipe length reference INLET X	
Date 180912		Time 		Location - Road name OFF MILL ROAD				Location - Place name BURY					
Start manhole no. MH02		Depth 2.22		Cover level 		Invert level 		Finish manhole no. INLET		Depth 		Cover level 	
Use W		Direction U		Size (dia) 1100		x Size 900		Shape R		Material MAC		Lining 	
										Pipe length 		Total length 163.7	
												Year laid 	
Video recording													
Index no. AQSER		Cleaned 		Flow Control 		Comments - general 01313PIGT0101B02							
Purpose F		Cat. 		Pre-cleaning N		Weather 4		Loc. code 		Further location details Pig Lee Trib			

Video no.	Photo no.	Distance (m)	Cont. def.	Letters	Diameter / Dimension	Numbers		Intrusion % mm	Remarks
				Code		Clock at / to			
0215	4_67a	101.8		CNI	100	01		0030	LIVE
0222		104.1		CN	150	11			
0225	4_69a	104.9		GO					2 X METAL BRACKETS ATTACHED TO SOFFIT
0233	4_70a	107.6		GO					METAL BRACKET ATTACHED TO SOFFIT
0235	4_71a	110.9		CNI	150	03		0030	
0241		112.2		LL					SHARP
0242	4_73a	112.2		GP					
0244	4_74a	114.4		GO					BEAM ACROSS SOFFIT
0253		117.8		LR					SHARP
0253	4_76a	117.8		GP					
0253		117.8		DC				1300	X 1500MM
0253		117.8		SC					SQUARE
0260	4_79a	120.4	S1	DE				10	RUBBLE
0271	4_80a	130.0		GP					
0275	4_81a	136.3		GO					3 X METAL BEAMS ACROSS SOFFIT
0284		141.1		CN	150	12			
0290	4_83a	141.5	C1	DE				20	RUBBLE
0290		141.5		WL				20	
0291	4_85a	141.5		GP					
0302	4_86a	146.1		CNI	100	11		0350	
0304	4_87a	146.6		DE				25	ROCKS ON LEFT
0304		146.6	C1	DE				15	RUBBLE
0310		150.4		LL					SHARP
0310	4_90a	150.4		GP					
0315	4_91a	151.4		CNI	100	02		0300	
0315	4_92a	151.4		CNI	400	03		0200	
0322	4_93a	153.2		EM		04 - 05		10	
0322	4_94a	153.2		IR		04 - 05			
0325	4_95a	156.6		DE				25	ROCK
0344	4_96a	163.3		GP					
0355		163.7	F1	DE				15	RUBBLE
0355	4_98a	163.7		MH					INLET
0360		163.7		FH					

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

Manhole Surveys

NFCDD REFERENCE	01313PIGT0101B02
NATIONAL GRID REFERENCE	No GPS
MAINTAINER (DELETE AS APPROPRIATE)	E.A.



ENVIRONMENT
AGENCY

**SURVEY RECORD FOR MANHOLE OR INLET/
OUTLET STRUCTURE**

STC25 GRID REFERENCE

Inlet

Pig Lee Trib B02, In Tetrosyl

LOCATION

YEAR	Z	STATUS	PU	FUNCTION	W	NODE TYPE	IN	SURVEY DATE	18-09-12			
COVER	SHAPE		HINGED		LOCK		DUTY		SIZE (MM)		TOXIC ATMOSPHERE	N
SHAFT	SIDE ENTRY		REGULAT COURCES		DEPTH		SIZE (MM)		EVIDENCE OF VERMIN	N		
CHAMBER	SOFFIT		STEPS		LAD-DERS		LNDG S		SIZE (MM)		CONSTRUCT CODE	MAC
DEPTH OF FLOW (MM)		DEPTH OF SILT (MM)		HEIGHT OF SURCH (MM)		COVER LEVEL (M)						

	UPSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE DIAM (MM)	BECKDROP DIAM (MM)	PIPE MATE- RIAL	LINING MATERIAL	DEPTH FROM COVER (M)	INVERT LEVEL (M)
Incoming Pipes	A	BROOK						
	B							
	C							
	D							
	E							
	F							

COND CRITY

Outgoing Pipes	X	MH01												
	Y													
CONDITION (Y/N) (Y IF ATTENTION REQUIRED)			COVER		IRON/ LADDERS		SHAFT		CHAMBER		BENCHING		OTHER	

NOTES:

Unable to gain access to Inlet, ladders required. Unable to gain access for GPS.

WEATHER: Dry.

SKETCH



ELEMENT (MIN OF 2)			
ID	TYPE	SUBTYPE	MATERIAL



**ENVIRONMENT
AGENCY**

NFCDD REFERENCE	01313PIGT0101B02
NATIONAL GRID REFERENCE	No GPS
MAINTAINER (DELETE AS APPROPRIATE)	E.A.

**SURVEY RECORD FOR MANHOLE OR INLET/
OUTLET STRUCTURE**

STC25 GRID REFERENCE

MH02

Pig Lee Trib B02, Warehouse in Tetrosyl

LOCATION

YEAR	Z	STATUS	PU	FUNCTION	W	NODE TYPE	MH	SURVEY DATE	18-09-12		
COVER	SHAPE S	HINGED	N	LOCK	N	DUTY	H	SIZE (MM)	660 x 660	TOXIC ATMOSPHERE	N
SHAFT	SIDE ENTRY	REGULAT COURCES	0	DEPTH	0.52	SIZE (MM)	610 x 610	EVIDENCE OF VERMIN	N		
CHAMBER	SOFFIT	STEPS	0	LADDERS		LNDG S		SIZE (MM)	3500 x 2800	CONSTRUCT CODE	MAC
DEPTH OF FLOW (MM)	0	DEPTH OF SILT (MM)	150	HEIGHT OF SURCH (MM)		COVER LEVEL (M)					

	UPSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE DIAM (MM)	BECKDROP DIAM (MM)	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (M)	INVERT LEVEL (M)
Incoming Pipes	A	INLET	R	1100 x 900		MAC	2.19	
	B							
	C							
	D							
	E							
	F							

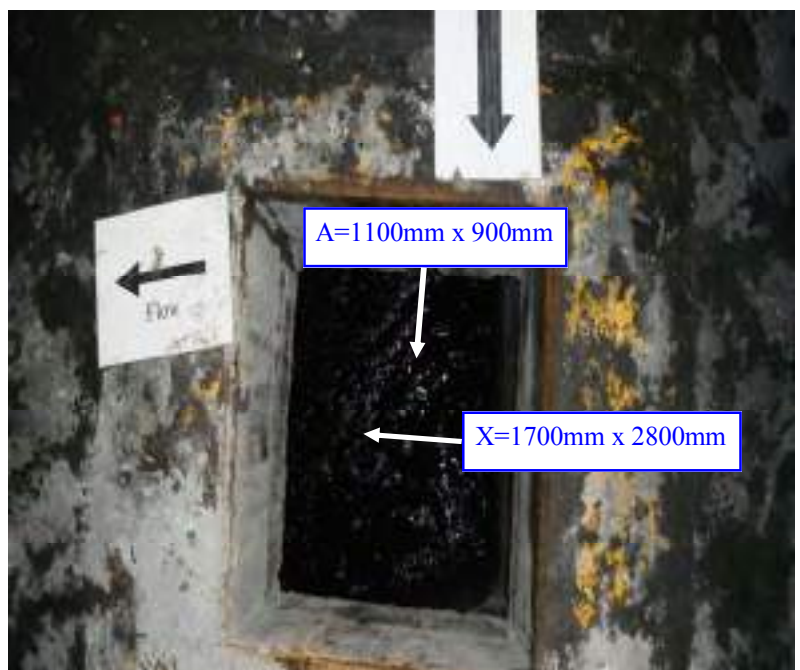
COND CRITY

Outgoing Pipes	X	MH01	R	1700 x 2800						MAC			2.22			
	Y															
CONDITION (Y/N) (Y IF ATTENTION REQUIRED)			COVER		IRON/ LADDERS		SHAFT		CHAMBER		BENCHING		OTHER			

NOTES:

WEATHER: Dry.

SKETCH



ELEMENT (MIN OF 2)			
ID	TYPE	SUBTYPE	MATERIAL



NFCDD REFERENCE	01313PIGT0101B02
NATIONAL GRID REFERENCE	SD8081913693
MAINTAINER (DELETE AS APPROPRIATE)	E.A.

**SURVEY RECORD FOR MANHOLE OR INLET/
OUTLET STRUCTURE**

STC25 GRID REFERENCE

MH01, (E:380819.08, N:413693.51)

Pig Lee Trib B02, Field R/O 11 Trent Drive

LOCATION

YEAR

Z

STATUS

PU

FUNCTION

W

NODE TYPE

MH

SURVEY DATE

18-09-12

COVER

SHAPE

S

HINGED

N

LOCK

N

DUTY

H

SIZE (MM)

650 x 650

TOXIC ATMOSPHERE

N

SHAFT

SIDE ENTRY

REGULAT COURCES

0

DEPTH

11.31

SIZE (MM)

700 x 500

EVIDENCE OF VERMIN

N

CHAMBER

SOFFIT

STEPS

40

LADDERS

LNDG S

SIZE (MM)

1930 x 1400

CONSTRUCT CODE

BR

DEPTH OF FLOW (MM)

100

DEPTH OF SILT (MM)

0

HEIGHT OF SURCH (MM)

COVER LEVEL (M)

135.76

	UPSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE DIAM (MM)	BECKDROP DIAM (MM)	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (M)	INVERT LEVEL (M)
Incoming Pipes	A	MH02	R	2500 x 1300		MAC	13.06	122.70
	B	UNKNOWN	C	300		VC	3.81	131.95
	C							
	D							
	E							
	F							

COND CRITY

Outgoing Pipes	X	OUTLET	C	1200						BR				13.36	122.40					
	Y																			
	CONDITION (Y/N) (Y IF ATTENTION REQUIRED)			COVER			IRON/ LADDERS			SHAFT			CHAMBER			BENCHING			OTHER	

NOTES:

Cover seized on MH01 the complete frame was removed to enable access into culvert.

WEATHER: Dry.

SKETCH



ELEMENT (MIN OF 2)			
ID	TYPE	SUBTYPE	MATERIAL

NFCDD REFERENCE	01313PIGT0101B02
NATIONAL GRID REFERENCE	No GPS
MAINTAINER (DELETE AS APPROPRIATE)	E.A.



ENVIRONMENT
AGENCY

**SURVEY RECORD FOR MANHOLE OR INLET/
OUTLET STRUCTURE**

STC25 GRID REFERENCE

Outlet

Pig Lee Trib B02, Banking opp 27 Walmersley Old Road

LOCATION

YEAR	Z	STATUS	PU	FUNCTION	W	NODE TYPE	OUT	SURVEY DATE	17-09-12			
COVER	SHAPE		HINGED		LOCK		DUTY		SIZE (MM)		TOXIC ATMOSPHERE	N
SHAFT	SIDE ENTRY		REGULAT COURCES		DEPTH		SIZE (MM)		EVIDENCE OF VERMIN	N		
CHAMBER	SOFFIT		STEPS		LAD-DERS		LNDG S		SIZE (MM)		CONSTRUCT CODE	BR
DEPTH OF FLOW (MM)	100	DEPTH OF SILT (MM)	0	HEIGHT OF SURCH (MM)		COVER LEVEL (M)						

	UPSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE DIAM (MM)	BECKDROP DIAM (MM)	PIPE MATE- RIAL	LINING MATERIAL	DEPTH FROM COVER (M)	INVERT LEVEL (M)
Incoming Pipes	A	MH01	C	1200			1.60	
	B							
	C							
	D							
	E							
	F							

COND CRITY

Outgoing Pipes	X	BROOK												
	Y													
CONDITION (Y/N) (Y IF ATTENTION REQUIRED)			COVER		IRON/ LADDERS		SHAFT		CHAMBER		BENCHING		OTHER	

NOTES:

Unable to gain GPS signal due to deep valley and trees.

WEATHER: Dry.

SKETCH



ELEMENT (MIN OF 2)			
ID	TYPE	SUBTYPE	MATERIAL

Appendix 4

Tetrosyl, Walmersley Old Road, Bury, BL9 6RG

ECOLOGICAL SURVEY AND ASSESSMENT
(including a Licensed Bat Survey and Assessment and Mitigation Strategy)

July 2019

[ERAP (Consultant Ecologists) Ltd ref: 2018-202]

ERAP (Consultant Ecologists) Ltd
49a Manor Lane
Penwortham
Preston
Lancashire
PR1 0TA

Tel: 01772 750502

mail@erap.co.uk
www.erap.co.uk



CONTENTS

Summary	4
1.0 Introduction	7
1.1 Background and Rationale	7
1.2 Scope of Works	7
2.0 Method of Survey	8
2.1 Desktop Study	8
2.2 Vegetation and Habitats	8
2.3 Animal Life	9
2.4 Survey Limitations	16
2.5 Evaluation Methodology	16
3.0 Survey Results	17
3.1 Desktop Study	17
3.2 Vegetation and Habitats	19
3.3 Animal Life	22
4.0 Evaluation and Assessment	27
4.1 Introduction and Description of Proposals	27
4.2 Designated Sites for Nature Conservation	27
4.3 Vegetation and Habitats	28
4.4 Protected Species and Other Wildlife	28
4.5 Summary of Assessment	29
5.0 Mandatory Actions, Recommendations and Enhancement for Biodiversity	29
5.1 Introduction	29
5.2 Recommendations in Relation to Site Layout	30
5.3 Preparation of a Construction Environmental Management Plan (CEMP) for Biodiversity	30
5.4 Protection of Existing Vegetation and Water Quality During Construction	31
5.5 Invasive Species	31
5.6 Badger	32
5.7 Lodge Drainage and Fish Rescue Strategy and Common Toad Mitigation Strategy	32
5.8 Bats	32
5.9 Birds	33
5.10 Enhancement of Existing / Retained Habitats	35
5.11 Habitat Creation and Enhancement and Landscape Planting	35
5.12 Landscape and Habitat Management Plan	36
6.0 Conclusion	36
7.0 References	38
8.0 Appendix 1: Tables and Figures	41
9.0 Appendix 2: Licensed Bat Survey and Assessment	59
9.1 Introduction and Objectives	59
9.2 Method of Survey	59
9.3 Results	63
9.4 Interpretation and Evaluation	67
9.5 Assessment of Impacts	68
9.6 Long-term Impacts: Roost Modification and Roost Loss	69
9.7 Long-term Impacts: Fragmentation and Isolation	69
9.8 Post-development interference impacts	69
9.9 Predicted Scale of Impact	69
9.10 Recommendations at all Buildings / Features Except Building 3	69
9.11 Bat Mitigation Strategy: Building 3 / Roost 1	70
9.12 Conclusion	73
9.13 Tables	73
9.14 Figure	85

List of Tables

Table 2.1: Consideration of Suitability of Foraging and Commuting Habitat for Bats	9
Table 2.2: Transect Survey Dates, Weather Conditions and Surveyors	10
Table 2.3: Details of the Survey Dates, Weather Conditions and Survey Times	12
Table 2.4: Ponds within 500 metres of the Site	12
Table 2.5: Pond Habitat Suitability Index Categories	14
Table 2.6: Important Habitat Characteristics for Reptiles	14
Table 2.7: Water Vole and Otter Survey Dates and Conditions	15
Table 3.1: Non-statutory Designated Sites for Nature Conservation within a One Kilometre Radius of the Site	18
Table 3.2: Records of Protected Species Within a One Kilometre Radius of the Site	18
Table 3.3: Summary of Survey Results: Repetition 1: 9 th August 2018	23
Table 3.4: Summary of Survey Results: Repetition 2: 24 th August 2018	23
Table 3.5: Bird Species Detected at the Site in 2017	24
Table 5.1: Suitable Native Species for Tree and Shrub Planting	36
Table 8.1: Plant Species List for the Mown Grassed Verges Within the Tetrosyl Site	41
Table 8.2: Plant Species List for the Scrub and Tall-herb Vegetation Around the Site Margins	42
Table 8.3: Plant Species List for Established Woodland in the Eastern Area of the Site	43
Table 8.4: Plant Species List for the Field of Improved Grassland in the North-eastern Area of Site	44
Table 8.5: Transect Survey Data Repetition 1: 9 th August 2018 (Sunset 20:57, Amy Sharples and Leah Hart)	44
Table 8.6: Transect Survey Data Repetition 2: 24 th August 2018 (Sunset 20:19: Amy Sharples & Leah Hart)	45
Table 8.7: Summary of All Bird Species Detected Over Both Survey Repetitions	46
Table 8.8: Breeding Bird Survey Repetition 1, 5 th July 2018: Raw Survey Data	47
Table 8.9: Breeding Bird Survey Repetition 2, 20 th July 2018: Raw Survey Data	48
Table 8.10: HSI Assessment	49
Table 8.11: Aquatic Invertebrate Survey Data 2018	50
Table 8.12: Table of Photographs	51
Table 9.1: Survey Equipment Used During Daylight Bat Survey	60
Table 9.2: Dawn Re-entry Survey Dates, Weather Conditions and Surveyors in 2017	61
Table 9.3: Dawn Re-entry Survey Date, Weather Conditions and Surveyors in 2018	62
Table 9.4: Photographs	74
Table 9.5: Bat Activity Detected During Dawn Re-entry Survey on 16 th August 2017	81
Table 9.6: Bat Activity Detected During Dawn Re-entry Survey on 30 th August 2017	82
Table 9.7: Bat Activity Detected During Dawn Re-entry Survey on 14 th September 2017	83
Table 9.8: Bat Activity Detected During Dawn Re-entry Survey on 12 th July 2018	83

List of Figures

Figure 8.1: Google Earth and MAGiC Map Extracts to Show Site Boundary and Surrounds and Location of Ponds 1 to 10	53
Figure 8.2: Phase 1 Habitat Survey and Vegetation Map	54
Figure 8.3: Results of Bat Transect Survey Repetitions 1 and 2 (August 2018)	55
Figure 8.4: Breeding Bird Survey Repetition 1: 5 th July 2018	56
Figure 8.5: Breeding Bird Survey Repetition 2: 20 th July 2018	57
Figure 8.6: Plan to Show Recommended Ecological Mitigation and Enhancement	58
Figure 9.1: Plan to Show All Buildings, Surveyor Locations and Position of Roost 1 (2017 & 2018), Roosts A to C (2010) and Roosts D to E (2015)	85

Document Control

Survey Type:	Surveyors ¹	Survey Date(s)
Phase 1 Habitat & Daylight bat survey and assessment	Victoria Burrows B.Sc. (Hons) M.Sc. CEnv MCIEEM and Amy Sharples B.Sc. (Hons) M.Sc. GradCIEEM	18 th July 2017 8 th November 2017 12 th July 2018
Dawn bat activity surveys	Victoria Burrows B.Sc. (Hons) M.Sc. CEnv MCIEEM and assistants	16 th August 2017 30 th August 2017 14 th September 2017 12 th July 2018
Bat transect surveys	Amy Sharples assisted by Leah Hart or Danielle Rowlands	9 th August 2018 24 th August 2018
Breeding bird surveys	Chris Swindells	5 th July 2018 20 th July 2018
Otter and water vole surveys	Chris Swindells and assistant	5 th July 2018 9 th July 2018
Aquatic invertebrate survey	Peter Flint and S. Flint	6 th August 2018
Reporting	Personnel	Date
Author	Victoria Burrows B.Sc. (Hons) M.Sc. CEnv MCIEEM Principal Ecologist	19 th December 2017
Signature(s)		
Checked by	Carol Flaxman B.Sc. (Hons) GradCIEEM	21 st December 2017
Revised and issued by	Victoria Burrows B.Sc. (Hons) M.Sc. CEnv MCIEEM	21 st December 2017
Revised	Victoria Burrows B.Sc. (Hons) M.Sc. CEnv MCIEEM	22 nd December 2017
Update 1	Victoria Burrows Updated to include results of surveys carried out in 2018 namely: Updated Phase 1 Habitat Survey; Updated badger survey; Water vole and otter survey; Breeding bird surveys; Aquatic flora and invertebrate survey; Bat re-entry survey; and Bat activity transect surveys. Updated to make reference to current wildlife legislation and planning policy guidance.	13 th December 2018
Update 2	Victoria Burrows Updated to refer to minor amendments to planning layout (Barratt Manchester Drawing 456/P/PL/02 Rev E (July 2019)) Updated to make reference to current wildlife legislation and planning policy guidance.	25 th July 2019
Checked by	Luke Atherton B.Sc. (Hons) M.Sc.	14 th December 2018
Version	3	
Report issued to	Barratt Manchester	
¹ Licence reference numbers		
Bats Victoria Burrows, Natural England Class Survey Licence (bats, Level 2) Registration Number 2015-10390-CLS-CLS		
Barn Owl Victoria Burrows Natural England Class Survey Licence Registration Number CL29/00061		

SUMMARY

Introduction and Scope

- i. This ecological survey and assessment presents the ecological, biodiversity and nature conservation status of land at the Tetrosyl site off Walmersley Old Road, Bury. The assessment was requested in connection with proposals to demolish the buildings, remediate and re-grade the site (including the mill lodge) and redevelop the site to housing.
- ii. The scope of ecological survey comprised a desktop study and data search, extended Phase 1 Habitat Survey, a licensed daylight bat survey and assessment, and dawn bat activity surveys carried out between July 2017 and November 2017. Additional surveys comprising an updated Phase 1 Habitat Survey, breeding bird surveys, otter and water vole surveys, aquatic invertebrate surveys, an updated dawn re-entry survey and bat activity transects were carried out in 2018. The scope of survey undertaken is appropriate to identify potential ecological constraints and any mitigation (including avoidance of specific habitats) required to inform the preparation of a detailed site layout.
- iii. The ecological survey has informed the preparation of comprehensive mitigation strategies for protected species, where necessary, and has enabled the specification of opportunities for biodiversity associated with the re-development proposals.
- iv. The approximately 10.5 hectare site is located approximately 3 kilometres to the north of Bury town centre and comprises a cluster of operational and derelict buildings surrounded by amenity grassland, unmanaged neutral grassland and tall-herb vegetation, established broadleaved woodland and a large mill lodge (open water). Land surrounding the site comprises existing residential development, the M66 motorway and agriculturally managed land.

Results of Survey and Assessment and Recommendations

- v. Provided the appropriate control measures are implemented in relation to the flow of water from the non-statutory designated sites to the north namely Baldingstone Site of Biological Importance (SBI) and Gindles Farm Clough Biological Heritage Site (BHS) it is reasonably concluded that the proposals will have no adverse direct or indirect effect on statutory or non-statutory designated sites for nature conservation, refer to **Section 4.2**.
- vi. Two Priority Habitats are present and comprise the lodge (Pond 1), which is suitable for the support of breeding common toad (Priority Species), and a 0.4 hectare area of Lowland Mixed Deciduous Woodland in the north-eastern area of the site. Priority Habitats are capable of being a material consideration in connection with a planning decision, this is recognised and addressed in this report to ensure the conservation function of these habitats is retained at the site, refer to **Section 5.2**.
- vii. Approximately 6 hectares (almost 60%) of the site is occupied by buildings and hard-standing. Of the remaining habitats, namely neutral grassland, self-seeded scrub, Bramble scrub and tall-herb vegetation, none are of significant interest in terms of their plant species composition or are representative of semi-natural habitat. The NVC communities present are typical of the geographical area and conditions present.
- viii. Invasive species listed on Schedule 9 of the *Wildlife and Countryside Act 1981* (as amended) are present, namely a stand of Japanese Knotweed, scattered Indian Balsam stands, Rhododendron shrubs and a small area of Montbretia. It is an offence under wildlife legislation to cause the spread of these species in the wild. Guidance on the control and management of these species is described (**Section 5.5**).
- ix. Badger activity is present at the site. The badger survey results and a mitigation strategy is presented in a separate addendum report (ERAP (Consultant Ecologists) Ltd, December 2018).

- x. A common pipistrelle bat day roost, supporting a maximum count of three bats (Roost 1) was recorded at the northern elevation of Building 3. Demolition will involve the loss of the roost which, in absence of mitigation, is a 'low' scale of impact in accordance with Figure 4 of *Bat Mitigation Guidelines* (Mitchell-Jones, 2004).
- xi. An appropriate Natural England licence will be required to legally proceed with the works and destroy the roost. It is concluded that the site meets the criteria and qualifies to be registered under the Natural England Bat Mitigation Class Licence (BMCL). The 'three tests' of *The Conservation of Habitats and Species Regulations 2017* will be met. **Appendix 2 (Section 9.0)** of this report presents both the results of the licensed bat survey and assessment and a mitigation strategy including the details of compensatory measures to demonstrate how the proposals may proceed in accordance with the BMCL, Natural England guidance and best practice including precautionary measures to be applied at the buildings / structures with high suitability for use by roosting bats.
- xii. Based on the ecological baseline, the proposals can be achieved with no adverse effect on other relevant protected species namely water vole, otter, Schedule 1 birds, great crested newt and reptile species.
- xiii. Best practice measures for the protection of fauna and environmental quality during the construction period will be detailed in a Construction Environmental Management Plan (CEMP) for Biodiversity to include:
 - Tree protection;
 - An Invasive Species Management Plan;
 - Compliance the relevant Pollution Prevention Guidelines (PPG);
 - The Badger Mitigation Strategy and works to be licensed by Natural England;
 - The Lodge Drainage and Fish Rescue Strategy to be applied;
 - A common toad mitigation strategy to be applied during the draining of the lodge and site preparation works;
 - The Bat Mitigation Strategy and works to be licensed by Natural England, refer to **Appendix 2**; and
 - The protection afforded to nesting birds and the mandatory actions to be applied during building demolition and vegetation clearance, refer to **Section 5.9**.
- xiv. The buildings and scrub habitats are suitable for use by nesting birds, including Priority Species such as dunnock. Guidance at **Section 5.9** in relation to the protection of nesting birds and the conservation of opportunities for nesting and foraging birds at the site in the long-term will be implemented.

Net Gain for Biodiversity

- xv. In addition to the mitigation and compensatory measures to be provided as part of the scheme, the redevelopment will secure a net gain for biodiversity by:
 - Creation of an open channel with a varied geomorphology (following the removal of a culvert);
 - Extensive planting of wildflower grassland;
 - Planting of extensive areas of native woodland and scrub to complement and supplement the wildlife corridor function along the eastern area of the site;
 - Planting of new hedgerows to demarcate the residential development and the open space;

- Provision of additional opportunities for nesting birds and roosting bats, including Priority Species, within the retained habitats, new habitats and the built environment; and
- Securing the management of the retained and created habitats by the preparation and implementation of a Landscape and Habitat Management Plan.

Conclusion

- xvi. The development proposals can be achieved with no adverse effect on designated sites for nature conservation and ecologically valuable or sensitive habitats. The site layout plan achieves the long-term protection of the woodland and the conservation of Priority Habitat. Mitigation for protected species (namely roosting bats, badger and nesting birds) and conservation and enhancement of opportunities for other wildlife is entirely feasible.
- xvii. The proposals will secure an opportunity to implement beneficial measures such as habitat management and habitat creation that will safeguard habitats for wildlife such as invertebrates, birds and bats, with the aim of providing a net gain in biodiversity in accordance with the principles of the NPPF.
- xviii. It is concluded that the proposals are feasible and acceptable in accordance with ecological considerations and relevant planning policy.

1.0 INTRODUCTION

1.1 Background and Rationale

- 1.1.1 ERAP (Consultant Ecologists) Ltd was initially commissioned by Barratt Manchester to carry out an updated ecological survey and assessment of the Tetrosyl site off Walmersley Old Road, Walmersley, Bury (hereafter referred to as the 'site') in July 2017. The Ordnance Survey (OS) grid reference at the centre of the site is SD 80955 13826.
- 1.1.2 Previous ecological surveys comprising a Phase 1 Habitat Survey and licensed bat survey were carried out in 2010 and 2011, refer to **Sections 2.1** and **3.1**, to inform an outline planning application to redevelop the site to housing. The proposals were granted outline planning consent by Bury Council on 30th January 2012, subject to a series of conditions (Bury Council reference: 53762). A second bat survey was carried out in 2015 to inform a reserved matters application; this document is also referred to for background information (BSG Ecology, September 2015).
- 1.1.3 The updated ecological survey and assessment carried out in 2017 was requested in connection with the submission of a new, full planning application for the redevelopment of the site to housing.
- 1.1.4 In June 2018, ERAP (Consultant Ecologists) Ltd was commissioned to carry out an updated survey to ensure a comprehensive suite of ecological survey information was available to support the planning submission. The scope of ecological survey works presented in this report and a separate Confidential Addendum (ERAP (Consultant Ecologists) Ltd, December 2018) has been discussed and agreed with David Dutton at the Greater Manchester Ecology Unit (GMEU).

1.2 Scope of Works

- 1.2.1 The scope of ecological works undertaken in 2017 and 2018 comprised:
- A desktop study and data search for known ecological information at the site and the local area;
 - An Extended Phase 1 Habitat Survey and assessment;
 - Assessment of the ecological value of the habitats within the site with the use of the National Vegetation Classification (NVC) and the Ratcliffe criteria, as presented in *A Nature Conservation Review* (Ratcliffe, 1977);
 - Survey and assessment of all habitats for relevant statutorily protected species and other wildlife including great crested newt (*Triturus cristatus*), water vole (*Arvicola amphibius*), otter (*Lutra lutra*), bird species, invertebrates and reptiles;
 - A licensed bat survey and assessment of the buildings and trees, refer to **Appendix 2**;
 - Transect surveys for bat activity;
 - Breeding bird surveys;
 - Surveys of the lodge for aquatic invertebrates and plants;
 - Identification of any potential ecological constraints on the proposals and the specification of the scope of mitigation and ecological enhancement required in accordance with wildlife legislation, planning policy guidance and other relevant guidance; and
 - The identification of any further surveys or precautionary actions that may be required prior to the commencement of any demolition / site preparation and redevelopment activities.
- 1.2.2 A separate Badger (*Meles meles*) Survey and Assessment report has been prepared for the site. The results are presented in a separate confidential addendum for restricted distribution (ERAP (Consultant Ecologists) Ltd, December 2018).

2.0 METHOD OF SURVEY

2.1 Desktop Study

2.1.1 The following sources of information and ecological records were consulted:

- a. MAGiC: A web-based interactive map which brings together geographic information on key environmental schemes and designations, including details of statutory nature conservation sites;
- b. Greater Manchester Local Records Centre (GMLRC);
- c. Lancashire Environment Record Network (LERN); and
- d. Greater Manchester Biodiversity Action Plan (BAP).

2.1.2 Ecological reports previously prepared for the site were also consulted, namely:

- a. Bevis Green Site, Walmersley. *Bat Survey Report* (Baker Shepherd Gillespie, October 2010);
- b. Bevis Green Site, Walmersley, Bury. *Ecology Survey Report* (Baker Shepherd Gillespie, February 2011); and
- c. Bevis Green Works, Mill Road, Bury. *Method Statement: Mitigation and Compensatory Measures for Bats* (BSG Ecology, September 2015).

2.1.3 Relevant consultation responses made in relation to the previously approved outline planning permission for the site (Bury Council reference: 53762) namely:

- a. Letter from David Dutton (Bury Council Wildlife Officer) dated 19th April 2011;
- b. Letter from Natural England dated 26th April 2011; and
- c. A subsequent follow-up letter prepared by Natural England dated 30th June 2011.

2.2 Vegetation and Habitats

2.2.1 An updated Extended Phase 1 Habitat Survey of the site was carried out by Victoria Burrows on 18th July 2017. The weather conditions were warm (22°C), sunny and calm (Beaufort Scale 0).

2.2.2 The survey was updated by Victoria Burrows and Amy Sharples on 8th November 2017. The weather was dry but overcast, with light air (Beaufort Scale 1) and 8°C at 9am.

2.2.3 A walkover survey was carried out on 12th July 2018 to valid the Phase 1 Habitat Survey results. The weather conditions were dry, 18°C with a light breeze (Beaufort Scale 2).

2.2.4 A habitat and vegetation map was produced for the site and the immediate surrounding area at a scale of 1:2000 (refer to **Figure 8.2**). The mapping is based on the Joint Nature Conservation Committee Phase 1 Habitat Survey methodology (JNCC, 2010) with minor adjustments to illustrate and examine the habitats with greater precision.

2.2.5 Plant species within the site boundary were determined with estimates of the distribution, ground cover, abundance and constancy of individual species. The estimation of abundance was based on the DAFOR system, where D = Dominant, A = Abundant, F = Frequent, O = Occasional and R = Rare, this being a widely used and accepted system employed by ecological surveyors. The terms L = Locally and V = Very were additionally used to describe the plant species distributions with greater precision.

- 2.2.6 Stands of vegetation and habitats were described and evaluated using the National Vegetation Classification (NVC). The NVC provides a systematic and comprehensive analysis of British vegetation and is a reliable framework for nature conservation and land-use planning.
- 2.2.7 Searches were made for uncommon, rare and statutorily protected plant species, those species listed as protected in the *Wildlife and Countryside Act 1981* (as amended) and species which are indicators of important and uncommon plant communities. Plant nomenclature follows *New Flora of the British Isles 3rd Edition* (Stace, 2010).
- 2.2.8 Searches were carried out for the presence of invasive species, including those listed on Schedule 9 of the *Wildlife and Countryside Act 1981* (as amended), including Japanese Knotweed (*Fallopia japonica*), Indian Balsam (*Impatiens glandulifera*) and Giant Hogweed (*Heracleum mantegazzianum*).

2.3 Animal Life

Badger

- 2.3.1 Refer to the separate 'Badger Survey and Assessment' report (ERAP (Consultant Ecologists) Ltd, December 2018).

Bat Species

Roosting Bats

- 2.3.2 The survey methods applied during the licensed daylight bat surveys of the buildings and trees and re-entry surveys are presented at **Appendix 2**.

Habitat Assessment for Commuting / Foraging Bats

- 2.3.3 Habitats within and adjacent to the site were assessed for their value and suitability for commuting and foraging bats in accordance with Table 4.1 of *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)*, (Collins, J. (ed), 2016). Reference has been made using the following categories and descriptions / examples, presented below.

Table 2.1: Consideration of Suitability of Foraging and Commuting Habitat for Bats

Suitability	Commuting Habitat	Foraging Habitat
Negligible	Negligible habitat features on site likely to be used by commuting bats.	Negligible habitat features on site likely to be used by foraging bats.
Low	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated i.e. not very well connected to the surrounding landscape by other habitat.	Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree or patch of scrub.
Moderate	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens.	Habitat that is linked to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	Continuous, high-quality habitat that is well connected to the wider landscape and is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. Habitats close to and connected to known roosts.	High-quality habitat that is well-connected to the wider landscape and is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Habitats close to and connected to known roosts.

Transect Surveys for Bat Activity

- 2.3.4 Two transect surveys have been conducted at the site in early and late August 2018. One transect route was walked on each survey occasion. Surveys at these times of year were considered appropriate to detect the maximum number of bats at the site as juvenile bats (typically born in June) will also be flying by this time.
- 2.3.5 The transect route, as shown on **Figure 8.3**, was plotted to examine all habitat types at the site, taking into account surveyor access and safety.
- 2.3.6 The walked transect surveys were conducted from sunset until 2 hours after sunset. All bat activity was recorded throughout the transect surveys by Anabat Express units. Surveyors noted areas of frequent or high levels of bat activity during the walked transects¹.
- 2.3.7 Five point counts were conducted at the transect route (labelled 1.1 to 1.5). During the point counts, all bat activity was recorded over 10 minute intervals. A measure of bat activity at each location was taken via counting the number of bat passes by each species detected. In order to ensure consistency of recording, a bat 'pass' has been defined as any bat activity detected within each ten second interval of the ten minute spot count.
- 2.3.8 The maximum number of bat passes per species which could therefore be recorded during one point count location is 60². Heterodyne detectors and recording detectors (Anabat Express units) were used to detect bats and identify to species (where possible, see 'Analysis of Anabat Data', below). The dates, times, weather conditions and personnel of each transect survey are presented below.

Table 2.2: Transect Survey Dates, Weather Conditions and Surveyors

Date	9 th August 2018	24 th August 2018
Sunset	20:57	20:19
Start and end time	20:50 to 22:55	20:19 to 22:26
Duration	2 hours and 5 minutes	2 hours and 7 minutes
Weather	Calm (Beaufort Scale 0), dry, 12°C	Light air (Beaufort Scale 1), dry with drizzle intervals, 11°C
Transect Number	Surveyor and Detector^a	Surveyor and Detector^a
1	Amy Sharples & Leah Hart Batbox III & AE	Amy Sharples & Danielle Rowlands Batbox III & AE

^a AE = Anabat Express Unit

- 2.3.9 The transect survey data have been used to determine species distribution across the transect, and levels of bat activity across different habitats over the transect.

Analysis of Transect Anabat Data

- 2.3.10 Anabat files have been initially analysed using species-specific filters for common and soprano pipistrelle (*Pipistrellus pipistrellus* and *P. pygmaeus*), noctule (*Nyctalus noctula*), *Myotis* species and brown long-eared bat (*Plecotus auritus*). The files have subsequently been individually checked by a suitably experienced ecologist to ensure the accuracy of the analysis and to locate and determine any calls of rarer or unusual species, such as Nathusius' pipistrelle (*P. nathusii*).

¹ It is recognised that this is a subjective measure, and comparative to the other areas surveyed as part of the transect

² 10 minutes x 60 = 600 seconds.

600 seconds ÷ 10 second intervals = 60.

60 is the maximum number of bat passes which can be recorded at any spot count location during that spot count repetition.

- 2.3.11 The analysis has been informed by ERAP (Consultant Ecologists) Ltd's knowledge of the area, the results of the desktop study and the known distribution of bat species within the UK, as well as the limitations of identifying bats to species from their recorded echolocation calls.
- 2.3.12 Noctule, Leisler's (*Nyctalus leisleri*) and serotine (*Eptesicus serotinus*) all emit similar echolocation calls, however only noctule are of known occurrence in the Bury area. All calls resembling noctule, Leisler's and serotine have been individually checked for characteristic features of Leisler's and serotine bats, and (unless characteristic call features of either species is present) a presumption has been given that the call is of a noctule bat.
- 2.3.13 *Myotis* species known to be present in the local area comprise whiskered and Brandt's bats (*Myotis mystacinus* and *M. brandtii*), Daubenton's bat (*Myotis daubentonii*) and Natterer's bat (*Myotis nattereri*). Calls have been checked for characteristic features of each species, however due to the number of calls which cannot be attributed to any one species, it is not been possible to use the *Myotis* calls to measure relative levels of activity of individual species. It has been considered more accurate to give the abundance of *Myotis* activity as a whole across the site, and name any individual species which may be identified by a characteristic call separately.
- 2.3.14 Two species of long-eared bat are native to the UK, namely the brown long-eared (*Plecotus auritus*) and grey long-eared bat (*Plecotus austriacus*). Both species have similar echolocation calls, however the grey long-eared bat is '*primarily confined to the extreme south of the British Isles, from Sussex to Devon, including Somerset, the Isle of Wight and the Channel Islands. Recently, a grey long-eared bat roost was found in Pembrokeshire, indicating that the species may be also present in south-west Wales*' (Bat Conservation Trust, 2012); the site is sufficiently distant from the known range of the grey long-eared bat that all calls resembling long-eared bats have been considered to be those of the brown long-eared bat.

Bird Species

Scoping Surveys and Assessment

- 2.3.15 Bird species observed and heard during the site visits were recorded.
- 2.3.16 Habitats throughout the site and in the immediate surrounding area were assessed for their value to roosting, feeding and nesting birds, as indicated by the amount of shelter, feeding value, woody vegetation structure and species diversity of tree and shrub species in the site.
- 2.3.17 All buildings were searched for pellets, faecal splashes and feathers which may indicate use by roosting or nesting barn owl on the 8th November 2017 in accordance with *The Barn Owl Conservation Handbook* (Barn Owl Trust, 2012) and *Barn Owl Tyto alba Survey Methodology and Techniques for use in Ecological Assessment. Developing Best Practice in Survey and Reporting* (Shawyer, 2011).
- 2.3.18 Observations of the buildings were also carried out for other relevant Schedule 1 listed birds namely black redstart and peregrine during both the daylight surveys and the dawn surveys for bat activity.

Breeding Bird Surveys

Survey Area

- 2.3.19 The survey area comprised the site and the immediate surrounding land.

Surveyors and Equipment

- 2.3.20 Breeding bird surveys were carried out by Chris Swindells, an experienced ornithologist. Bird species were identified by their call and binoculars (Nikon 10x50) were used to identify bird species, where necessary.

Survey Dates and Weather Conditions

2.3.21 The surveys were carried out on the following dates:

Table 2.3: Details of the Survey Dates, Weather Conditions and Survey Times

Survey Number	Date	Time Period	Weather Conditions
1	5 th July 2018	06:00 to 09:00	Sunny. Light air (Beaufort Scale 1), 26°C (maximum)
2	20 th July 2018	06:00 to 09:00	Sunny. Light air (Beaufort Scale 1), 20°C (maximum)

2.3.22 It is accepted that the surveys were not carried out in full accordance with the timings specified in *Bird Monitoring Methods* (Gilbert, et al., 1998), however, the surveys in July 2018 were carried out at time of year when the some species are still nesting and other birds are present with young; in combination with observations at the site during all other surveys it is considered that this survey approach has enabled an understanding of the use of the site by nesting birds and has informed the proposals, particularly in consideration of Priority Species and Schedule 1 listed birds.

Survey Approach

2.3.23 The survey methodology employed was broadly based on that of territory mapping as used for the British Trust for Ornithology (BTO) Breeding Bird Survey (BBS) and Common Bird Census (CBC). Transects were walked through the site and survey area survey stations / vantage points were used. Bird surveys were not undertaken in unfavourable conditions such as heavy rain or strong wind, which may negatively affect the results.

2.3.24 Standard BTO species codes and symbols for bird activities were used to identify birds and denote activity, sex and age where appropriate.

2.3.25 For the purposes of this assessment birds were counted as 'breeders' within the site (or close by) if they were recorded in territorial song, observed as a family, carrying food / nest material, in an actual nest and / or repeatedly giving alarm calls thought to have a strong territorial significance. Other birds have been categorised as 'non-breeders' if they were observed flying over the site only, were not engaged in any behaviours indicative of breeding and / or the habitat is not considered to suitable for breeding habitat for that species.

Great Crested Newt

Desktop Search for Ponds

2.3.26 In accordance with current Natural England guidance (Natural England, 2015) all ponds within an unobstructed 500 metres of a site should be considered for their suitability to support breeding great crested newts.

2.3.27 There are 10 ponds within 500 metres radius from the site boundary, as detailed in **Table 2.1**.

Table 2.4: Ponds within 500 metres of the Site

Pond Reference	OS Grid Reference	Distance from Site Boundary	Location (refer to Figure 8.1)
1	SD 81030 13923	Within site	Large (1.1 hectare) on-line lodge
2	SD 81177 13858	108 metres	Large on-line lodge to the east of the site, separated from the site by a stone wall
3	SD 80967 13457	166 metres	Located to the south of the site, on the opposite side of existing built land
4	SD 81106 13509	199 metres	Located to the south of the site, on the opposite side of existing built land

Pond Reference	OS Grid Reference	Distance from Site Boundary	Location (refer to Figure 8.1)
5	SD 81249 13463	348 metres	Located to the south-east of the site, on the opposite side of existing built land
6	SD 81210 13420	335 metres	Located to the south-east of the site, on the opposite side of existing built land
7	SD 81249 14463	303 metres	Located within Baldingstone SBI to the north of the site and on the opposite side of the M66
8	SD 81258 14495	320 metres	Located within Baldingstone SBI to the north of the site and on the opposite side of the M66
9	SD 81338 14515	404 metres	Located within Baldingstone SBI to the north of the site and on the opposite side of the M66
10	SD 81389 14578	479 metres	Located within Baldingstone SBI to the north of the site and on the opposite side of the M66

Assessment of Requirement for Further Survey

2.3.28 The requirement for further survey at each pond was assessed using the following criteria:

- Results of the desktop study and data search;
- Presence of dispersal barriers to great crested newt movements between ponds and the site, as detected during the walkover survey;
- Distance of the ponds from the site;
- Potential influence of the proposed development of the site on any populations of great crested newt (if present at ponds), using the Natural England rapid risk assessment tool, as needed; and
- Presence of other ponds which may form metapopulations and/or alter the influence of the site on ponds at greater distances.

2.3.29 In accordance with ODPM Circular 06/2005 “*developers should not be required to undertake surveys for protected species unless there is a reasonable likelihood of the species being present and affected by the development*” (Office of the Deputy Prime Minister, August 2005). The ponds are considered in relation to this guidance below.

2.3.30 Ponds 7 to 10 are located over 300 metres from the site and on the opposite side of the M66 motorway embankment. There is no direct habitat connectivity between the pond cluster 7 to 10 and the site. Examination of the OS map indicates that Ponds 7, 9 and 10 are hydrologically connected and that there is hydrological connectivity between Ponds 7, 9 and 10 to Pond 1 within the site. However, all ponds, including Pond 1, are reported to support coarse fish (pers. comm. with site personnel). In consideration of the combination of the distance between the site and Ponds 7 to 10, the presence of the M66 motorway embankment as a dispersal barrier and the sub-optimal conditions at these ponds for use by great crested newt no further survey and assessment was considered necessary at Ponds 7 to 10 to inform the application.

2.3.31 The cluster of ponds at Ponds 3 to 4 and also Pond 2 are on-line ponds and likely to support coarse fish. Ponds 5 and 6 are located over 300 metres from the site and are separated from the site by existing built development and a stone wall at the eastern boundary between Pond 2 and the site. It is reasonably concluded that Ponds 2 to 6 are separated from the site by dispersal barriers, unsuitable for use by breeding great crested newt and / or are isolated from the site.

2.3.32 In consideration of the combination of the distance between Ponds 2 to 10 and the site boundary, the intervening habitats including physical barriers to dispersal such as the M66 motorway and existing building development, the absence of any positive great crested newt records within at least 500 metres from the site, the presence of fish in a number of the on-line ponds in the radius and the conditions at the site it is concluded that the presence of great crested newt is reasonably

discounted. No further survey for great crested newt at Ponds 2 to 10 is necessary to support this planning application.

Habitat Suitability Index Assessment

- 2.3.33 Pond 1 (within the site) was assessed using the Habitat Suitability Index (HSI) (Oldham, et al., 2000). The pond was examined with reference to the ten HSI scoring criteria, which are: **SI₁**: Geographical location; **SI₂**: Pond area; **SI₃**: Pond drying; **SI₄**: Water quality (as indicated by the diversity of aquatic plants and invertebrates); **SI₅**: Shade; **SI₆**: Waterfowl; **SI₇**: Fish; **SI₈**: Abundance of other ponds within a one kilometre radius; **SI₉**: Quality of terrestrial habitat; and **SI₁₀**: Macrophyte cover (i.e. aquatic and emergent plants). The survey was conducted in accordance with *ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index. Amphibian and Reptile Groups of the United Kingdom* (ARG UK, 2010).
- 2.3.34 The assessment followed guidance in relation to interpreting HSI scores, following the categorical scale shown below.

Table 2.5: Pond Habitat Suitability Index Categories

HSI Score	Pond Suitability for Great Crested Newt
<0.5	Poor
0.5 – 0.59	Below average
0.6 – 0.69	Average
0.7 – 0.79	Good
>0.8	Excellent

Assessment of Terrestrial Habitat

- 2.3.35 An assessment of the terrestrial habitat within the site for great crested newts was conducted, as informed by the *Great Crested Newt Mitigation Guidelines* (English Nature, 2001) and the *Great Crested Newt Conservation Handbook* (Langton, 2001).
- 2.3.36 Habitats present within the site were assessed for their value to support foraging, sheltering and hibernating great crested newt and other amphibians such as common toad (*Bufo bufo*), a Priority Species. Favourable habitats can comprise rough grassland, scrubland, woodland and sites with underground crevices or cracks, such as mammal holes, voids in tree stumps or banks, and refugia such as rock piles or dead wood.

Reptile Species

- 2.3.37 The site and its surroundings were assessed in terms of their suitability for use by reptile species using the important characteristics for reptiles outlined in the draft document '*Reptile Mitigation Guidelines*' (Natural England, 2011), and the *Reptile Habitat Management Handbook* (Edgar, et al., 2010). These habitat characteristics are outlined in **Table 2.3**, below.

Table 2.6: Important Habitat Characteristics for Reptiles

1. Location (in relation to species range)	7. Connectivity to nearby good quality habitat
2. Vegetation Structure	8. Prey abundance
3. Insolation	9. Refuge opportunity
4. Aspect	10. Hibernation habitat potential
5. Topography	11. Disturbance regime
6. Surface geology	12. Egg-laying site potential

Water Vole and Otter

Survey Area

2.3.38 The survey for evidence and field signs of water vole and otter covered the following search area:

- a. All banks and margins of the lodge, including the inlet; and
- b. The banks of the open section of the outfall at the southern end of the site.

Surveyors, Survey Date and Conditions

2.3.39 The survey was carried out by Chris Swindells and an assistant on the 5th and 9th July 2018. The weather conditions are detailed below.

Table 2.7: Water Vole and Otter Survey Dates and Conditions

Survey	Survey Date	Conditions
1	5 th July 2018	Sunny. Light air (Beaufort Scale 1), 26°C (maximum)
2	9 th July 2018	Sunny with scattered cloud. Light air (Beaufort Scale 1) and 22°C

2.3.40 The survey of the lodge was carried out from a canoe.

Water Vole

2.3.41 The survey methodology detailed in *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series)* Eds. Fiona Mathews and Paul Chanin (Dean, et al., 2016), was applied and the lodge and outlet banks were searched for burrows, latrines, feeding remains, runs, feeding lawns, nests and footprints.

Otter

2.3.42 The survey area was also searched for dung (spraints), tracks (footprints), feeding remains, otter slides (into water), holts (underground dens) and couches (above ground sites where otters rest during the day).

2.3.43 An assessment of the suitability of each habitat feature was undertaken to assess their suitability for use by otter (*Lutra lutra*) in accordance with the habitat requirements and preferences detailed in *Ecology of the European Otter. Conserving Natura 2000 Rivers, Ecology Series 10* (Chanin, 2003) and searches were made for signs of otter in accordance with *Monitoring the Otter Lutra lutra. Conserving Natura 2000 Rivers Monitoring Series No 10* (Chanin, 2003) and current Natural England guidance (Natural England, 2014).

Aquatic Invertebrates

2.3.44 Aquatic invertebrate surveys were conducted by Peter Flint FRES and Sharon Flint B.Sc., two highly experienced entomologists with extensive knowledge of invertebrate survey methods and the local area.

2.3.45 A site visit was undertaken on 6th August 2018. The weather on this date was dry and cloudy with sunny intervals, 16 °C, with a gentle breeze (Beaufort Scale 3). The time of year was suitable for undertaking aquatic invertebrate surveys.

2.3.46 Surveys were carried out in accordance with the methods described in *Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation* (Drake, et al., 2007).

2.3.47 Where the margins of the lodge were accessible a long-handled, standard mesh, pond net was used to sample the substrate and any aquatic vegetation, together with any marginal vegetation. Where stones and items of woody debris were present hand searching was carried out.

- 2.3.48 Each sampling station was approached quietly and observed for several minutes to ascertain if any surface active insects; such as whirligig beetles (*Gyrinidae* sp.) or pondskater bugs (*Gerridae* sp.) were visible before the water was disturbed by sampling.
- 2.3.49 The contents of the net were examined in a tray of water on the bank. Most specimens were collected into 70% alcohol to be returned to the laboratory for identification. Some, soft bodied, animals were collected into water to be returned to the laboratory alive as preservation in the field renders them unidentifiable.
- 2.3.50 As one of the objectives of the survey was to ascertain whether or not swan mussel (*Anodonta cygnea*) were present in the lodge a hand operated drag-line dredge sampler was deployed from the bank. As with the pond net samples the contents of the dredge sampler were examined in a tray of water on the bank.
- 2.3.51 The inflow stream was sampled by the standard 'kick netting' technique; supplemented by hand searching of stones and woody debris.

Other Wildlife

- 2.3.52 The site was assessed for its suitability for use by notable species (i.e. Priority Species) associated with semi-rural landscapes such as brown hare (*Lepus europaeus*).

2.4 Survey Limitations

- 2.4.1 No access restrictions or other survey limitations were experienced in the completion of the scope of works outlined above.
- 2.4.2 Survey limitations experienced during the bat surveys are described in **Appendix 2**.

2.5 Evaluation Methodology

- 2.5.1 The habitats, vegetation and animal life were evaluated with reference to standard nature conservation criteria as described in *A Nature Conservation Review* (Ratcliffe, 1977). These are size (extent), diversity, naturalness, rarity, fragility, typicality, recorded history, position in an ecological or geographical unit, potential value and intrinsic appeal.
- 2.5.2 Habitats have been assessed to determine whether they meet those described in *UK Biodiversity Action Plan: Priority Habitat Descriptions* (Maddock, A (ed), 2008); these lists are used to help draw up the statutory lists of Priority Habitats, as required under Section 41 of the *Natural Environment and Rural Communities (NERC) Act 2006*. Where suitable, the ecological value of the habitats present have been assessed using the terms outlined in *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2018).
- 2.5.3 Government advice on wildlife, as set out in the *National Planning Policy Framework* (Ministry of Housing, Communities and Local Government, February 2019) and associated government circulars has been taken into consideration. Legislation relating to protected species, such as those listed under Schedules 1, 5, 6 and 8 of the *Wildlife and Countryside Act 1981* (as amended) and *The Conservation of Habitats and Species Regulations 2017*, is referenced where applicable, and any impacts to protected species are evaluated in accordance with current guidance.
- 2.5.4 The presence of any Priority Species, as listed under Section 41 of the *NERC Act 2006* is noted, and habitats are assessed in terms of their suitability and value for these species. The presence of habitats and/or species listed by the Greater Manchester Biodiversity Action Plans has been taken into account in the evaluation of the site.

3.0 SURVEY RESULTS

3.1 Desktop Study

Land Allocations

- 3.1.1 Approximately 1.7 hectares in the north-eastern corner of the site is allocated as Green Belt in the Bury Unitary Development Plan (UDP) (Bury Council, August 1997). This allocation restricts certain actions, such as development, to ensure the strategic purpose of Green Belt is fulfilled.
- 3.1.2 Immediately outside the north-eastern site boundary and parallel with the M66 motorway is land allocated under Policy EN6/4. Policy EN6/4 Wildlife Links and Corridors states:

"The Council will seek to consolidate and, where appropriate, strengthen wildlife links and corridors, and will not permit development which would adversely affect identified areas. In particular, the Council will seek to ensure that new development within or adjacent to identified links or corridors contributes to their effectiveness through the design, landscaping and siting of development proposals and mitigation works, where appropriate".

Designated Sites for Nature Conservation

- 3.1.3 The site has no statutory or non-statutory designation for nature conservation.
- 3.1.4 The site lies within the Site of Special Scientific Interest (SSSI) Impact Risk Zone (IRZ) for the West Pennine Moors SSSI. The West Pennine Moors SSSI at Ramsbottom is 3.6 kilometres to the north-west of the site boundary. The large (7,615.49 ha) SSSI is designated for the presence of an extensive mosaic of upland and upland-fringe habitats. It is of special interest for the following nationally important features that occur within and are supported by the wider habitat mosaic:
- blanket bogs;
 - wet and dry heathlands;
 - acid and lime-rich flushes;
 - rush pastures and mire grasslands;
 - acid grasslands;
 - neutral hay meadows and pastures;
 - wet and dry broadleaved woodlands and scrub;
 - diverse assemblages of upland moorland, in-bye and woodland breeding birds;
 - breeding black-headed gull (*Chroicocephalus ridibundus*), Mediterranean gull (*Larus melanocephalus*) and grey heron (*Ardea cinerea*); and
 - populations of Starry lady's-mantle (*Alchemilla acutiloba*), Large-toothed Lady's-mantle (*A. subcrenata*) and Floating Water-plantain (*Luronium natans*).
- 3.1.5 The proposal to redevelop the site to housing, within an existing built up area, is not identified as a criterion that would trigger the need for the local planning authority (LPA) to consult with Natural England in relation to a planning application and the statutory designated sites (Ordnance Survey, 2018).
- 3.1.6 Two non-statutory Sites of Biological Importance (SBI) and one Biological Heritage Site (BHS) lie within 1 kilometre of the site boundary and comprise:

Table 3.1: Non-statutory Designated Sites for Nature Conservation within a One Kilometre Radius of the Site

Site Name	OS Grid Reference	Minimum Distance and Direction from Site	Reasons for Designation
Gorses Quarry SBI Grade B	SD811131	470 metres to the south	A geological site with the presence of pools that support great crested newt and common toad.
Baldingstone SBI Grade B	SD812145	250 metres to the north-west	A wooded clough supporting ancient woodland and fishing ponds supporting common toad.
Gindles Farm BHS	SD814145	250 metres to the north-west	A wooded clough supporting ancient woodland, acid grassland, scrub and fishing ponds supporting common toad.
Note: Gindles Farm BHS and Baldingstone SBI Grade B adjoin each other			

Priority Habitat

- 3.1.7 An approximately 0.4 hectare of land in the north-eastern area of the site, on the east and north-west side of the lodge, is identified as Deciduous Woodland Priority Habitat on MAGIC.

Protected and Notable Species

- 3.1.8 The Greater Manchester Local Records Centre (GMLRC) holds no records of protected species for the site.
- 3.1.9 Reported records of protected and notable species for a one kilometre radius of the site are summarised below.

Table 3.2: Records of Protected Species Within a One Kilometre Radius of the Site

Taxon Group	Species Name and Designation ¹	Notes (all measurements are approximate and are taken from the site boundary)
Amphibians	Great crested newt (<i>Triturus cristatus</i>) EPS, WCAs5, S41 and GMBAP	2 records from a pond 625 metres south of the site
	Common toad (<i>Bufo bufo</i>) WCAs5 (sale only) and S41	16 records at least 50 metres from the site
Bat species	Common pipistrelle (<i>Pipistrellus pipistrellus</i>) EPS, WCAs5 and GMBAP	2 records of roosts at least 410 metres from the site and 6 records of signs of bats at least 215 metres from the site
	Soprano pipistrelle (<i>Pipistrellus pygmaeus</i>) EPS, WCAs5, S41 and GMBAP	1 record of a roost 520 metres from the site and 1 record of signs of bats 610 metres from the site
	Pipistrelle species (<i>Pipistrellus</i> sp.) EPS, WCAs5 and GMBAP	7 records of roosts at least 240 metres from the site and 3 records of signs of bats at least 100 metres from the site
	Noctule (<i>Nyctalus noctula</i>) EPS, WCAs5, S41 and GMBAP	2 records of signs of bats at least 500 metres from the site
	Bat species EPS, WCAs5 and GMBAP	2 records of signs of bats at least 250 metres from the site
Birds	S41 Single records of bullfinch (<i>Pyrrhula pyrrhula</i>), song thrush (<i>Turdus philomelos</i>) and yellowhammer (<i>Emberiza citrinella</i>) at least 200 metres from the site. WCAs1 One record of Kingfisher (<i>Alcedo atthis</i>) 230 metres south of the site.	
¹ Key to designation codes EPS = European Protected Species under the <i>Conservation of Habitats and Species Regulations 2017</i> WCAs1 = Listed on Schedule 1 of the <i>Wildlife and Countryside Act 1981</i> (as amended) WCAs5 = Listed on Schedule 5 of the <i>Wildlife and Countryside Act 1981</i> (as amended) S41 = Priority Species listed under Section 41 of the <i>NERC Act (2006)</i> GMBAP = Greater Manchester Biodiversity Action Plan		

Previous Ecological Surveys

Phase 1 Habitat Survey and Bat Surveys 2010

- 3.1.10 Ecological surveys carried out to support the previously approved planning application for the site in 2010 ((Baker Shepherd Gillespie, February 2011) and (Baker Shepherd Gillespie, October 2010)) reported the following sightings / records of protected and notable species:
- a. A common pipistrelle day roost (one bat) recorded entering an access point between the window lintel and blockwork at the western elevation of Building 5a on 25th May 2010 (Roost A);
 - b. A common pipistrelle day roost (four bats) recorded entering at a crack in the stonework above the stone window lintel on the third floor level of the south elevation of Building 7 on 25th May 2010 (Roost B);
 - c. A common pipistrelle day roost ("at least 6 bats") recorded entering a roost above the window lintel on the east elevation of Building 7 of 28th July 2010 (Roost C); and
 - d. Use of Buildings 5a and 7 by nesting swift (*Apus apus*).

Updated Bat Surveys 2015

- 3.1.11 To inform a reserved matters application submission, BSG carried out updated bat activity surveys in July and August 2015 (BSG Ecology, September 2015). The results are summarised as:
- a. No evidence of use of the previously recorded bat roosts (Roosts A to C) was recorded;
 - b. A possible but unconfirmed common pipistrelle roost (1 bat) was reported at the ridge of Buildings 5a/5b (Roost D); and
 - c. A possible but unconfirmed common pipistrelle roost (1 bat) was reported at the roof of Building 6 (Roost E).
- 3.1.12 The previously recorded roost locations are annotated on **Figure 9.1** at **Appendix 2**.
- 3.1.13 In addition, the consultation response prepared by Bury Council for the planning application in 2011 referred to a previous planning application and survey of the lodge (Pond 1) carried out in 2003 that did not detect great crested newt but confirmed the presence of common toad, a Priority Species.
- 3.1.14 The records of protected and notable species within the site and the wider area has been taken into account throughout this report.

3.2 Vegetation and Habitats

General Description

- 3.2.1 The approximately 10.5 hectare (ha) site is located immediately south of the M66 and approximately 3 kilometres to the north of Bury town centre.
- 3.2.2 The site comprises an operational factory with associated buildings and hard-standing. In the north-eastern area of the site is a large (1.1 ha) lodge of open water with mature Oak (*Quercus*) woodland along the eastern and northern margins.
- 3.2.3 The site is bounded by Walmersley Old Road and existing residential development to the west and north, parkland to the south, a track and agricultural land to the east and a scrub covered embankment leading up to the M66 motorway to the north-east.

3.2.4 A Phase 1 Habitat Survey map appended at **Figure 8.2**. Photographs are appended at **Table 8.12**.

Buildings, Hard-standing and Grassed Verges

3.2.5 All buildings are described at **Appendix 2**.

3.2.6 Associated with the buildings are grass verges with short mown grassland, refer to **Photos 1 and 2**. The verges support constant and abundant Perennial Rye-grass (*Lolium perenne*) with constant, frequent and locally abundant Dandelion (*Taraxacum officinale* agg.), Cock's-foot (*Dactylis glomerata*), Red Fescue (*Festuca rubra*) and Common Bent (*Agrostis capillaris*).

3.2.7 Scattered borders of ornamental planting are present.

3.2.8 The verge along the western boundary and site entrance off Walmersley Old Road supports a row of mature Poplar (*Populus* sp.) trees with planted standard Cherry (*Prunus* sp.), Silver Birch (*Betula pendula*) and Sycamore (*Acer pseudoplatanus*).

3.2.9 The grass verges are characteristic of the OV23 *Lolium perenne* – *Dactylis glomerata* community that is typically associated with frequently mown grassland such as those at institutional playing fields and grassed verges. A plant species list is appended at **Table 8.1**.

Scrub and Tall-herb Vegetation Around the Site Margins

3.2.10 Around the margins of the site, particularly around the western and northern site boundaries and local areas to the south of the car park areas are unmanaged belts of scattered planted and self-seeded young trees and shrubs. Species comprise of frequent Grey Poplar (*Populus x canescens*), Silver Birch, Goat Willow (*Salix caprea*), Hazel (*Corylus avellana*), Norway Maple (*Acer platanoides*), Grey Willow (*Salix cinerea*), Cherry Laurel (*Prunus laurocerasus*), Dogwood (*Cornus sanguinea*) and occasional scattered Ash (*Fraxinus excelsior*) saplings.

3.2.11 The understorey supports locally dominant and abundant Bramble (*Rubus fruticosus* agg.) with frequent and locally abundant Yorkshire-fog (*Holcus lanatus*), Cock's-foot, Red Fescue (*Festuca rubra*) and locally frequent False Oat-grass (*Arrhenatherum elatius*), Common Nettle (*Urtica dioica*) and Ribwort Plantain (*Plantago lanceolata*). Where the scrub cover is less dense, Bramble scrub or stands of tall herb vegetation comprising of Great Willowherb (*Epilobium hirsutum*) or Rosebay Willowherb (*Chamerion angustifolium*) have established, refer to **Photos 3 and 4**.

3.2.12 In the north-western corner of the site the shallow soils and compacted ground over a storage area have been colonised by a sparse cover of ruderal pioneer herbs such as Creeping Bent (*Agrostis stolonifera*), Strawberry (*Fragaria vesca*), Hairy Sedge (*Carex hirta*), Great Willowherb, Colt's-foot (*Tussilago farfara*), Herb Robert (*Geranium robertianum*), Common Ragwort (*Senecio jacobaea*), Dove's-foot Crane's-bill (*Geranium molle*) and Butterfly Bush (*Buddleia* sp.) saplings. A small stand of approximately 10 Southern Marsh-orchid (*Dactylorhiza praetermissa*) spikes were also found immediately north of Building 1. Indian Balsam plants are scattered around this area, as annotated on **Figure 8.2**.

3.2.13 The establishing scrub does not currently conform to any NVC community. A plant species list is appended at **Table 8.2**.

Established Woodland

North-eastern Area of Site

3.2.14 As detailed on **Figure 8.2**, along both sides of the lodge and on steeply sloping ground to the south of Building 10 is established broadleaf woodland. Semi-mature to mature Pedunculate Oak (*Quercus robur*) dominates the canopy of the woodland in the north east of the site with locally frequent Goat Willow, Grey Willow and Sycamore.

- 3.2.15 The shrub layer is open but constant species comprise frequent Hawthorn (*Crataegus monogyna*), Holly (*Ilex aquifolium*) and Rhododendron (*Rhododendron ponticum*) with very locally frequent Guelder Rose (*Viburnum opulus*) and Beech (*Fagus sylvatica*).
- 3.2.16 The herb layer is sparse but supports constant Bramble and locally frequent Creeping Soft-grass (*Holcus mollis*). Stands of Bracken (*Pteridium aquilinum*) are abundant at the woodland margins. Woodland herbs are restricted to Broad Buckler-fern (*Dryopteris dilatata*), Male-fern (*D. filix-mas*), Hart's Tongue (*Phyllitis scolopendrium*) and Wood Avens (*Geum urbanum*) with a single plant of Common Polypody (*Polypodium vulgare*). The 2011 ecological survey (Baker Shepherd Gillespie, February 2011) reported the presence of Bluebell (*Hyacinthoides non-scripta*); no evidence of this species was found at the time of year the surveys were carried out. Tufted Hair-grass (*Deschampsia cespitosa*) is locally frequent and Wavy Hair-grass (*Deschampsia flexuosa*) is very locally frequent.
- 3.2.17 Both standing and fallen dead wood is present but there is no evidence that the woodland has received any management in recent years.
- 3.2.18 The woodlands has affinities with the W10 *Quercus robur* – *Pteridium aquilinum* – *Rubus fruticosus* NVC community. A plant species list is appended at **Table 8.3**.

Woodland to the South of Building 10

- 3.2.19 The steeply sloping ground to the south of Building 10 is colonised by semi-mature trees comprising Poplar species, Ash, Goat Willow, Sycamore, Pedunculate Oak and Lombardy Poplar (*Populus nigra 'Italica'*).
- 3.2.20 The understorey supports abundant Common Nettle and Bramble with locally abundant Dogwood, Tufted Hair-grass, Cock's-foot, Ivy (*Hedera helix*) and Great Willowherb. Woodland herbs are limited to Male-fern, Wood Avens and Hart's Tongue.
- 3.2.21 The woodland is similar in species composition to the woodland in the north-eastern area of the site but modifications as a result of planting of non-native species and it's relatively small area (0.1 hectare) suggest this wooded fragment does not meet the criteria to be Priority Habitat.

Field of Improved Grassland

- 3.2.22 Immediately north of the Tetrosyl working area is a small (c. 1.6 hectare) field of short mown improved grassland, refer to **Photo 5**. Ribwort Plantain dominates the sward with frequent Perennial Rye-grass, Creeping Buttercup (*Ranunculus repens*) and locally abundant Yorkshire-fog, Smooth Meadow-grass (*Poa pratensis*), Rough Meadow-grass (*Poa trivialis*) and White Clover (*Trifolium repens*).
- 3.2.23 The grassland is species-poor and characteristic of the MG7 *Lolium perenne* ley community of the NVC. A plant species list is appended at **Table 8.4**.

Lodge (Pond 1)

- 3.2.24 The lodge extends an area of approximately 1.1 hectares, refer to **Table 8.5**. The lodge is fed from a water course that enters the site from a culvert beneath the M66 to the north. At the western boundary of the lodge, near Building 4 is a weir and overflow which takes water from lodge into a culvert beneath Building 5a.
- 3.2.25 The banks along the southern boundary of the lodge are formed by large stone and concrete boulders colonised by self-seeded Goat Willow and Alder (*Alnus glutinosa*) scrub. At the western and eastern boundaries are stone retaining walls that separate the water from the established woodland and areas of built development.

- 3.2.26 The lodge supports limited vegetation with the exception of local stands of Brooklime (*Veronica beccabunga*) and Yellow Water-lily (*Nuphar lutea*) associated with the shallow water near the weir.

Land South of Mill Road

- 3.2.27 The site boundary includes a small (0.2 hectares) parcel of land outside of the Tetrosyl site border and south of Mill Road.
- 3.2.28 The area supports neutral grassland composed of Red Fescue, Cock's-foot and Ribwort Plantain bordered by dense Bramble scrub and Great Willowherb tall-herb vegetation and semi-mature Goat Willow, Crack Willow (*Salix fragilis*) and Ash trees.

Invasive Plant Species

- 3.2.29 As annotated on **Figure 8.2**, four invasive non-native species (INNS) were recorded at the site namely:
- a. An established stand of Japanese Knotweed at the southern site boundary;
 - b. A couple of plants of Montbretia (*Crocasmia x crocosmiiflora*) at the margin of the compacted ground storage area in the north-western area of the site;
 - c. Scattered plants of Indian Balsam around the margins of the compacted ground storage area in the north-western area of the site and at the weir where water from the lodge enters a culvert beneath Building 4; and
 - d. Rhododendron shrubs within the oak woodland (not annotated on Figure 8.2).
- 3.2.30 All these INNS are listed on Schedule 9 of the *Wildlife and Countryside Act 1981* (as amended), and it is an offence to spread or cause their spread in the wild. This is considered further at **Section 4.3**.

3.3 Animal Life

Badger

- 3.3.1 Please refer to the separate 'Badger Survey and Assessment' addendum (ERAP (Consultant Ecologists) Ltd, December 2018).

Bat Species

Roosting Bats

- 3.3.2 The report of licensed bat surveys carried out in 2017 and 2018 is appended at **Appendix 2**.
- 3.3.3 In summary:
- a. Buildings 3, 5, 6 and 7 are assessed to have a high suitability for use by roosting bats;
 - b. Buildings 9 and 11c are assessed to have a moderate suitability for use by roosting bats;
 - c. Buildings 4, 13 and 14 are assessed to have a low suitability for use by roosting bats;
 - d. Buildings 1, 2, 8, 10, 11a, 11b and 11d, 12, 15, 16 are assessed to have negligible suitability for use by roosting bats;
 - e. A common pipistrelle bat day roost (maximum three bats) was recorded in the stone wall at the northern elevation of Building 3 on all survey dates (Roost 1);
 - f. No bat exit or entry activity was recorded at the culvert entrances;

- g. No evidence of use of the common pipistrelle day roosts (Roosts A to C) previously recorded at Buildings 5 and 7 in 2010 was recorded;
- h. No evidence of use of the common pipistrelle day roosts (Roosts D and E) previously recorded at Buildings 5a/5b and 6 in 2015 was recorded;
- i. The presence of a maternity roost is reasonably discounted owing to the results of the 2010, 2015 and 2017 bat activity surveys and the absence of suitable conditions;
- j. Use of the buildings, particularly crevices in the stone buildings (Buildings 3, 5, 6 and 7) and the underarch of the stone culverts is possible and precautionary measures prior to demolition are necessary; and
- k. Only two bat species were recorded at the site by the surveyors and the Anabat detector recordings and comprise common pipistrelle which was recorded on all surveys and two brief passes of a *Myotis* species over the lodge on 30th August 2017 and a brief pass at surveyor position 6 on 16th August 2017.

Habitat Assessment for Commuting / Foraging Bats

- 3.3.4 The lodge and wooded belts are of moderate suitability for use by foraging bats. The areas of hard-standing and developed areas are of low suitability for the attraction of an abundance and / or diversity of foraging bats as these areas are unlikely to provide an abundance or diversity of invertebrate prey. This is demonstrated by the results of the bat transect surveys, as described below.

Bat Activity Surveys: Transects

- 3.3.5 **Tables 3.3** and **3.4** show the bat species recorded at each spot count location and between the spot counts during the transect surveys; raw data are appended at **Tables 8.5** and **8.6**. Only one species was recorded (common pipistrelle) throughout all surveys. **Figure 8.3**, appended, illustrates the route of the transect, the spot count locations and all recorded bat activity.

Table 3.3: Summary of Survey Results: Repetition 1: 9th August 2018

	Common Pipistrelle Pass Counts at Each Spot Count Location					Total
	1	2	3	4	5	
Transect circuit 1	0	0	1	18	2	21
Transect circuit 2	4	0	0	27	-	31
Transect circuit 3	-	1	5	3	-	9
Maximum number of passes during any transect circuit	4	1	5	27	2	N/A
¹ Sunset time was 20:57. The survey started at 20:50 and ended at 22:55. All detected echolocation calls were of common pipistrelle. The first detected call was at 21:17, 20 minutes after sunset, and the latest call was detected at 22:55. 64 passes were detected during the transect survey, 61 of which (i.e. 95%) were detected during the spot counts.						

Table 3.4: Summary of Survey Results: Repetition 2: 24th August 2018

	Common Pipistrelle Pass Counts at Each Spot Count Location					Total
	1	2	3	4	5	
Transect circuit 1	0	0	0	0	0	0
Transect circuit 2	0	1	0	1	-	2
Transect circuit 3	0	0	0	0	-	0
Total number of passes over whole survey	0	1	0	1	0	N/A
¹ Sunset time was 20:19. The survey started at 20:19 and ended at 22:26. The first detected call was at 21:22, 1 hour and 2 minutes after sunset, and the latest call was detected at 21:53. Three passes were detected during the transect survey, 2 of which (i.e. 67%) were detected during the spot counts.						

- 3.3.6 Low levels of common pipistrelle activity were detected during the surveys. The greatest level of bat activity was detected at Spot Count Location 4, refer to **Figure 8.3**; this is comparable with observations made during the dawn re-entry surveys.
- 3.3.7 Use of the site by a diversity of bat species and a high level of bat activity has not been regularly detected, it is considered that the site is used by the recorded species (namely common pipistrelle) for foraging as part of a wider network of habitats.

Bird Species

Barn Owl

- 3.3.8 No evidence of barn owl was found during the daylight survey of the buildings. One barn owl was observed flying over the lodge during the bat transect survey on the 9th August 2018, the owl flew into the site from the east, over the lodge, towards the M66.

Other Schedule 1 Bird Species

- 3.3.9 No evidence of use of the site by other relevant schedule 1 birds namely black redstart or peregrine was recorded.

Bird Species Detected During Breeding Bird Surveys 2017 and 2018

- 3.3.10 Birds detected during the site visits in 2017 are listed below.

Table 3.5: Bird Species Detected at the Site in 2017

Scientific Name	Common Name	Location / Habitat	Nesting Recorded / Likely on Site?	BOCC Status ¹
<i>Anas platyrhynchos</i>	Mallard	Three birds on the lodge	Yes	Amber
<i>Cinclus cinclus</i>	Dipper	Associated with the weir at the west side of the lodge (possibly nesting in culvert)	Yes	Amber
<i>Columba livia domestica</i>	Feral pigeon	At the buildings	Yes	-
<i>Columba palumbus</i>	Wood pigeon	In the woodland / scrub at the site margins	Yes	Green
<i>Corvus monedula</i>	Jackdaw	On roofs of buildings	Possible	Green
<i>Erithacus rubecula</i>	Robin	In the woodland / scrub at the site margins	Yes	Green
<i>Gallinula chloropus</i>	Moorhen	Single bird on the lodge	Yes	Green
<i>Phalacrocorax carbo</i>	Cormorant	Single bird on the lodge	No	Green
<i>Pica pica</i>	Magpie	In the woodland / scrub at the site margins	Yes	Green
<i>Prunella modularis</i>	Dunnock	In the woodland / scrub at the site margins	Yes	Amber
<i>Troglodytes troglodytes</i>	Wren	In the woodland / scrub at the site margins	Yes	Green
<i>Turdus merula</i>	Blackbird	In the woodland / scrub at the site margins	Yes	Green
¹ BOCC: Birds of Conservation Concern (Eaton, et al., 2015). Priority Species are presented in bold for ease of reference.				

- 3.3.11 These data are supplemented by the data at **Tables 8.7 to 8.9** and presented on **Figures 8.4 and 8.5**, appended.

3.3.12 The 2018 breeding bird surveys confirmed the following:

- a. 35 species of bird were recorded over the two survey repetitions;
- b. Three breeding Priority Species namely song thrush, dunnoek and bullfinch were recorded at the woodland and scrub bordering the lodge;
- c. Waterfowl / wading species recorded as breeders at the lodge (or at the banks) comprise mallard, common sandpiper (*Actitis hypoleucos*) (one pair) and Canada goose (*Branta canadensis*) (family);
- d. Birds recorded visiting the lodge comprise heron, Muscovy duck (*Cairina moschata*), black-headed gull, grey wagtail (*Motacilla cinerea*) and golden plover (*Pluvialis apricaria*);
- e. Oystercatcher (*Haematopus ostralegus*) was recorded flying over the lodge on survey repetitions 1 and 2 and resting in the field of improved grassland to the north of the Tetrosyl site during survey repetition 2;
- f. Species associated with the buildings comprised feral pigeon associated with Buildings 4a, 5b and 7 and one kestrel (*Falco tinnunculus*) resting at Building 6 during both surveys;
- g. Swift were recorded nesting at Building 5a;
- h. Swallow (*Hirundo rustica*) and lesser black-backed gull (*Larus fuscus*) were recorded in flight over the site only;
- i. The other 18 bird species are passerine species associated with the woodland and shrub bordering the site and comprise the following breeders blackbird, blackcap (*Sylvia atricapilla*), blue tit (*Cyanistes caeruleus*), carrion crow (*Corvus corone corone*), chaffinch (*Fringilla coelebs*), coal tit (*Periparus ater*), goldfinch (*Carduelis carduelis*), greenfinch (*Chloris chloris*), great spotted woodpecker (*Dendrocopos major*), great tit (*Parus major*), jay (*Garrulus glandarius*), long-tailed tit (*Aegithalos caudatus*), magpie, nuthatch (*Sitta europaea*), robin, wood pigeon and wren. As expected the species more typically associated with woodland habitats namely nuthatch, great spotted woodpecker and chaffinch were generally recorded within the established woodland habitats along the eastern and north-western margins of the lodge.

Great Crested Newt (GCN) and Other Amphibian Species

- 3.3.13 In accordance with the HSI, refer to **Table 8.10**, appended, Pond 1 is of 'poor' suitability for great crested newt. The poor result is influenced by the large size of the pond, the presence of coarse fish (a predator of great crested newt larvae and eggs) and the absence of macrophytes and opportunities for egg laying.
- 3.3.14 The consideration of this score, in combination with the absence of any known great crested newt records at the site (as informed by ecological surveys carried out to support planning applications made in 2003 and 2011), and the background information provided by Bury Council in their letter dated April 2011 which indicates surveys at the lodge undertaken in 2003 and 2005 that confirmed an absence of GCN, provides appropriate survey evidence to conclude that the presence of great crested newt at Pond 1 is not reasonably likely.
- 3.3.15 The reported presence of common toad, a Priority Species, and possible presence of common frog and smooth newt species is recognised in this assessment and is discussed in **Section 5.0**.

Reptiles

- 3.3.16 Random samples of debris suitable for sheltering and basking reptiles was examined during the survey; no reptile species were found.

- 3.3.17 The site is not adjacent or linked to any areas of favourable habitat for reptile species, and there are no records of reptile for the site or the wider area. The presence of reptiles within the site is reasonably discounted.

Water Vole

- 3.3.18 The banks of the channel leading from the M66 to the lodge are stone lined and unsuitable for use by water vole. The lodge retaining banks are constructed from large boulders and solid stone retaining walls, refer to **Photo 6**; none of these conditions are suitable for use by water vole. No evidence of water vole was detected during the survey in July 2018; the presence of this species is reasonably discounted.

Otter

- 3.3.19 No evidence of an otter holt was found at the margins of the lodge.
- 3.3.20 No field signs of otter (such as spraints or dead fish) were recorded at the site. There are no reported records of otter in the area and / or the lodges north of the site and the connectivity to other watercourses to the south is limited by the presence of culverts and existing developed land.
- 3.3.21 Owing to the presence of connectivity between the lodge at the site and the watercourse and fishing lodges north of the site (Baldingstone SBI and Gindles Farm BHS) use of the site by feeding otter cannot be entirely discounted, however, for reasons given above the presence of this species is not reasonably likely.

Aquatic Invertebrates

- 3.3.22 **Table 8.11**, appended presents a list of the aquatic invertebrates recorded at the lodge and inflow stream. Sixty species were recorded in total (41 at the lodge and 27 at the inflow stream).
- 3.3.23 One adult brown hawker dragonfly (*Aeshna grandis*) was observed. Larvae of brown hawker were found in the lodge together with larvae of the large red damselfly (*Pyrrosoma nymphula*); larvae of two other species of damselfly were found in the lodge but were too young and small for accurate identification.
- 3.3.24 A single adult specimen of the iron blue mayfly (*Baetis muticus*) was seen flying by the inflow stream where one other adult mayfly was seen but not caught. Adults of the Willow Stonefly (*Leuctra geniculata*) were seen by the inflow stream where their larvae were also seen. No adult caddisflies were detected.
- 3.3.25 None of the recorded species are European protected species, protected under the *Wildlife and Countryside Act 1981* (as amended), are Priority Species or Greater Manchester BAP species. None of the recorded species are listed as invasive species on Schedule 9 of the *Wildlife and Countryside Act 1981* (as amended).
- 3.3.26 The surveyors reported that the limited diversity of macroinvertebrate fauna is attributed to the low habitat diversity within the lodge and that the presence of abundant shredders of dead leaves; such as the water hoglouse is attributed to the overhanging trees and availability of leaf detritus.
- 3.3.27 No swan mussels were detected, although a single empty shell of the duck mussel (*Anodonta anatina*) was brought up by the dredge.

4.0 EVALUATION AND ASSESSMENT

4.1 Introduction and Description of Proposals

- 4.1.1 The proposals comprise the redevelopment of the existing Tetrosyl site and the associated lodge to residential housing. The current proposals are illustrated on the Planning Layout drawing number 456/P/PL/02 Rev E prepared by Barratt Manchester. To create a viable site it is understood that the proposals will involve:
- a. Demolition of all buildings;
 - b. Remediation and re-grading of the site to create suitable development platforms;
 - c. Infilling of the lodge (to a greater extent than previously approved in 2012), in conjunction with the removal of a culvert to create an open channel and an on-line pond; and
 - d. Avoidance of any new development within the Green Belt and retention of the Green Belt land within the north-eastern area of the site as public open space / area for ecological mitigation and enhancement.
- 4.1.2 As detailed in **Section 5.2**, the ecological surveys carried out in 2017 and 2018 have informed the preparation of the detailed site layout to support this full planning application.
- 4.1.3 **Section 5.2** of this report and the separate Badger Survey and Assessment report (ERAP (Consultant Ecologists) Ltd, December 2018) present the measures that have been incorporated into the site layout to comply with principles of the National Planning Policy Framework (NPPF), local planning policy, relevant wildlife legislation, Natural England's standing advice in relation to protected species and best practice. The ecological input has paid particular consideration to conserving and creating wildlife links / Green Infrastructure and maximising opportunities for biodiversity within the built environment to satisfy local planning policy requirements and in accordance with good practice.

4.2 Designated Sites for Nature Conservation

Statutory Designated Sites

- 4.2.1 Due to the distance between the site and the statutory designated sites for nature conservation in the wider area and the absence of complementary habitats, adverse direct and indirect impacts on statutory designated sites are reasonably discounted.

Non-statutory Designated Sites

- 4.2.2 As the lodge is downstream of the Gindles Farm BHS and Baldingstone SBI on the opposite (northern) side of the M66 motorway it is imperative that any alterations to the current management of water and flow rates do not adversely affect the upstream and downstream habitats, particularly those associated with the non-statutory designated sites for nature conservation and their features of special interest.
- 4.2.3 This has been explored further and it is understood that the lodge (Pond 1) at the site has a neutral attenuation value (i.e. the same volume of water that enters the lodge from the north leaves the lodge via the weir overflow); the lodge is understood to have no storm water attenuation purpose. At this stage it is reasonably concluded that works at the site will have no adverse effect on the upstream designated sites.

4.3 Vegetation and Habitats

- 4.3.1 None of the habitats present are species-rich or of rare or restricted distribution with the UK. The NVC communities present are typical of the geographical area and conditions present.
- 4.3.2 Approximately 6 hectares (almost 60%) of the site is occupied by buildings and hard-standing which is devoid of vegetation and therefore of no ecological value in terms of plant species.
- 4.3.3 The woodland habitats, particularly the established woodland associated with the eastern and north-western margins of the lodge to total an area of c. 0.4 hectares is characteristic of the W10 woodland community and is therefore Lowland Mixed Deciduous Woodland Priority Habitat. The presence of Priority Habitat, albeit limited in area, and the habitat connectivity function and opportunities for biodiversity it provides is of value at the local level.
- 4.3.4 Owing to the reported presence of breeding common toad, a Priority Species, the lodge meets the criteria under the Pond Priority Habitat description.
- 4.3.5 The presence of invasive species listed on Schedule 9 of the *Wildlife and Countryside Act 1981* (as amended), namely Japanese Knotweed, Indian Balsam, Rhododendron and Montbretia is a consideration. The redevelopment will provide a mechanism to eradicate these species from the site and / or prevent the risk of spread into the retained habitat in the site and habitats in the wider area; guidance is provided at **Section 5.5**.

4.4 Protected Species and Other Wildlife

Bats

- 4.4.1 As detailed at **Appendix 2**, appropriate and proportionate survey effort, in accordance with standard survey guidelines (Collins, J. (ed), 2016), has been applied to survey and assess the buildings / structures and trees for their suitability for use by roosting bats.
- 4.4.2 The common pipistrelle day roost recorded at Building 3 (Roost 1) is of 'low' conservation significance in accordance with Figure 4 of the *Bat Mitigation Guidelines* (Mitchell-Jones, 2004), and appropriate and proportionate mitigation for the loss of the roost as a result of the demolition is entirely feasible.
- 4.4.3 No further survey or assessment in relation to bats is needed to inform the application for the relevant Natural England licence to facilitate the demolition, *provided* works are carried out before May 2019 (i.e. the next bat activity season). If commencement of works is delayed beyond May 2019, an updated bat activity survey will be required to inform the licence application.
- 4.4.4 Habitats within and adjacent to the site are suitable for foraging and commuting bats. Recommendations relating to the retention of features suitable for use by foraging and commuting bats, and features to enhance habitats for roosting bats at the site are presented at **Section 5.8**.

Badger

- 4.4.5 The Badger Survey and Assessment addendum (ERAP (Consultant Ecologists) Ltd, December 2018) provides an evaluation and assessment of the site and proposals in relation to badger.

Other Protected Species

- 4.4.6 Appropriate and proportionate survey effort and assessment have been applied to examine the site for other protected species.
- 4.4.7 The proposals can be achieved with no adverse effect on other relevant protected species namely water vole, otter, Schedule 1 birds, great crested newt and reptile species.

- 4.4.8 Habitats at the site are suitable for use by nesting birds, including Priority Species such as dunnoek. Guidance is presented at **Section 5.9** in relation to the protection of nesting birds and the conservation and enhancement of opportunities for nesting and foraging birds at the site in the long-term.

4.5 Summary of Assessment

- 4.5.1 The proposals can be achieved with no adverse direct or indirect effect on designated sites for nature conservation.
- 4.5.2 The presence of two Priority Habitats (Pond and Lowland Mixed Deciduous Woodland) is capable of being a material consideration in connection with a planning decision. The essential re-grading of the banks of the lodge and creation of a functioning drainage system at the redeveloped site will result in the temporary loss of the open water habitat from the site, however, in the long-term open water suitable for use by breeding common toad and invertebrates will be retained at the site, refer to **Figure 8.6**.
- 4.5.3 In addition, whilst the engineering works around the lodge are essential, through liaison between ERAP and the engineers all efforts have been made to avoid encroachment into the wooded areas bordering the existing lodge to ensure this Priority Habitat and its habitat connectivity function is conserved, refer to **Sections 5.2** and **5.11**.
- 4.5.4 Mitigation and compensation for protected species, namely roosting bats and badger, and Priority Species such as common toad and nesting birds, is entirely feasible, as detailed in **Section 5.0**, **Appendix 2** and the Badger Survey and Assessment addendum (ERAP (Consultant Ecologists) Ltd, December 2018).
- 4.5.5 The redevelopment proposals can be achieved whilst providing compensatory and enhanced opportunities for fauna such as nesting birds and roosting bats.
- 4.5.6 Provided the guidance in **Section 5.0** and **Appendix 2** of this report and the Badger Survey and Assessment addendum is implemented no significant ecological constraints on the demolition and redevelopment proposals have been identified.

5.0 MANDATORY ACTIONS, RECOMMENDATIONS AND ENHANCEMENT FOR BIODIVERSITY

5.1 Introduction

- 5.1.1 The mandatory actions and recommendations outlined below aim to ensure that the development is implemented in accordance with all wildlife legislation, Natural England guidance, the principles of the National Planning Policy Framework (NPPF), local planning policy and best practice.
- 5.1.2 The recommendations are appropriate and proportionate to the findings of the baseline ecological survey and the likely impacts of the redevelopment proposals.
- 5.1.3 This section of the report outlines the measures to be applied to protect Priority Habitat, protected species and Priority Species. Where impacts on these identified features of ecological interest are unavoidable, the mitigation and, where necessary, compensatory measures are described in appropriate detail to facilitate the progression of a planning application.
- 5.1.4 Where possible, opportunities to enhance the ecological interest and habitat connectivity and seek a net gain for biodiversity through appropriate landscape planting and habitat creation have been identified, as required by the NPPF and other relevant planning documents.

5.2 Recommendations in Relation to Site Layout

5.2.1 The following ecological guidance has informed the preparation of the Planning Layout:

- a. Maximise the retention of areas of woodland and scrub, including the 0.4 hectare area of oak woodland identified as Priority Habitat and bring the retained areas into active management in accordance with conservation objectives, refer to **Sections 5.10 to 5.12**;
- b. Arrange the layout to ensure the protection of badger, their habitats and survival / welfare requirements as much as possible, refer to separate addendum (ERAP (Consultant Ecologists) Ltd, December 2018);
- c. Ensure an opportunity for breeding amphibians, nesting waterfowl, fish and a fresh source of drinking water for fauna such as badger is retained at the site and managed in accordance with conservation objectives in the long-term, refer to **Section 5.11**;
- d. Ensure the retention of a permanent area of open water and opportunity for breeding common toad and aquatic invertebrates and thereby conserve Pond Priority Habitat at the site (and secure active management in the long-term);
- e. Avoid culverting of watercourses and, where possible, maximise the length of open channel to be created;
- f. Use of native trees and shrubs in the landscape planting schedule, refer to **Sections 5.10 and 5.11**;
- g. Appropriate and sensitive use of lighting to avoid impacts on crepuscular wildlife, refer to **Section 5.8**;
- h. Arrangement of contiguous rear gardens at the new properties to maximise the value of greenspace created by gardens;
- i. Lifting of plot boundary fences by 0.1 to 0.15 metres from the ground to create a permeable site and permit passage of wildlife such as hedgehog and common toad;
- j. Alignment of new properties to face areas of retained habitats and ecological protection zones (rather than properties backing on to these areas) to minimise the likelihood of potentially harmful operations such as rear garden extensions and fly-tipping of invasive and non-native plant species; and
- k. Maximise the incorporation of opportunities for use by nesting birds and roosting bats at the site as part of good design (in addition to the mandatory provisions required by the Natural England licensing process) and to achieve a net gain for biodiversity in accordance with the principles of the NPPF, refer to **Sections 5.8 and 5.9**.

5.3 Preparation of a Construction Environmental Management Plan (CEMP) for Biodiversity

5.3.1 The detail of the measures to be applied for the protection of biodiversity during the construction phase will be presented in a Construction Environmental Management Plan (CEMP) for Biodiversity. The CEMP can form the subject of a suitably worded planning condition and at this site will include:

- a. Detail of the tree protection fencing, refer to **Section 5.4**;
- b. Cross-reference to the Invasive Species Management Plan, refer to **Section 5.5**;
- c. Compliance with and implementation of the relevant Pollution Prevention Guidelines (PPG) prepared by the Environment Agency, refer to **Section 5.4**;
- d. Cross-reference to the Badger Mitigation Strategy and works to be licensed by Natural England, refer to separate addendum report (ERAP (Consultant Ecologists) Ltd, December 2018);

- e. Cross-reference to the Lodge Drainage and Fish Rescue Strategy to be applied, refer to **Section 5.7**;
- f. Cross-reference to a common toad mitigation strategy to be applied during the draining of the lodge and site preparation works;
- g. Cross-reference to the Bat Mitigation Strategy and works to be licensed by Natural England, refer to **Appendix 2**; and
- h. The protection afforded to nesting birds and the mandatory actions to be applied during building demolition and vegetation clearance, refer to **Section 5.9**.

5.4 Protection of Existing Vegetation and Water Quality During Construction

Woodland, Trees and Habitats to be Retained

- 5.4.1 During the construction phase, temporary protective demarcation fencing will be used to protect the woodland, trees, shrubs and other vegetation to be retained. The fencing must remain in position until construction operations are completed to ensure protection is provided throughout the construction phase.
- 5.4.2 The fencing will be in accordance with BS5837:2012 *Trees in Relation to Design, Demolition and Construction: Recommendations* (BSI, 2012).

Water Quality

- 5.4.3 To protect water quality during construction, the following Pollution Prevention Guidelines (PPG) will be adhered to:
 - a. PPG1: Basic good environmental practices (Environment Agency, 2013);
 - b. PPG5: Works in, near or over watercourses (Environment Agency, 2014);
 - c. PPG6: Construction and demolition sites (Environment Agency, 2012); and
 - d. PPG7: Operating refuelling sites (Environment Agency, 2011).

5.5 Invasive Species

- 5.5.1 It is an offence under the *Wildlife and Countryside Act 1981* (as amended) to cause the spread of Japanese Knotweed, Indian Balsam, Montbretia and Rhododendron in the wild.
- 5.5.2 The preparation of an Invasive Species Management Plan will be necessary to describe how the plants will be managed and eradicated. Owing to the presence of protected species it is not recommended that all the Rhododendron is removed from the retained areas of woodland. The Rhododendron may be managed in selected areas and this will be dealt with under the Habitat Management Plan to be prepared for the site, refer to **Section 5.12**.
- 5.5.3 In consideration of the Indian Balsam and Japanese Knotweed ERAP (Consultant Ecologists) Ltd recommend a specialist firm is appointed, such as Knotweed Eradication (<http://www.knotweederadication.co.uk/> / 01772 621013), to provide guidance and prepare the Plan.
- 5.5.4 Montbretia should be eradicated by grubbing out by the roots / bulbs during construction works and appropriate disposal; no other operations are necessary.

5.6 Badger

- 5.6.1 The strategy as outlined in the Badger Survey and Assessment addendum (ERAP (Consultant Ecologists) Ltd, December 2018) has been incorporated into the site layout and the specific actions for the protection of badger both during the construction phase and in the long-term will be applied.

5.7 Lodge Drainage and Fish Rescue Strategy and Common Toad Mitigation Strategy

- 5.7.1 To ensure the protection of biodiversity, a Lodge Drainage and Fish Rescue Strategy will be prepared. The Strategy will detail:
- a. The appropriate timing of works to avoid adverse effects on breeding waterfowl, invertebrates and amphibians;
 - b. The services of a Fish Handler such as Blue Slate Fisheries (<http://blueslatefishery.co.uk/contact/>) will be commissioned to ensure the appropriate permits are obtained and measures are applied for the protection of fish welfare. ERAP (Consultant Ecologists) Ltd has been in discussion with the fish handler in relation to the strategy to be applied;
 - c. The sequence of works to minimise disruption to wildlife; and
 - d. Measures to be applied to attempt to deter mass predation by gulls of relatively immobile aquatic fauna such as molluscs.
- 5.7.2 A Common Toad Mitigation Strategy will be prepared to describe the measures to be applied to avoid impacts on common toad during the draining down of the lodge and site preparation works.

5.8 Bats

Mitigation Strategy

- 5.8.1 A Bat Mitigation Strategy and consideration of licensing requirements are detailed at **Appendix 2**.

Updated Surveys

- 5.8.2 The 2017 and 2018 survey data are only valid until May 2019. As detailed in **Section 9.11**, and in accordance with Natural England guidance, if a licence application is delayed beyond May 2019, an updated bat activity survey will be required to support the licence application and facilitate the demolition works.

Lighting

- 5.8.3 Paragraph 180, bullet point 'c' in Chapter 15 (conserving and enhancing the natural environment) of the NPPF states that development should:

'limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.'

- 5.8.4 The lighting scheme to be implemented at the redeveloped site must involve the use of appropriate products and screening, where necessary, to ensure no excessive artificial lighting shines over habitats identified to be of value for use by foraging bats and other fauna such as the retained woodlands, the new pond and the new open water channel, as lighting overspill may deter use by wildlife.
- 5.8.5 The lighting scheme will be designed with reference to current guidance, namely:

- a. *Guidance Note 8: Bats and Artificial Lighting in the UK* (Institution of Lighting Professionals & Bat Conservation Trust, 2018); and
- b. Bats and lighting: Overview of current evidence and mitigation guidance (Stone, 2014).

Enhancing the Site for Use by Roosting Bats

- 5.8.6 In addition to the mandatory compensatory provisions for roosting bats, required as part of the licensing process detailed at **Appendix 2**, it is recommended that the redeveloped site incorporates the installation of commercially available bat access panels at the new properties.
- 5.8.7 The bat access panels should be sited at least four metres above ground level, ideally facing or close to areas of landscape planting and existing linear features. The access panels should not be positioned over windows or doorways where bat droppings may become a nuisance. Once the site layout has been finalised, an ecologist will advise on appropriate positions for the bat access panels. Suitable bat access panels are available from NHBS Ecology (www.nhbs.com) or Wild Care Shop (www.wildcareshop.com) and are presented below:



Insert 1: Examples of commercially available bat access panels and externally mounted boxes
Left to right: IBstock Enclosed Bat Box 'c' (left); Habitat Bat Access Panels (centre left and centre right) and Greenwood's Ecohabitats box (right)

Enhancing Habitats for Roosting Bats within the Retained and Created Habitats

- 5.8.8 The details of the measures to be applied to enhance the retained woodland habitats for roosting bats, such as the installation of bat boxes, are annotated on **Figure 8.6**.
- ## 5.9 Birds
- ### Protection
- 5.9.1 All wild birds are protected under the *Wildlife and Countryside Act 1981* (as amended) while they are nesting.
 - 5.9.2 It is advised that any works such as building demolition and vegetation clearance that will affect habitats suitable for use by nesting birds are scheduled to commence outside the bird nesting season. Commencement of works in the nesting season must be informed by a pre-work nesting bird survey, carried out by a suitably experienced ecologist. The bird breeding season typically extends between March to August inclusive.
 - 5.9.3 If breeding birds are detected the ecologist will issue guidance in relation to the protection of the nesting birds in conjunction with the scheduled works. This may involve cordoning off an area of the site until the young birds have fledged.

Enhancing Habitats for Nesting Birds within the Built Environment

- 5.9.4 In addition to the installation of opportunities for nesting birds at the retained areas of woodland, refer to **Section 5.10**, it is recommended that provision for nesting birds is provided at the built environment.

House Sparrow

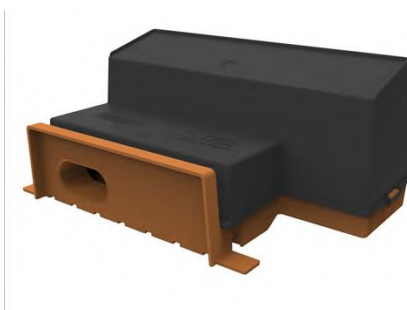
- 5.9.5 House sparrows are associated with suburban areas. Monitoring suggests a severe decline in the UK house sparrow population, estimated as dropping by 71 per cent between 1977 and 2008 with substantial declines in both rural and urban populations (RSPB, 2018).
- 5.9.6 The installation of house sparrow terrace nest boxes is recommended at the new properties. The boxes will be positioned over windows or doorways where droppings may become a nuisance. RSPB advice states that boxes should ideally be sited facing north to east, to avoid exposure to direct sunlight, which may cause overheating of chicks in the nest. An example of a suitable house sparrow bird box is given below, in **Insert**, below:



Insert 2: Schwegler 1SP House Sparrow Nesting Terrace

Swift

- 5.9.7 Swift nest boxes should be installed beneath the eaves of taller properties, as shown in **Insert 3**, below.



Insert 3: Manthorpe GSWB Swift Nest Box

- 5.9.8 ERAP (Consultant Ecologists) Ltd will advise on the siting of the bird boxes, as required.

Enhancing Habitats for Nesting Birds within the Retained and Created Habitats

- 5.9.9 The details of the measures to be applied to enhance the retained woodland habitats and created habitat such as the open water channel and new pond for nesting birds are described below and annotated on **Figure 8.6**.

5.10 Enhancement of Existing / Retained Habitats

Retained Woodland

- 5.10.1 It is recommended that the retained woodland habitat is brought into active management and enhanced in accordance with conservation objectives. Suggested recommendations comprise:
- a. Selective felling / thinning of self-seeded Ash and Goat Willow shrubs and saplings to permit light penetration to the herb layer;
 - b. Installation of bird boxes suitable for a range of species i.e. boxes with hole entrances for blue tit and open-fronted boxes suitable for use by robin;
 - c. Installation of bat boxes;
 - d. Creation of dead wood habitat piles for colonisation by invertebrates, fungi and small mammals including hedgehog (*Erinaceus europaeus*), a Priority Species; and
 - e. Introduction of native woodland herb plug plants typically present in a W10 woodland such as Red Campion (*Silene dioica*), native bluebell (*Hyacinthoides non-scripta*) and Wood Anemone (*Anemone nemorosa*).

Retained Grassland

- 5.10.2 In addition to its amenity function, the ecological value of the retained grassland in the north-eastern corner of the site will be enhanced by the seeding of areas of wildflower grassland and native scrub planting. The grassland lies adjacent to the land allocated as a Wildlife Links and Corridor and Link in the Bury UDP; the landscape planting will seek to supplement the function and value of the corridor.

5.11 Habitat Creation and Enhancement and Landscape Planting

New Pond

- 5.11.1 The proposed redevelopment will involve the loss of the existing lodge. To ensure the function of this Priority Habitat and an opportunity for breeding waterfowl, amphibians, foraging bats and a fresh water drinking water source is retained at the site, the inflow at the north-eastern area of the site will be modified to create a new pond. The new pond will be constructed and enhanced in accordance with the following principles and will be managed to promote Priority Habitat:
- a. An area of at least 1000m²;
 - b. Shallow sloping margins on at least one side to facilitate access by wildlife and colonisation by marginal plants;
 - c. Invert levels to achieve a water depth of 0.8 metres (and a maximum of 1.1 metres);
 - d. A profile and outflow channel / pipe invert level that ensures the creation of calm water;
 - e. Introduction of native aquatic plants, as appropriate;
 - f. Seeding of the pond banks with wildflower grassland, as appropriate.

New Open Water Brook Channel

- 5.11.2 The redevelopment provides an opportunity to open up the culverted sections of brook and create an open channel to provide habitat connectivity and habitats for flora and fauna. The exact detail of the channel is not known at this stage but the channel will be created and landscaped in accordance with the following principles:

- a. A meandering course to create a varied flow and areas of riffles and pools;
- b. Landscape planting to be complementary to the Oak and Birch woodland in the local area; and
- c. Marginal seeding of native low maintenance grassland with wildflowers.

Habitat Between the New Pond and the M66

- 5.11.3 As annotated on **Figure 8.6**, the woodland belt between the new pond and the M66 motorway will be planted with native trees and shrubs to complement the existing habitats and enhance and supplement the wildlife corridor function.

New Hedgerow

- 5.11.4 It is recommended that the demarcation between the residential development and the open space to the north is demarcated with a native hedgerow, refer to **Figure 8.3**.

Landscape Planting within the Residential Areas

- 5.11.5 It is recommended that the landscape planting within the residential site is composed from native species and species known to be of value for the attraction of wildlife.
- 5.11.6 It is recommended that trees which support blossom and fruit which will attract insects are selected. Suitable species are presented below.

Table 5.1: Suitable Native Species for Tree and Shrub Planting

Scientific Name	Common Name	Scientific Name	Common Name
<i>Acer campestre</i>	Field Maple	<i>Prunus spinosa</i>	Blackthorn
<i>Corylus avellana</i>	Hazel	<i>Rosa arvensis</i>	Field Rose
<i>Crataegus monogyna</i>	Hawthorn	<i>Rosa canina</i>	Dog-rose
<i>Ilex aquifolium</i>	Holly	<i>Sambucus nigra</i>	Elder
<i>Malus sylvestris</i>	Crab Apple	<i>Sorbus aucuparia</i>	Rowan
<i>Prunus avium</i>	Wild Cherry	<i>Ulmus glabra</i>	Wych Elm
<i>Prunus padus</i>	Bird Cherry	<i>Viburnum opulus</i>	Gelder Rose

- 5.11.7 The understorey and ground cover planting design should be prepared to optimise the attraction of invertebrates such as feeding bumblebees and butterflies. Where possible the use of native species should be maximised but where necessary non-native species known to be attractive to invertebrates should be used.
- 5.11.8 Planting schemes that include flowering species such as *Viburnum*, *Ceanothus*, *Hebe*, *Lavandula*, *Lonicera*, *Potentilla*, *Rosmarinus* and *Vinca* can maximise opportunities for feeding invertebrates and for the attraction of foraging bats and birds.

5.12 Landscape and Habitat Management Plan

- 5.12.1 To secure the long-term benefits for biodiversity associated with the scheme a Landscape and Habitat Management Plan will be prepared. The Plan will detail the objectives and prescriptions to be applied to maximise the biodiversity value of retained and new habitats and can be secured by an appropriately worded planning condition.

6.0 CONCLUSION

- 6.1 This ecological appraisal has demonstrated that demolition and re-development proposals at the Tetrosyl site can be achieved with no adverse effect on designated sites for nature conservation.

-
- 6.2 The protection of woodland Priority Habitat and retention of the conservation function of pond Priority Habitat will be retained at the site.
- 6.3 Mitigation for protected species, namely roosting common pipistrelle bats and badger and Priority Species such as common toad and nesting birds is entirely feasible. This report demonstrates that the relevant tests of the Habitats Regulations will be satisfied (**Appendix 2**).
- 6.4 Protection of nesting birds and recommendations for the provision of compensatory and enhanced habitats and opportunities for nesting birds are feasible and can be accommodated (**Sections 5.2, 5.9 to 5.12**).
- 6.5 Measures to conserve the habitat connectivity and Green Infrastructure function through and around the site are entirely feasible (**Section 5.2 and 5.10 to 5.11**).
- 6.6 Redevelopment at the site will provide an opportunity to secure ecological enhancement for fauna typically associated with residential areas such as breeding birds and roosting bats and the positive management of retained and created habitats in accordance with conservation objectives.

7.0 REFERENCES

- Andrews, H (ed), 2013. *Bat Tree Habitat Key, 3rd Edition*. Bridgewater: AEcol Ltd.
- ARG UK, 2010. *ARG Advice Note 5: Great Crested Newt Habitat Suitability Index*. [Online]
Available at: <http://www.arguk.org/advice-and-guidance/view-category>
- Baker Shepherd Gillespie, February 2011. *Bevis Green Site, Walmersley, Bury. Ecology Survey Report*, Bakewell: BSG.
- Baker Shepherd Gillespie, October 2010. *Bevis Green site, Walmersley. Bat Survey Report*, Bakewell: BSG.
- Barn Owl Trust, 2012. *Barn Owl Conservation Handbook*. Exeter: Pelagic Publishing.
- Bat Conservation Trust, 2012. *Grey Long-eared bat*. [Online]
Available at: http://www.bats.org.uk/pages/grey_long-eared_bat.html
[Accessed 6 November 2017].
- BCT, 2007. *BCT Mitigation Conference Proceedings*, London: Bat Conservation Trust.
- BSG Ecology, September 2015. *Bevis Green Works, Mill Road, Bury. Method Statement: Mitigation and Compensatory Measures for Bats*, Hathersage: BSG Ecology.
- BSI, 2012. *Trees in relation to design, demolition and construction. Recommendations*. London: BSI Standards Limited.
- BTHK, 2018. *Bat Roosts in Trees - A Guide to Identification and Assessment for Tree-Care and Ecology Professionals*, Exeter: Pelagic Publishing.
- Bury Council, August 1997. *Bury Unitary Development Plan (UDP)*, Bury: Bury Council.
- Chanin, P., 2003. *Ecology of the European Otter. Conserving Natura 2000 Rivers, Ecology Series 10*. Peterborough: English Nature.
- Chanin, P., 2003. *Monitoring the Otter Lutra lutra. Conserving Natura 2000 Rivers Monitoring Series No 10*, Peterborough: English Nature.
- CIEEM, 2013. *Technical Guidance Series Competencies for Species: Bats*. Winchester: Chartered Institute of Ecology and Environmental Management.
- CIEEM, 2016. *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd Edition*. Winchester: Chartered Institute of Ecology and Environmental Management.
- CIEEM, 2018. *Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*, Winchester: Chartered Institute of Ecology and Environmental Management.
- Collins, J. (ed), 2016. *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)*. London: The Bat Conservation Trust.
- Dean, M., Strachan, R., Gow, D. & Andrews, R., 2016. *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series) Eds. Fiona Mathews and Paul Chanin*, London: The Mammal Society.
- Drake, C. M., Lott, D. A., Alexander, K. N. & Webb, J., 2007. *Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation*, Sheffield: Natural England.
- Eaton, M. A. et al., 2015. Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. *British Birds*, Issue 108, pp. 708-746.
- Edgar, P., Foster, P & Baker, J., 2010. *Reptile Habitat Management Handbook*. Bournemouth: Amphibian and Reptile Conservation.
- English Nature, 2001. *Great Crested Newt Mitigation Guidelines*. Peterborough: English Nature.
- Environment Agency, 2011. *Operating Refuelling Sites, PPG7: Prevent Pollution*. [Online]
Available at: <https://www.gov.uk/government/publications/operating-refuelling-sites-ppg7-prevent-pollution>
- Environment Agency, 2012. *Construction and Demolition Sites, PPG6: Prevent Pollution*. [Online]
Available at: <https://www.gov.uk/government/publications/construction-and-demolition-sites-ppg6-prevent-pollution>
- Environment Agency, 2013. *Basic Good Environmental Practices, PPG1: Prevent Pollution*. [Online]
Available at: <https://www.gov.uk/government/publications/basic-good-environmental-practices-ppg1-prevent-pollution>

- Environment Agency, 2014. *Works in, near or over watercourses, PPG5: Prevent Pollution*. [Online]
Available at: <https://www.gov.uk/government/publications/works-in-near-or-over-watercourses-ppg5-prevent-pollution>
- ERAP (Consultant Ecologists) Ltd, December 2018. *Tetrosyl, Walmersley Old Road, Walmersley, Bury BL9 6RG. Confidential Addendum: Badger Survey and Assessment*, Preston: ERAP (Consultant Ecologists) Ltd.
- Gilbert, G., Gibbons, D. W. & Evans, J., 1998. *Bird Monitoring Methods*. Exeter: Pelagic Publishing Ltd..
- Great Britain, 1981. *Wildlife and Countryside Act*. London: H.M.S.O.
- Great Britain, 2006. *Natural Environment and Rural Communities Act*. London: H.M.S.O.
- Great Britain, 2017. *The Conservation of Habitats and Species Regulations*. London: H.M.S.O.
- Institution of Lighting Professionals & Bat Conservation Trust, 2018. *Guidance Note 8: Bats and Artificial Lighting in the UK*. [Online]
Available at: <https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting/>
[Accessed 18 October 2018].
- JNCC, 2010. *Handbook for Phase 1 Habitat Survey: A technique for Environmental Audit*. Peterborough: NCC.
- Langton, T. B. C. a. F. J., 2001. *Great Crested Newt Conservation Handbook*. Halesworth: Froglife.
- Maddock, A (ed), 2008. *UK Biodiversity Action Plan: Priority Habitat Descriptions*. [Online]
Available at: <http://jncc.defra.gov.uk/page-5718>
- Maddock, A., 2008. *UK Biodiversity Action Plan; Priority Habitat Descriptions (Updated Dec 2011)*. [Online]
Available at: <http://jncc.defra.gov.uk/page-5706>
- Marchant, J., 1983. *Common Birds Census Instructions*. Tring: BTO.
- Ministry of Housing, Communities and Local Government, February 2019. *National Planning Policy Framework*. London: H.M.S.O.
- Mitchell-Jones, A., 2004. *Bat Mitigation Guidelines*. Peterborough: English Nature.
- Mitchell-Jones, A. J. & Mcleish, A. P., 2004. *Bat Workers' Manual, 3rd Edition*. Peterborough: Joint Nature Conservation Committee.
- Natural England, 2007. *Badgers and Development*, Peterborough: Natural England.
- Natural England, 2011. *The Reptile Mitigation Guidelines*. Peterborough: Natural England.
- Natural England, 2014. *Otters: surveys and mitigation for development projects*. [Online]
Available at: <https://www.gov.uk/guidance/otters-protection-surveys-and-licences>
[Accessed 03 November 2016].
- Natural England, 2015. *Badgers: Surveys and mitigation for development projects*. [Online]
Available at: <https://www.gov.uk/guidance/badgers-surveys-and-mitigation-for-development-projects>
[Accessed 3 December 2015].
- Natural England, 2015. *Great crested newts: surveys and mitigation for development projects*. [Online]
Available at: <https://www.gov.uk/guidance/great-crested-newts-surveys-and-mitigation-for-development-projects>
[Accessed 2017].
- Office of the Deputy Prime Minister, August 2005. *Government Circular 06/2005. Biodiversity and Geological Conservation - Statutory Obligations and their Impact within the Planning System*, London: ODPM.
- Oldham, R. S., Keeble, J., Swan, M. J. S. & Jeffcote, M., 2000. Evaluating the Suitability of Habitat for the Great Crested Newt (*Triturus cristatus*). *Herpetological Journal*, Volume 10(4), pp. 143-155.
- Ordnance Survey, 2018. *Site Check Report Centroid Grid Ref: SD809137*. [Online]
Available at: <http://magic.defra.gov.uk/magicmap.aspx>
[Accessed 13 December 2018].
- Ratcliffe, D. A., 1977. *A Nature Conservation Review*. Cambridge: Cambridge University Press.
- Rodwell, J. S., 1991. *British Plant Communities: Volume 1, Woodlands and Scrub*. Cambridge: Cambridge University Press.
- Rodwell, J. S., 1992. *British Plant Communities: Volume 3, Grasslands and Montane Communities*. Cambridge: Cambridge University Press.

-
- Roper, T., 2010. *Badger (Collins New Naturalist Library, Book 114)*. Glasgow: Harper Collins.
- RSPB, 2018. *Population Trends: The Recent Decline of House Sparrows*. [Online]
Available at: <https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/house-sparrow/population-trends/>
[Accessed 25 August 2018].
- Shawyer, C., 2011. *Barn Owl Tyto alba Survey Methodology and Techniques for use in Ecological Assessment. Developing Best Practice in Survey and Reporting*, Winchester: IEEM.
- Stace, C. A., 2010. *New Flora of the British Isles 3rd Edition*. Cambridge: Cambridge University Press.
- Stone, E. L., 2014. *Bats and Lighting: Overview of current evidence and mitigation guidance*. Bristol: University of Bristol.

8.0 APPENDIX 1: TABLES AND FIGURES

Table 8.1: Plant Species List for the Mown Grassed Verges Within the Tetrosyl Site

Scientific Name	Common Name	DAFOR ¹	Cover
Woody Species			
<i>Acer campestre</i>	Field Maple	LF	2%
<i>Acer pseudoplatanus</i>	Sycamore	O	<1%
<i>Betula pendula</i>	Silver Birch	O	<1%
<i>Corylus avellana</i>	Hazel	VLF	<1%
<i>Fraxinus excelsior</i>	Ash	VL	<1%
<i>Populus</i> sp.	Poplar species	LA	2%
<i>Prunus</i> sp.	Cherry species	O	1%
<i>Salix caprea</i>	Goat Willow	VLF	<1%
Grassland Species			
<i>Achillea millefolium</i>	Yarrow	VLF	<1%
<i>Agrostis capillaris</i>	Common Bent	LA/F*	5%
<i>Anthriscus sylvestris</i>	Cow Parsley	VLF	<1%
<i>Arrhenatherum elatius</i>	False Oat-grass	VLA	1%
<i>Dactylis glomerata</i>	Cock's-foot	LA/F*	5%
<i>Festuca rubra</i>	Red Fescue	LA/F*	5%
<i>Galium aparine</i>	Cleavers	VLA	<1%
<i>Geranium robertianum</i>	Herb-robert	VLA	<1%
<i>Hedera helix</i>	Ivy	VLA	<1%
<i>Holcus lanatus</i>	Yorkshire-fog	F	10%
<i>Lolium perenne</i>	Perennial Rye-grass	F/LA*	60%
<i>Plantago lanceolata</i>	Ribwort Plantain	LF	1%
<i>Poa annua</i>	Annual Meadow-grass	VLA	<1%
<i>Poa pratensis</i>	Smooth Meadow-grass	F	5%
<i>Poa trivialis</i>	Rough Meadow-grass	F	5%
<i>Prunella vulgaris</i>	Self-heal	VLF	<1%
<i>Ranunculus repens</i>	Creeping Buttercup	LF	1%
<i>Rumex obtusifolius</i>	Broad-leaved Dock	O	<1%
<i>Taraxacum officinale</i> agg.	Dandelion	LF/O*	1%
<i>Trifolium pratense</i>	Red Clover	O	<1%
¹ Key to DAFOR: D = Dominant, A = Abundant, F = Frequent, O = Occasional, R = Rare, V = Very, L = Local and *denotes a constant species			

Table 8.2: Plant Species List for the Scrub and Tall-herb Vegetation Around the Site Margins

Scientific Name	Common Name	DAFOR ¹	Cover
Woody Species			
<i>Acer platanoides</i>	Norway Maple	LF	2%
<i>Betula pendula</i>	Silver Birch	F	5%
<i>Buddleja davidii</i>	Butterfly-bush	LF	5%
<i>Cornus sanguinea</i>	Dogwood	F/LA	5%
<i>Corylus avellana</i>	Hazel	LF	5%
<i>Crataegus monogyna</i>	Hawthorn	O	<1%
<i>Fraxinus excelsior</i>	Ash sapling	O	<1%
<i>Populus x canescens</i>	Grey Poplar	LF	10%
<i>Prunus laurocerasus</i>	Cherry Laurel	VLF	<1%
<i>Quercus robur</i>	Pedunculate Oak sapling	O	<1%
<i>Salix caprea</i>	Goat Willow	LF/A*	50%
<i>Salix cinerea</i>	Grey Willow	LF	2%
<i>Sambucus nigra</i>	Elder	VLF	<1%
Herb Species			
<i>Agrostis stolonifera</i>	Creeping Bent	LF	5%
<i>Arrhenatherum elatius</i>	False Oat-grass	LF/A*	15%
<i>Calystegia sepium</i>	Hedge Bindweed	VLF	<1%
<i>Carex hirta</i>	Hairy Sedge	VLF	<1%
<i>Chamerion angustifolium</i>	Rosebay Willowherb	VLF	<1%
<i>Cirsium arvense</i>	Creeping Thistle	O	<1%
<i>Crocsmia x crocosmiiflora</i>	Montbretia	VLF	<1%
<i>Dactylis glomerata</i>	Cock's-foot	LF/LA*	15%
<i>Dactylorhiza praetermissa</i>	Southern Marsh-orchid	VLF	<1%
<i>Dryopteris filix-mas</i>	Male-fern	O	<1%
<i>Epilobium hirsutum</i>	Great Willowherb	VLA	1%
<i>Festuca rubra</i>	Red Fescue	F/LA*	15%
<i>Fragaria vesca</i>	Strawberry	VLA	<1%
<i>Galium aparine</i>	Cleavers	VLA	<1%
<i>Geranium molle</i>	Dove's-foot Crane's-bill	VLA	<1%
<i>Geranium robertianum</i>	Herb Robert	VLA	<1%
<i>Hedera helix</i>	Ivy	VLA	<1%
<i>Heracleum sphondylium</i>	Common Hogweed	O	<1%
<i>Holcus lanatus</i>	Yorkshire-fog	F/LA*	5%
<i>Impatiens glandulifera</i>	Indian Balsam	O/VLF	<1%
<i>Iris pseudacorus</i>	Yellow Iris	VLF	<1%
<i>Juncus effusus</i>	Soft-rush	O	<1%
<i>Plantago lanceolata</i>	Ribwort Plantain	LF/O	2%
<i>Pteridium aquilinum</i>	Bracken	VLA	<1%
<i>Ranunculus repens</i>	Creeping Buttercup	VLF	<1%
<i>Rubus fruticosus</i> agg.	Bramble	LVA/LA*	20%
<i>Rumex conglomeratus</i>	Clustered Dock	O	<1%
<i>Scrophularia nodosa</i>	Common Figwort	VLF	<1%
<i>Senecio jacobaea</i>	Common Ragwort	O	<1%
<i>Taraxacum officinale</i> agg.	Dandelion	O	<1%
<i>Trifolium pratense</i>	Red Clover	O	<1%
<i>Tussilago farfara</i>	Colt's-foot	VLA	<1%
<i>Urtica dioica</i>	Common Nettle	LF	1%
<i>Vicia cracca</i>	Tufted Vetch	VL	<1%
¹ Key to DAFOR: D = Dominant, A = Abundant, F = Frequent, O = Occasional, R = Rare, V = Very, L = Local and * denotes a constant species			

Table 8.3: Plant Species List for Established Woodland in the Eastern Area of the Site

Scientific Name	Common Name	DAFOR ¹	Cover
Woody Species			
<i>Acer pseudoplatanus</i>	Sycamore	LF	5%
<i>Betula pendula</i>	Silver Birch	LF	5%
<i>Crataegus monogyna</i>	Hawthorn	F*	5%
<i>Fagus sylvatica</i>	Beech	VLF	<1%
<i>Fraxinus excelsior</i>	Ash sapling	O	<1%
<i>Ilex aquifolium</i>	Holly	LF	2%
<i>Quercus robur</i>	Pedunculate Oak	F/LA*	50%
<i>Rhododendron ponticum</i>	Rhododendron	F/LA	20%
<i>Salix caprea</i>	Goat Willow	LF/LA	5%
<i>Salix cinerea</i>	Grey Willow	LF	5%
<i>Sambucus nigra</i>	Elder	O	1%
<i>Sorbus aucuparia</i>	Rowan	VLF	<1%
<i>Tilia</i> sp.	Lime species	LF	1%
<i>Viburnum opulus</i>	Guelder Rose	VLF	<1%
Herb Species			
<i>Asplenium scolopendrium</i>	Hart's Tongue	O	<1%
<i>Carex remota</i>	Remote Sedge	O	<1%
<i>Dactylis glomerata</i>	Cock's-foot	LA	1%
<i>Deschampsia cespitosa</i>	Tufted Hair-grass	LF	1%
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	VLF	<1%
<i>Digitalis purpurea</i>	Foxglove	VLF	<1%
<i>Dryopteris dilatata</i>	Broad Buckler-fern	LF	5%
<i>Dryopteris filix-mas</i>	Male Fern	O/LF	1%
<i>Epipactis helleborine</i>	Broad-leaved Helleborine	R	<1%
<i>Equisetum arvense</i>	Field Horsetail	VLF	<1%
<i>Festuca rubra</i>	Red Fescue	LA	2%
<i>Geum urbanum</i>	Wood Avens	VLA	<1%
<i>Hedera helix</i>	Ivy	LVA	5%
<i>Heracleum sphondylium</i>	Common Hogweed	O	<1%
<i>Holcus mollis</i>	Creeping Soft-grass	LF	5%
<i>Impatiens glandulifera</i>	Indian Balsam	VLA	1%
<i>Juncus effusus</i>	Soft-rush	VLF	<1%
<i>Lonicera periclymenum</i>	Honeysuckle	LF	1%
<i>Phalaris arundinacea</i>	Reed Canary-grass	VLA	<1%
<i>Polypodium vulgare</i>	Common Polypody	R	<1%
<i>Pteridium aquilinum</i>	Bracken	LA	2%
<i>Rubus fruticosus</i> agg.	Bramble	F/LA*	60%
<i>Rubus idaeus</i>	Raspberry	VLA	<1%
<i>Taraxacum officinale</i> agg.	Dandelion	O	<1%
¹ Key to DAFOR: D = Dominant, A = Abundant, F = Frequent, O = Occasional, R = Rare, V = Very, L = Local and * denotes a constant species			

Table 8.4: Plant Species List for the Field of Improved Grassland in the North-eastern Area of Site

Scientific Name	Common Name	DAFOR ¹	Cover
Herb Species			
<i>Bellis perennis</i>	Daisy	LF	<1%
<i>Cerastium fontanum</i>	Common Mouse-ear	VLA	<1%
<i>Cynosurus cristatus</i>	Crested Dog's-tail	O	5%
<i>Festuca rubra</i>	Red Fescue	LA	<1%
<i>Holcus lanatus</i>	Yorkshire-fog	LA	2%
<i>Juncus effusus</i>	Soft-rush	VLA	<1%
<i>Lolium perenne</i>	Perennial Rye-grass	F	10%
<i>Plantago lanceolata</i>	Ribwort Plantain	A*	70%
<i>Poa annua</i>	Annual Meadow-grass	LF	<1%
<i>Poa pratensis</i>	Smooth Meadow-grass	LA	2%
<i>Poa trivialis</i>	Rough Meadow-grass	LA	2%
<i>Pteridium aquilinum</i>	Bracken	VLA	1%
<i>Ranunculus repens</i>	Creeping Buttercup	F	10%
<i>Rumex acetosa</i>	Common Sorrel	VLA	<1%
<i>Trifolium repens</i>	White Clover	LA	1%
¹ Key to DAFOR: D = Dominant, A = Abundant, F = Frequent, O = Occasional, R = Rare, V = Very, L = Local and * denotes a constant species			

Table 8.5: Transect Survey Data Repetition 1: 9th August 2018 (Sunset 20:57, Amy Sharples and Leah Hart)

Spot Count Locations	Start time	End time	Number of Passes Recorded (all common pipistrelle)
1	20:50:00	21:00:00	0
Between point 1 and point 2	21:00:00	21:00:00	0
2	21:00:00	21:10:00	0
Between point 2 and point 3	21:10:00	21:11:00	0
3	21:11:00	21:21:00	1
Between point 3 and point 4	21:21:00	21:21:00	0
4	21:21:00	21:31:00	18
Between point 4 and point 5	21:31:00	21:33:00	3
5	21:33:00	21:43:00	2
Between point 5 and point 4	21:43:00	21:45:00	0
4	21:45:00	21:55:00	27
Between point 4 and point 3	21:55:00	21:55:00	0
3	21:55:00	22:05:00	0
Between point 3 and point 2	22:05:00	22:06:00	0
2	22:06:00	22:16:00	0
Between point 2 and point 1	22:16:00	22:16:00	0
1	22:16:00	22:26:00	4
Between point 1 and point 2	22:26:00	22:27:00	0
2	22:27:00	22:37:00	1
Between point 2 and point 3	22:37:00	22:38:00	0
3	22:38:00	22:48:00	5
Between point 3 and point 4	22:48:00	22:49:00	0
4	22:49:00	22:55:00	3
Total Number of Passes Recorded:			64
Total Number of Passes Recorded at Spot Count Locations			61
Total Number of Passes Records Between Spot Count Locations			3

Table 8.6: Transect Survey Data Repetition 2: 24th August 2018 (Sunset 20:19: Amy Sharples & Leah Hart)

Spot Count Locations	Start time	End time	Number of Passes Recorded (all common pipistrelle)
1	20:19:00	20:29:00	0
<i>Between point 1 and point 2</i>	20:29:00	20:30:00	0
2	20:30:00	20:40:00	0
<i>Between point 2 and point 3</i>	20:40:00	20:41:00	0
3	20:41:00	20:51:00	0
<i>Between point 3 and point 4</i>	20:51:00	20:53:00	0
4	20:53:00	21:03:00	0
<i>Between point 4 and point 5</i>	21:03:00	21:06:00	0
5	21:06:00	21:16:00	0
<i>Between point 5 and point 4</i>	21:16:00	21:20:00	0
4	21:20:00	21:30:00	1
<i>Between point 4 and point 3</i>	21:30:00	21:32:00	1
3	21:32:00	21:42:00	0
<i>Between point 3 and point 2</i>	21:42:00	21:44:00	0
2	21:44:00	21:54:00	1
<i>Between point 2 and point 1</i>	21:54:00	21:56:00	0
1	21:56:00	22:06:00	0
<i>Between point 1 and point 2</i>	22:06:00	22:06:00	0
2	22:06:00	22:16:00	0
<i>Between point 2 and point 3</i>	22:16:00	22:16:00	0
3	22:16:00	22:26:00	0
Total			3
Total at spot counts			2
Total between spot counts			1

Table 8.7: Summary of All Bird Species Detected Over Both Survey Repetitions

Common Name	Repetition 1 (05/07/2018)		Repetition 2 (20/07/2018)	
	Total Number Seen	Breeding?	Total Number Seen	Breeding?
Blackbird	4	4	2	1
Blackcap	1	1	1	1
Bullfinch	1	1	3	1
Black-headed gull	4	0	4	0
Blue tit	1	1	1	1
Carrion crow	1	1	2	2
Chiffchaff	2	2	-	-
Canada goose	3	3	3	3
Chaffinch	2	2	3	3
Common sandpiper	1	1	-	-
Coal tit	1	1	-	-
Dunnock	3	3	-	-
Feral pigeon	22	0	34	0
Grey wagtail	-	0	1	0
Goldfinch	2	2	2	2
Golden plover	-	-	1	0
Greenfinch	1	1	-	-
Great spotted woodpecker	1	0	1	1
Great tit	-	-	1	1
Grey heron	1	0	1	0
Jay	2	2	1	1
Kestrel	1	0	1	0
Lesser black-backed gull	-	-	1	0
Long-tailed tit	1	1	-	-
Mallard	4	0	2	1
Magpie	1	1	2	0
Muscovy duck	1	0	-	-
Nuthatch	1	0	1	1
Oystercatcher	1	0	2	0
Robin	3	3	5	1
Swift	1	1	-	-
Swallow	9	1	10	0
Song thrush	1	1	1	0
Wood pigeon	2	2	1	1
Wren	5	5	5	5
Total Number of Birds Seen:	84		91	
Total Number of Species Present:	31		27	
¹ i.e. Number of birds either of confirmed or probable breeding status; birds detected engaged in activity associated with breeding birds within the survey area. Activity associated with breeding birds comprises singing and alarm calling (i.e. marking territory), male and female pairs observed together, family units and birds carrying food for young. Birds highlighted in Bold are Priority Species.				

Table 8.8: Breeding Bird Survey Repetition 1, 5th July 2018: Raw Survey Data

Scientific Name	Common Name	Times observed	Total seen	BOCC	Singing	Calling	Alarm call	In flight	Male	Male & female	None	Family
<i>Actitis hypoleucos</i>	Common sandpiper	1	1	Amber	0	0	1	0	0	0	0	0
<i>Aegithalos caudatus</i>	Long-tailed tit	1	1	Green	0	0	0	0	0	0	0	1
<i>Anas platyrhynchos</i>	Mallard	1	4	Amber	0	0	0	0	0	0	4	0
<i>Apus apus</i>	Swift	1	1	Amber	0	0	0	0	0	0	1	0
<i>Ardea cinerea</i>	Grey heron	1	1	Green	0	0	0	0	0	0	1	0
<i>Branta canadensis</i>	Canada goose	1	2	Green	0	0	0	0	0	1	0	2
<i>Cairina moschata</i>	Muscovy duck	1	1	Green	0	0	0	0	0	0	1	0
<i>Carduelis carduelis</i>	Goldfinch	2	2	Green	1	0	0	0	0	0	0	1
<i>Carduelis chloris</i>	Greenfinch	1	1	Green	0	0	1	0	1	0	0	0
<i>Chroicocephalus ridibundus</i>	Black-headed gull	1	4	Amber	0	0	0	0	0	0	4	0
<i>Columba livia</i>	Feral pigeon	2	22	Green	0	0	0	0	0	0	22	0
<i>Columba palumbus</i>	Wood pigeon	2	2	Green	2	0	0	0	0	0	0	0
<i>Corvus corone corone</i>	Carrion crow	1	1	Green	0	0	0	0	0	0	0	1
<i>Dendrocopos major</i>	Great spotted woodpecker	1	1	Green	0	1	0	0	0	0	0	0
<i>Erithacus rubecula</i>	Robin	3	3	Green	3	0	0	0	0	0	0	0
<i>Falco tinnunculus</i>	Kestrel	1	1	Amber	0	0	0	0	1	0	1	0
<i>Fringilla coelebs</i>	Chaffinch	2	2	Green	2	0	0	0	0	0	0	0
<i>Garrulus glandarius</i>	Jay	2	2	Green	0	1	0	0	0	0	0	1
<i>Haematopus ostralegus</i>	Oystercatcher	1	1	Amber	0	0	0	1	0	0	0	0
<i>Hirundo rustica</i>	Swallow	3	9	Green	0	0	0	8	0	0	0	1
<i>Parus caeruleus</i>	Blue tit	1	1	Green	0	0	0	0	0	0	0	1
<i>Pariparus ater</i>	Coal tit	1	1	Green	0	0	1	0	0	0	0	0
<i>Phylloscopus collybita</i>	Chiffchaff	2	2	Green	2	0	0	0	0	0	0	0
<i>Pica pica</i>	Magpie	1	1	Green	0	0	0	0	0	0	0	1
<i>Prunella modularis</i>	Dunnock	3	3	Amber	3	0	0	0	0	0	0	0
<i>Pyrrhula pyrrhula</i>	Bullfinch	1	1	Amber	0	0	1	0	1	0	0	0
<i>Sitta europaea</i>	Nuthatch	1	1	Green	0	1	0	0	0	0	0	0
<i>Sylvia atricapilla</i>	Blackcap	1	1	Green	1	0	0	0	0	0	0	0
<i>Troglodytes troglodytes</i>	Wren	5	5	Green	5	0	0	0	0	0	0	0
<i>Turdus merula</i>	Blackbird	4	4	Green	4	0	0	0	0	0	0	0
<i>Turdus philomelos</i>	Song thrush	1	1	Red	1	0	0	0	0	0	0	0

¹ i.e. Number of birds either of confirmed or probable breeding status; birds detected engaged in activity associated with breeding birds within the survey area. Activity associated with breeding birds comprises singing and alarm calling (i.e. marking territory), male and female pairs observed together, family units and birds carrying food for young. Birds highlighted in **Bold** are Priority Species.

Table 8.9: Breeding Bird Survey Repetition 2, 20th July 2018: Raw Survey Data

Scientific Name	Common Name	Times observed	Total seen	BOCC	Singing	Calling	Alarm call	In flight	Male	Male & female	None	Family
<i>Anas platyrhynchos</i>	Mallard	1	2	Amber	0	0	0	0	0	1	2	0
<i>Ardea cinerea</i>	Grey heron	1	1	Green	0	0	0	0	0	0	1	0
<i>Branta canadensis</i>	Canada goose	1	2	Green	0	0	0	0	0	1	0	2
<i>Carduelis carduelis</i>	Goldfinch	2	2	Green	0	0	0	0	0	0	0	2
<i>Chroicocephalus ridibundus</i>	Black-headed gull	1	4	Amber	0	0	0	0	0	0	4	0
<i>Columba livia</i>	Feral pigeon	3	34	Green	0	0	0	0	0	0	34	0
<i>Columba palumbus</i>	Wood pigeon	1	1	Green	1	0	0	0	0	0	0	0
<i>Corvus corone</i>	Carrion crow	2	2	Green	0	0	0	0	0	0	0	2
<i>Dendrocopos major</i>	Great spotted woodpecker	1	1	Green	0	0	1	0	0	0	0	0
<i>Erithacus rubecula</i>	Robin	5	5	Green	1	4	0	0	0	0	0	0
<i>Falco tinnunculus</i>	Kestrel	1	1	Amber	0	0	0	0	1	0	1	0
<i>Fringilla coelebs</i>	Chaffinch	3	3	Green	2	0	1	0	0	0	0	0
<i>Garrulus glandarius</i>	Jay	1	1	Green	0	0	0	0	0	0	0	1
<i>Haematopus ostralegus</i>	Oystercatcher	2	2	Amber	0	0	0	1	0	0	1	0
<i>Hirundo rustica</i>	Swallow	2	10	Green	0	0	0	10	0	0	0	0
<i>Larus fuscus</i>	Lesser black-backed gull	1	1	Amber	0	0	0	1	0	0	0	0
<i>Motacilla cinerea</i>	Grey wagtail	1	1	Amber	0	0	0	0	0	0	1	0
<i>Parus caeruleus</i>	Blue tit	1	1	Green	0	0	0	0	0	0	0	1
<i>Parus major</i>	Great tit	1	1	Green	0	0	0	0	0	0	0	1
<i>Pica pica</i>	Maggie	1	2	Green	0	0	0	0	0	0	2	0
<i>Pluvialis apricaria</i>	Golden plover	1	1	Amber	0	0	0	0	1	0	1	0
<i>Pyrrhula pyrrhula</i>	Bullfinch	2	3	Amber	0	1	0	0	1	1	2	0
<i>Sitta europaea</i>	Nuthatch	1	1	Green	0	0	1	0	0	0	0	0
<i>Sylvia atricapilla</i>	Blackcap	1	1	Green	0	0	0	0	0	0	0	1
<i>Troglodytes troglodytes</i>	Wren	5	5	Green	5	0	0	0	0	0	0	0
<i>Turdus merula</i>	Blackbird	2	2	Green	0	1	0	0	1	0	0	1
<i>Turdus philomelos</i>	Song thrush	1	1	Red	0	0	0	0	0	0	1	0

¹ i.e. Number of birds either of confirmed or probable breeding status; birds detected engaged in activity associated with breeding birds within the survey area. Activity associated with breeding birds comprises singing and alarm calling (i.e. marking territory), male and female pairs observed together, family units and birds carrying food for young. Birds highlighted in **Bold** are Priority Species.

Table 8.10: HSI Assessment

General Description		Pond 1 (Lodge)	
Photograph			
HSI Calculation		Description	Score
SI ₁	Geographic Location	Zone A	1.0
SI ₂	Pond area	11100m ²	-
SI ₃	Permanence	Never	0.9
SI ₄	Water quality	Moderate	0.67
SI ₅	Shade	50%	1.0
SI ₆	Waterfowl	Minor	0.33
SI ₇	Fish	Major	0.01
SI ₈	Pond count ²	1 pond	0.4
SI ₉	Terrestrial habitat	Poor	0.33
SI ₁₀	Macrophytes	0%	0.3
HSI Score¹		Poor	0.34
¹ Calculated by $(SI_1 \times SI_3 \times SI_4 \times SI_5 \times SI_6 \times SI_7 \times SI_8 \times SI_9 \times SI_{10})^{1/9}$ (Criteria SI ₂ has been omitted from this calculation as there are no data for such large ponds)			
² Ponds within an unobstructed one kilometre radius of the site divided by 3.14			

Table 8.11: Aquatic Invertebrate Survey Data 2018

Order and Higher Taxa	Family	Genus and Species	Common Name (where known)	Waterbody	
				Lodge	Inflow
Turbellaria: Tricladida	Dendrocoelidae	<i>Dendrocoelum lacteum</i>	-	✓	
	Dugesidae	<i>Dugesia tigrina</i>	-	✓	
	Planariidae	<i>Polycelis felina</i>	-		✓
	Planariidae	<i>Polycelis</i> sp. (nigra/tenuis)	-	✓	
Annelida: Oligochaeta	Tubificidae	Not identified further	-	✓	
Annelida: Hirudinea	Glossiphoniidae	<i>Glossiphonia complanata</i>	-	✓	
	Glossiphoniidae	<i>Helobdella stagnalis</i>	-	✓	
	Glossiphoniidae	<i>Theromyzon tessulatum</i>	-	✓	
	Erpobdellidae	<i>Erpobdella octoculata</i>	-	✓	
Mollusca: Gastropoda	Bithyniidae	<i>Bithynia tentaculata</i>	Common bithynia	✓	✓
	Hydrobiidae	<i>Potamopyrgus antipodarum</i>	Jenkin's spire shell	✓	
	Limnaeidae	<i>Radix balthica</i>	Wandering pond snail	✓	✓
	Limnaeidae	<i>Limnaea stagnalis</i>	Great pond snail	✓	
	Planorbidae	<i>Planorbis carinatus</i>	Keeled ram's-horn	✓	
	Planorbidae	<i>Anisus vortex</i>	Whirlpool ram's-horn	✓	
	Planorbidae	<i>Gyraulus albus</i>	White ram's-horn		✓
	Planorbidae	<i>Ancylus fluviatilis</i>	River limpet		✓
Mollusca: Bivalvia	Unionidae	<i>Anodonta anatina</i>	Duck mussel	✓	
	Sphaeriidae	<i>Sphaerium corneum</i>	Horny orb mussel	✓	
	Sphaeriidae	<i>Pisidium</i> sp.	-	✓	
Crustacea: Amphipoda	Crangonyctidae	<i>Crangonyx pseudogracilis</i>	-	✓	
	Gammaridae	<i>Gammarus pulex</i>	Freshwater shrimp		✓
Crustacea: Isopoda	Asellidae	<i>Asellus aquaticus</i>	Freshwater hoglouse	✓	✓
Insecta: Ephemeroptera	Baetidae	<i>Baetis muticus</i>	Iron blue		✓
	Leptophlebiidae	<i>Habrophlebis fusca</i>	Ditch dun		✓
	Ephemerellidae	<i>Seratella ignita</i>	Blue winged olive		✓
Insecta: Odonata	Coenagriidae	<i>Pyrrhosoma nymphula</i>	Large red damselfly	✓	
	Coenagriidae	Unidentified small larvae	-	✓	
	Aeshnidae	<i>Aeshna grandis</i>	Brown hawk	✓	
Insecta: Plecoptera	Leuctridae	<i>Leuctra fusca</i>	Late needle fly		✓
	Leuctridae	<i>Leuctra geniculata</i>	Willow fly		✓
Insecta: Hemiptera	Hydrometridae	<i>Hydrometra stagnorum</i>	Water measurer	✓	✓
	Gerridae	<i>Gerris lacustris</i>	Pond skater	✓	
	Nepidae	<i>Nepa cinerea</i>	Water scorpion	✓	
	Notonectidae	<i>Notonecta glauca</i>	Water boatman	✓	
	Corixidae	<i>Corixa</i> sp.	-	✓	
Insecta: Megaloptera	Sialidae	<i>Sialis lutaria</i>	Alder fly	✓	
Insecta: Trichoptera	Rhyacophilidae	<i>Rhyacophila dorsalis</i>	Sand fly		✓
	Polycentropodidae	<i>Cyrnus trimaculatus</i>	-	✓	✓
	Polycentropodidae	<i>Plectrocnemia conspersa</i>	-		✓
	Psychomyiidae	<i>Lype phaeopa</i>	Micro black sedge	✓	✓
	Phryganeidae	Empty larval cases only	-	✓	
	Limnephilidae	<i>Drusus annulatus</i>	-		✓
	Limnephilidae	<i>Chaetopteryx villosa</i>	-		✓
	Limnephilidae	<i>Anabolia nervosa</i>	Brown sedge	✓	
	Limnephilidae	<i>Glyptotaelius pellucidus</i>	Mottled sedge	✓	
	Limnephilidae	<i>Limnephilus lunatus</i>	Cinnamon sedge	✓	
	Limnephilidae	<i>Halesus digitatus</i>	Caperer	✓	✓
	Limnephilidae	<i>Halesus radiatus</i>	Caperer	✓	
	Limnephilidae	<i>Potamophylax latipennis</i>	Large cinnamon sedge		✓
	Sericostomatidae	<i>Sericostoma personatum</i>	Welshman's button		✓
	Molannidae	<i>Molanna angustata</i>	-	✓	
	Leptoceridae	<i>Athripsodes</i> sp.	-		✓
	Leptoceridae	<i>Mystacides longicornis</i>	Grouse wing	✓	
Insecta: Coleoptera	Gyrinidae	<i>Gyrinus substriatus</i>	Whirligig beetle	✓	
	Dytiscidae	<i>Platambus maculatus</i>	-		✓
	Dytiscidae	<i>Oreodytes sanmarkii</i>	-		✓
Insecta: Diptera	Tipulidae	Not identified further	-	✓	✓
	Chironomidae	Not identified further	-	✓	
	Muscidae	<i>Limnophora</i> sp.	-		✓
Total				41	27

Table 8.12: Table of Photographs

Note: Photographs of the buildings are presented at **Table 9.4, Appendix 2**

	
Photo 1: Row of mature Poplar and planted Birch over mown amenity grassland verges at the site entrance off Walmersley Old Road	Photo 2: Mown grassed verges (and west and north elevation of Building 11)
	
Photo 3: Tall-herb vegetation, Bramble scrub and scattered shrubs on site margins	Photo 4: Scrub around the buildings
	
Photo 5: Field of improved grassland in the north-eastern area of the site with marginal Bramble scrub (M66 embankment to the right)	Photo 6: Stone and concrete boulders at the banks of the lodge (Pond 1)



Photo 7: Broadleaf woodland around the inflow to the lodge at the northern end of the site



Photo 8: Site boundary at the palisade fence (right) and stone wall between the site and Pond 2 to the left



Photo 9: Hard-standing around the operational Tetrosyl site

Figure 8.1: Google Earth and MAGiC Map Extracts to Show Site Boundary and Surrounds and Location of Ponds 1 to 10

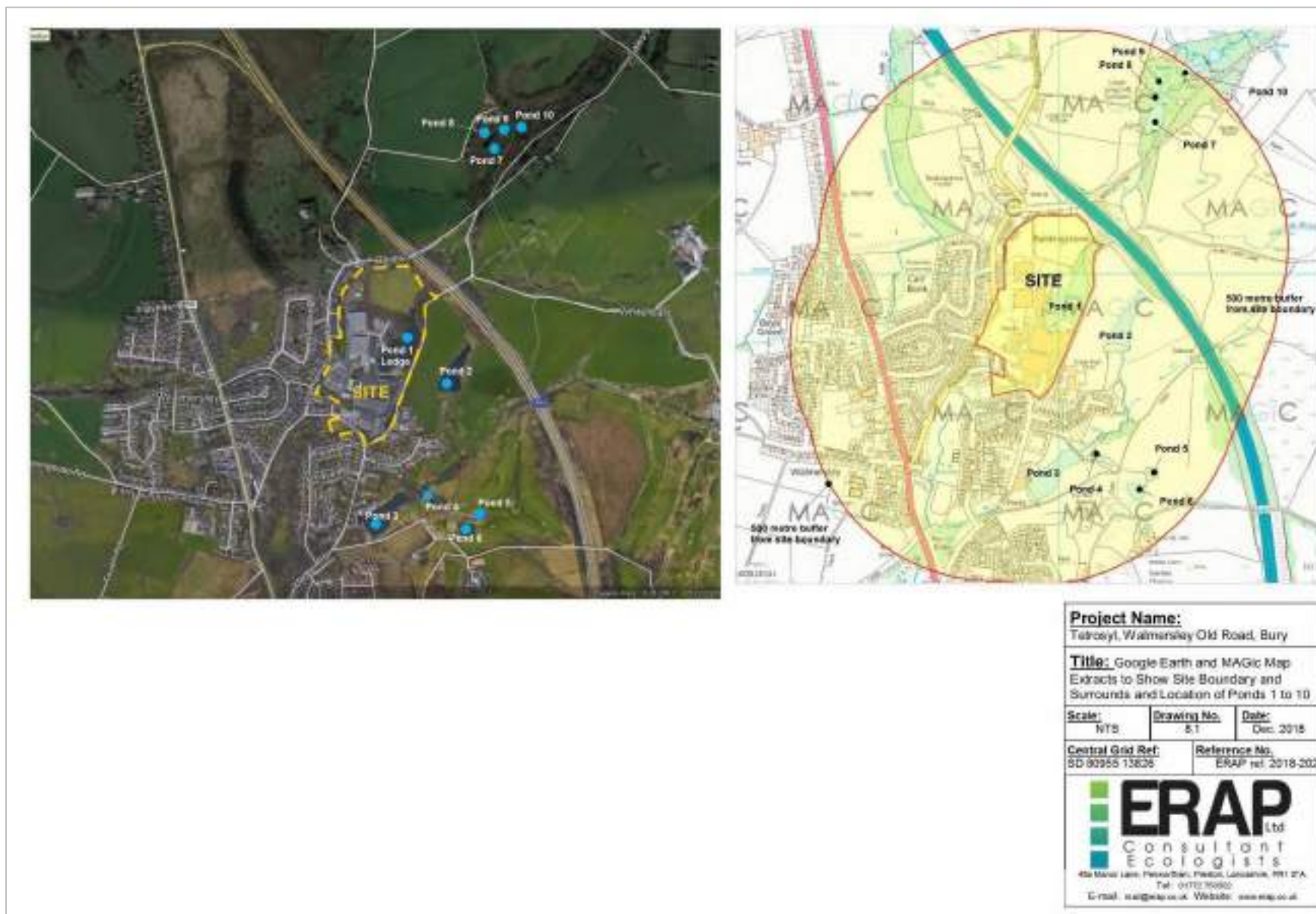


Figure 8.2: Phase 1 Habitat Survey and Vegetation Map



Figure 8.3: Results of Bat Transect Survey Repetitions 1 and 2 (August 2018)



Figure 8.4: Breeding Bird Survey Repetition 1: 5th July 2018

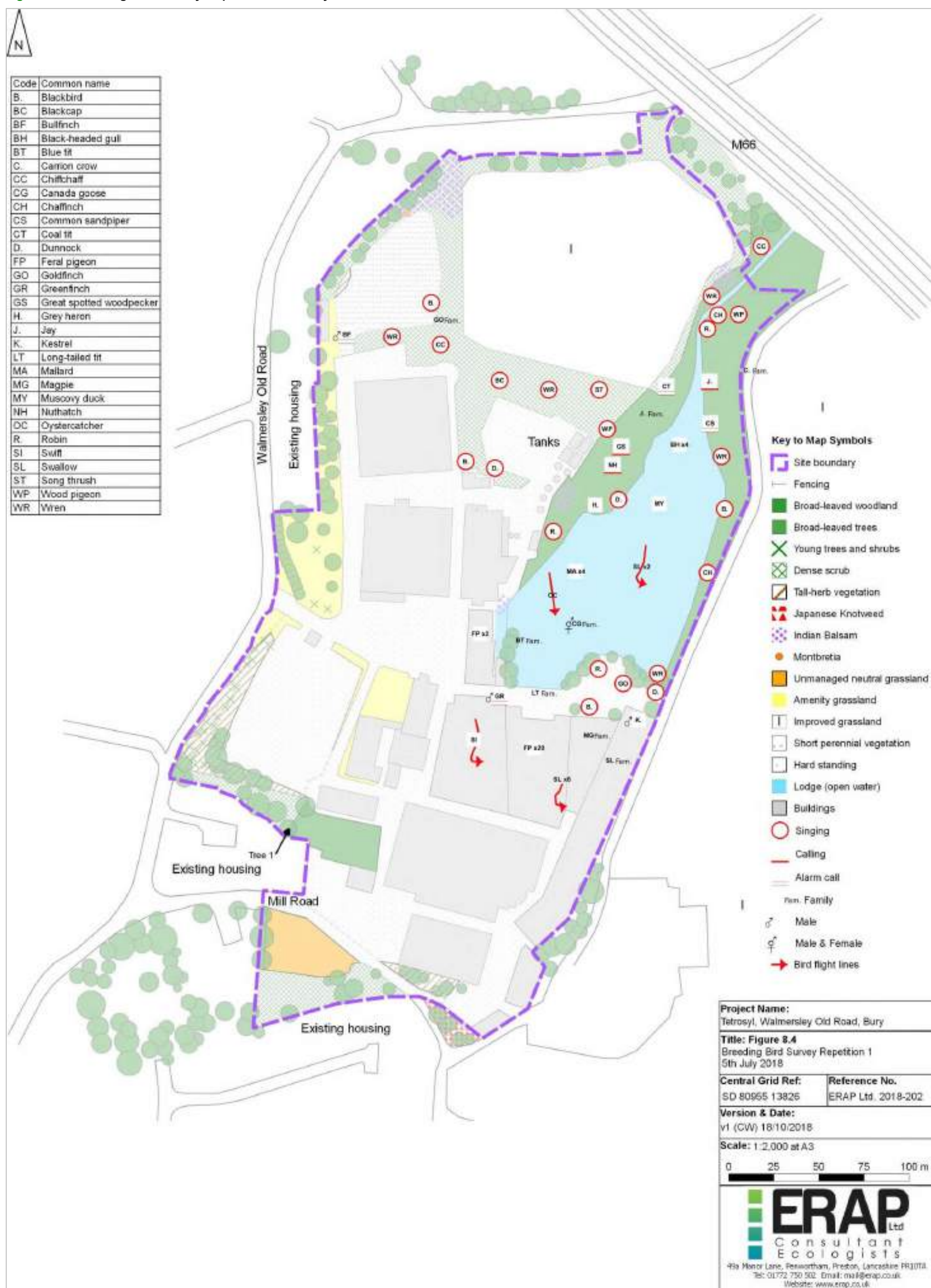


Figure 8.5: Breeding Bird Survey Repetition 2: 20th July 2018

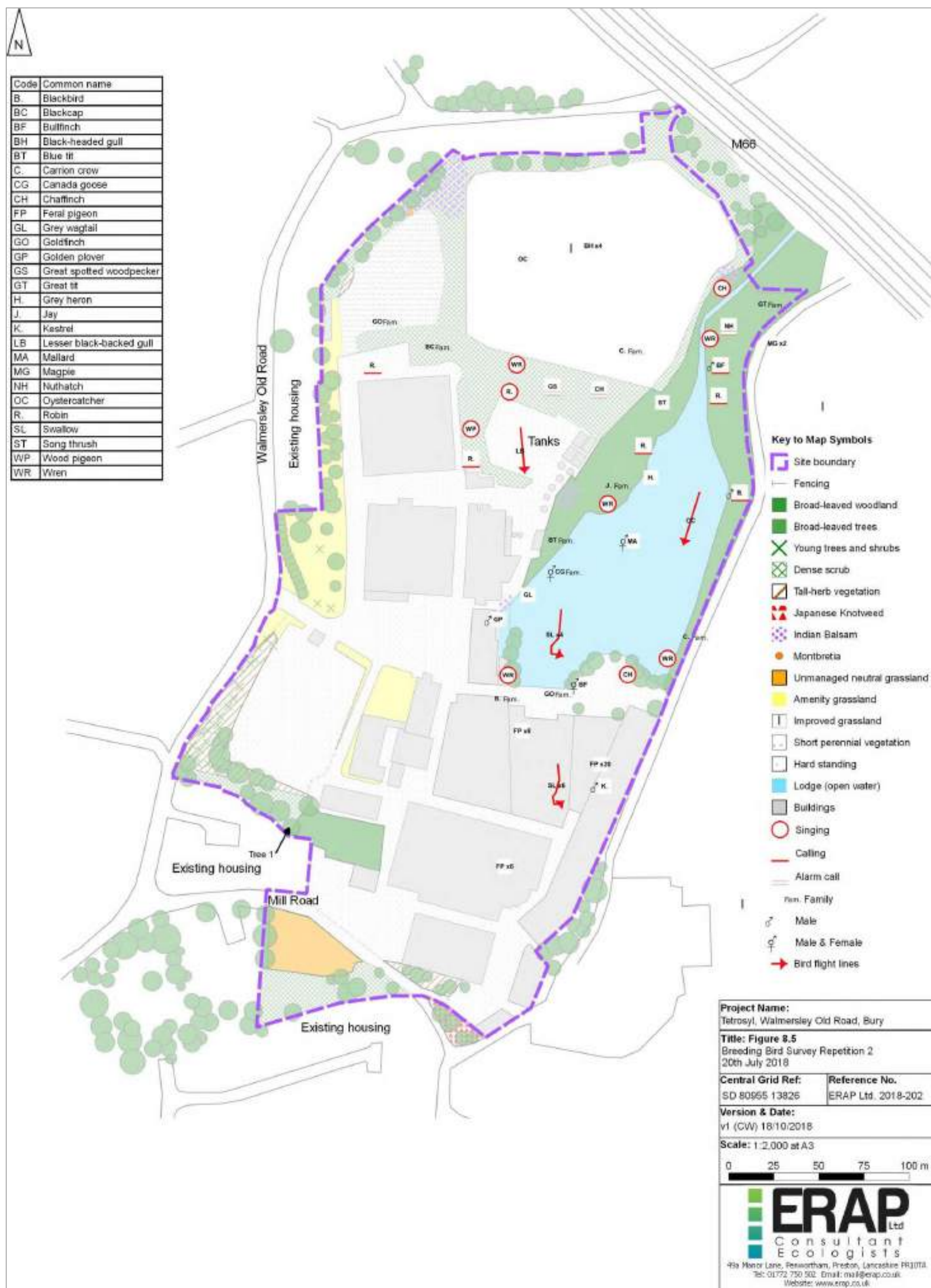
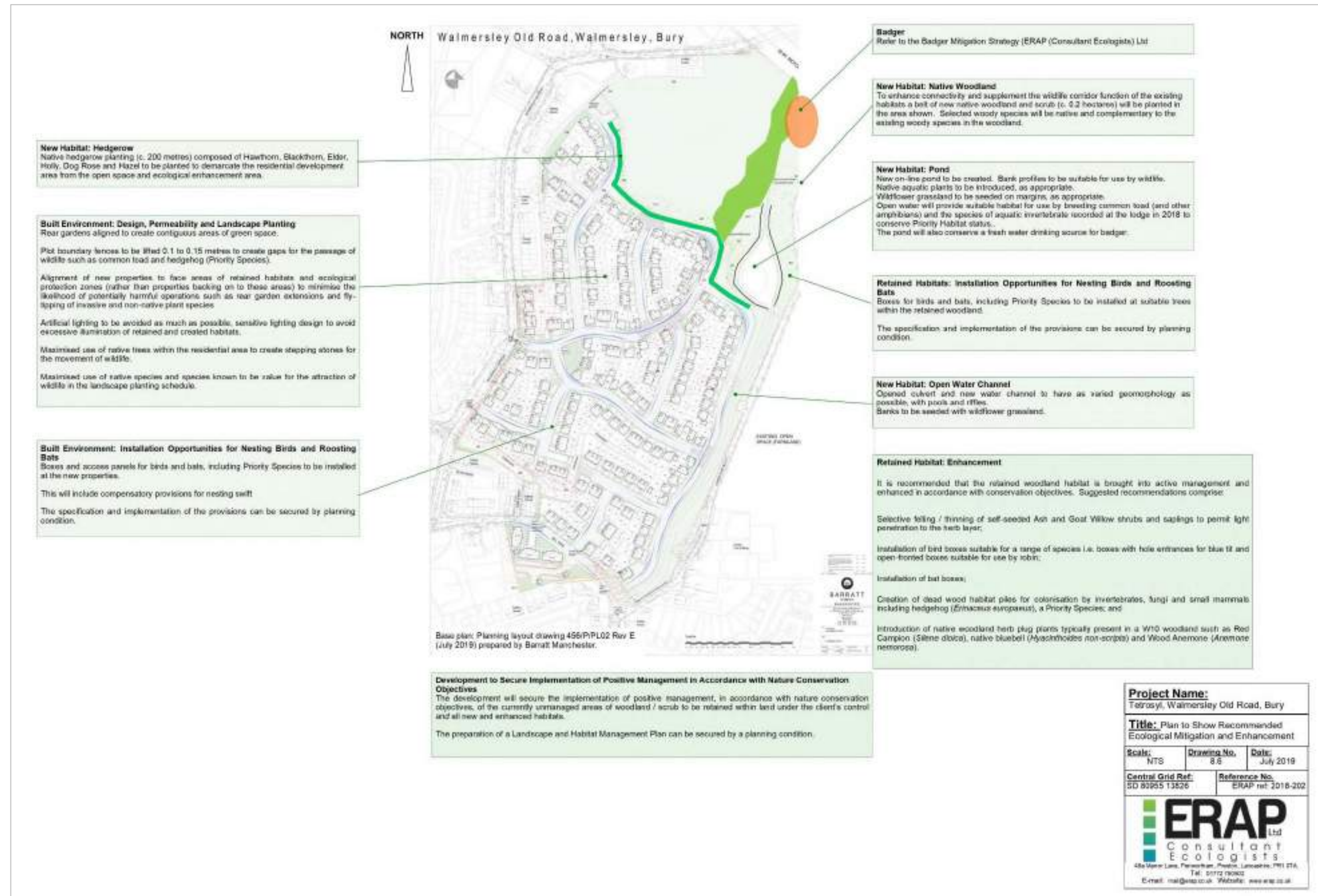


Figure 8.6: Plan to Show Recommended Ecological Mitigation and Enhancement



9.0 APPENDIX 2: LICENSED BAT SURVEY AND ASSESSMENT

9.1 Introduction and Objectives

Survey Approach and Objectives

- 9.1.1 This section of the report describes the objectives and methods of survey applied to survey and assess the buildings, trees and culvert for roosting bats.
- 9.1.2 The licensed bat survey and assessment was carried out in accordance with standard methodology described in the *Bat Mitigation Guidelines* (Mitchell-Jones, 2004), the *Bat Workers' Manual 3rd Edition* (Mitchell-Jones & Mcleish, 2004) and *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn) (Collins, J. (ed), 2016).
- 9.1.3 The objectives of the initial daylight licensed bat survey were to:
- Assess the suitability of the buildings / structures to support roosting bat species at any time of year;
 - Examine the exterior and interior (where relevant) of the buildings / structures for evidence of the current and previous presence of roosting bat species;
 - Examine the status and condition of the previously identified roosts (Roosts A to C) as described in **Section 3.1** of this of this Ecological Survey and Assessment report and the Bat Survey Report prepared in 2010 (Baker Shepherd Gillespie, October 2010);
 - Examine the status and condition of the previously identified roosts (D and E) as described in **Section 3.1** of this Ecological Survey and Assessment report and the bat survey carried out by BSG in 2015 (BSG Ecology, September 2015);
 - Determine the scope of nocturnal bat survey necessary, in accordance with site conditions, access limitations and the survey guidelines;
 - Provide guidance in accordance with wildlife legislation, *National Planning Policy Framework* (Ministry of Housing, Communities and Local Government, February 2019), *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn) (Collins, J. (ed), 2016), and best practice in relation to the proposed works;
 - Detail the scope of any further actions, if necessary, that may be required prior to and during the demolition works; and
 - Collate sufficient survey data to facilitate the planning application and an application for the relevant Natural England licence, as appropriate.

9.2 Method of Survey

Survey Area

- 9.2.1 The survey area comprised:
- All buildings (Buildings 1 to 16) within the Tetrosyl site;
 - All trees within the footprint of the proposed re-development; and
 - A culvert that takes water from an overflow at the lodge (Pond 1) downstream and off site, refer to **Figure 9.1**

Daylight Survey

Survey Date and Conditions

- 9.2.2 The daylight survey and assessment was carried out on 18th July 2017. The weather conditions were warm (22°C), sunny and calm (Beaufort Scale 0).
- 9.2.3 The survey was updated by Victoria Burrows and Amy Sharples on 8th November 2017. The weather was dry but overcast, with light air (Beaufort Scale 1) and 8°C at 9am.
- 9.2.4 In addition, external observations of the buildings and a search for bat droppings was carried out after the dawn surveys in August and September 2017 and July 2018.

Survey Personnel

- 9.2.5 The survey area was assessed for its suitability to support roosting bats by Victoria Burrows. Victoria holds a Natural England Class Survey Licence WML CL18 (Bat Survey Level 2), Registration Number 2015-10390-CLS-CLS.
- 9.2.6 The surveyor's qualifications and experience meet the criteria as defined in the *Technical Guidance Series Competencies for Species Survey: Bats* (CIEEM, 2013).

Buildings

- 9.2.7 An inspection of the external surfaces, walls and roofs of the buildings was carried out to find potential bat roosting habitat or accesses into internal areas where roosts may be present. Searches for evidence of bat presence in the form of droppings, urine stains, feeding signs, grease marks and other evidence were also carried out.
- 9.2.8 Owing to the dilapidated roof and reportedly unsafe condition of the internal areas of Buildings 5c, 6, 11c, 13 and 14, an internal survey was not permitted. Where possible, the internal areas were carefully viewed from open window apertures and damaged doorways around the perimeter of the buildings.
- 9.2.9 A list of equipment used is detailed at **Table 9.1**, below:

Table 9.1: Survey Equipment Used During Daylight Bat Survey

Ladders
LED Lenser P14 torch
Clulite CB2 hand lamp
Canon Ixus digital camera
8x20 binoculars
Ridgid Micro Inspection Camera Borescope CA-300

- 9.2.10 The suitability of each building has been assessed in accordance with Table 4.1 of *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)*, (Collins, J. (ed), 2016), taking into account any presence of gaps suitable for access by bats, features suitable for use by roosting bats within the building (including crevice dwelling and species which can roost in the open in roof voids), and the suitability of the surrounding habitats for use by foraging and commuting bats.

Trees

- 9.2.11 A preliminary assessment of the trees within the footprint of the proposed redevelopment was conducted to assess their suitability for use by roosting bats, and to inform whether further surveys or precautionary measures were required.
- 9.2.12 Trees were assessed from the ground using binoculars and a high-powered torch. Each tree was searched for the presence of the following features:

Woodpecker holes, rot holes, hazard beams, other vertical or horizontal cracks or splits in stems and branches, partially decayed platey bark, knot holes, man-made holes, tear-outs, cankers in which cavities have developed, other hollows or cavities, including butt-rots, double-leaders forming compression forks with included bark, gaps between overlapping stems or branches, partially detached Ivy (Hedera helix) with stem diameters in excess of 50mm and bat, bird or dormouse (Muscardinus avellanarius) boxes.

9.2.13 Terms used to describe any features present follow (where possible) those outlined and described in *Bat Tree Habitat Key, 2nd Edition* (Andrews, H (ed), 2013) and *Bat Roosts in Trees: A Guide to Identification and Assessment for Tree-care and Ecology Professionals* (BTHK, 2018).

9.2.14 The requirement for further presence / absence surveys at each tree was then considered.

Presence / Absence Surveys: Dawn Re-entry Surveys

9.2.15 Following the consultation of the previous bat survey report (Baker Shepherd Gillespie, October 2010), the daylight survey and the assessment of the surrounding habitats, Buildings 1, 2, 8, 10, 11a, 11b, 11d, 12, 15 and 16 was assessed to have no suitability for use by roosting bats. No further survey was considered necessary at these buildings. although some of the building elevations were visible during the further dawn surveys at other buildings.

9.2.16 Buildings 3, 5a to 5c, 6, 7, 9 and 11c are assessed to have moderate or high suitability for use by roosting bats. Buildings 4, 13 and 14 have low suitability but internal access was not possible. In accordance with the guidelines (Collins, J. (ed), 2016), and to ensure sufficient survey effort has been applied to overcome the access limitations and apply reasonable effort to determine the presence (or likely absence) of a bat roost, three dawn re-entry surveys were conducted using up to 10 surveyor positions on one survey.

9.2.17 Surveyors, experienced in conducting bat surveys, were positioned at suitable locations to maximise the coverage of the buildings to determine any entry into the buildings by roosting bats. Heterodyne detectors were used to determine any bat detected to species. Recording bat detectors units (Anabat Express, Anabat Walkabout and Anabat SD2) were also used to record and analyse echolocation calls after the survey using AnalookW Bat call analysis software.

9.2.18 The dawn re-entry surveys commenced approximately 1.5 hours before sunrise and ended at sunrise, provided all bat activity had ceased by this point. Following the completion of three dawn surveys in summer 2017, an updated dawn re-entry survey was carried out in July 2018 to updated and validate the survey data and conclusions.

9.2.19 Surveyor positions are annotated on **Figure 9.1**. Any bat emergence or re-entry activity was recorded. All surveys were conducted under suitable conditions. The dates of the surveys, surveyors and equipment used and weather conditions present are presented at **Tables 9.2** and **9.3**, below.

9.2.20 As dawn surveys were carried out, the surveyors were not stationary at the surveyor positions; if bats were observed entering the site from the wider area or circling a specific feature at a building the bats were tracked to ensure re-entry activity was not missed.

Table 9.2: Dawn Re-entry Survey Dates, Weather Conditions and Surveyors in 2017

Date	16 th August 2017	30 th August 2017	14 th September 2017
Sunrise	05:48	06:14	06:40
Start time	03:30	04:00	05:00
End time	06:00	06:20	06:47
Wind	Bft 0 (calm)	Bft 0 (calm)	Bft 0 (calm)
Precipitation	Dry	Dry	Dry and overcast
Air temperature	12°C at 03:30	12°C at 04:00	9°C at 05:30
Surveyor Position and (Main Target Building / Feature)	Surveyor and Detector¹	Surveyor and Detector¹	Surveyor and Detector¹
1 (North elevation of Building 3)	Richard Lowe Petersson D100 and SD2	Richard Lowe Petersson D100 and AE	Tracy Cumberbatch Batbox Duet & AE

Date	16 th August 2017	30 th August 2017	14 th September 2017
2 (West elevation of Building 3 and north and west elevation of Building 4)	Tracy Cumberbatch Batbox Duet & AE	Aidan Pickering Batbox Duet & AE	-
3 (Culvert and north elevations of Buildings 5a and 5b)	Aidan Pickering Batbox Duet & AE	Amy Sharples Batbox Duet and SD2	Chris Walsh Anabat Walkabout
4 (Buildings 6, 5c and east elevation of 5b)	Victoria Burrows Batbox Duet & AE	-	Chris Schofield Batbox Duet & AE
5 (West elevation of Building 5a (Roost A), south elevation of 5a and north elevation of 7)	Carol Flaxman Batbox Duet & Peersonic	Carol Flaxman Batbox Duet & AE	Richard Lowe Petersson D100 and SD2
6 (South elevations of Building 5 and east elevation of Building 7 (Roost C))	Danielle Rowlands Batbox Duet & Anabat Walkabout	Danielle Rowlands Batbox Duet & Anabat Walkabout	Danielle Rowlands Batbox Duet & Anabat Walkabout
7 (South and east elevation of Building 7 (Roost B) and west and south elevation of Building 6)	Darren Graham Batscanner & AE	Darren Graham Batscanner & AE	Marie Pickering Batbox Duet & AE
8 (South elevation Building 7)	Jordan Prendergast Batscanner & SD2	Marie Pickering Batbox Duet & AE	-
9 (Building 9)	Rebecca Whitmore Batscanner & AE	Ryan Evans Magenta and AE	-
10 (East elevation of Building 6 and tracking bats entering site from east)	Chris Schofield Batbox Duet & AE	Chris Schofield Batbox Duet & AE	-
11 (East elevation of Buildings 3 and 4 and tracking any bats moving off lodge)	-	Victoria Burrows Batbox Duet & SD2	Victoria Burrows Batbox Duet
12 (Buildings 13 and 14)	-	-	Aidan Pickering Batbox Duet & AE

1: AE = Anabat Express, SD2 = Anabat SD2

Table 9.3: Dawn Re-entry Survey Date, Weather Conditions and Surveyors in 2018

Date	12 th July 2018
Sunrise	04:54
Start time	03:10
End time	05:00
Wind	Beaufort Scale 1 (light air)
Precipitation	Dry and overcast
Air temperature	16°C at 03:30
Surveyor Position and (Main Target Building / Feature)	Surveyor and Detector ¹
1	Carol Flaxman: Batbox Duet & AE
2	John Harrison-Bryant: Batbox Duet & Anabat Walkabout
4	Amy Sharples: Batbox III and AE
6	Danielle Rowlands: Batbox Duet & Anabat Walkabout
7	Chris Wilkinson: Batbox Duet & AE
8	Chris Swindells: Petersson D100 & AE
11	Victoria Burrows: Batbox Duet & AE

1: AE = Anabat Express, SD2 = Anabat SD2

Bat Activity

9.2.21 In addition to the recording of bat activity at the surveyor positions, Anabat SD2 detectors were positioned facing the lodge on each survey date to record any bat activity over the lodge during the survey period, refer to **Figure 9.1**.

Barn Owl and Other Birds

- 9.2.22 Recordings of any observations of birds entering the buildings during the dawn bat surveys were made.

Survey Limitations

- 9.2.23 The inability to access the interior of Buildings 5c, 6, 11c, 13 and 14 for health and safety reasons was addressed by the completion of the relevant number of dawn re-entry surveys. Sufficient survey effort has been conducted at the site to reliably determine the presence or absence of roosting bats and use of the site by foraging bats. No significant survey limitations were experienced.

9.3 Results

Daylight Survey

Buildings

- 9.3.1 Buildings locations are annotated at **Figure 9.1**. Photographs are presented at **Table 9.4**.

Building 1: Warehouse

- 9.3.2 Building 1 is a large (50 metres long by 50 metres wide) steel framed warehouse with lower elevations walls of brick supporting upper sections of corrugated metal sheeting and a shallow pitched and unlined corrugated sheeting roof, refer to **Photos 1 to 3**.
- 9.3.3 No gaps or opportunities for use by roosting bats were found around the external elevations of the building.
- 9.3.4 Internally the steel framed building has no roof void and the wall tops are filled with mortar; no gaps or opportunities for roosting bats are present.
- 9.3.5 Building 1 is assessed to have negligible suitability for use by roosting bats.

Building 2: Warehouse

- 9.3.6 Building 2 is the same construction as Building 1 with an additional loading bay canopy on the south elevation, refer to **Photo 4**.
- 9.3.7 No gaps or opportunities for use by roosting bats were found at Building 2; the building is assessed to have negligible suitability for use by roosting bats.

Building 3: North Lights

- 9.3.8 Building 3 is a single storey stone north lights building with three slate covered roofs with ridges in a north to south alignment, refer to **Photos 5 to 6**. Concrete copings are present to create a parapet end wall which limits the opportunities for bats to access gaps beneath the slates at the wall top. The walls are well-sealed with the exception of a number of cracks and crevices in the north and east facing elevations.
- 9.3.9 A three sided and single-leaf brick built annex is attached to the east elevation and a cement fascia is present at the south elevation, refer to **Photo 6**; careful examination of this feature confirmed an absence of opportunities for use by roosting bats.
- 9.3.10 An internal inspection confirmed that the underside of the slates is lined with timber sarking and the internal walls are unlined, refer to **Photo 7**. No bat droppings were found during a search of the internal areas of the building.
- 9.3.11 Owing to its proximity to the lodge and woodland and the presence of crevices for bat access into the stone walls and beneath the slates and ridge copings, Building 3 is assessed to be of high suitability for use by crevice roosting bats.

Buildings 4a and 4b: Derelict Offices

- 9.3.12 The northern section of Building 4a comprises a two storey brick office with a shallow pitched corrugated sheeting covered roof, refer to **Photos 8 and 9**. The elevation walls and roof covering offer no opportunities for use by roosting bats. A section of fascia is missing from the north elevation, refer to **Photo 11**, this feature was observed by Surveyor Position 2 during the dawn bat surveys. Inspection of the void above the suspended ceiling confirmed that the roof covering is unlined; no bats or evidence of bat access was observed, refer to **Photo 12**.
- 9.3.13 The single storey section supports a hipped, slate covered roof. No gaps or opportunities for bat access were observed but a lifted section of lead flashing is present at the west side where the single storey section meets the two storey section, refer to **Photo 10**. Closer inspection from a ladder with the endoscope confirmed that the feature has a limited depth; no bats or evidence of previous use by bats. This feature was observed by Surveyor Positions 2 and 11.
- 9.3.14 Inspection of the void beneath the hipped roof confirmed the presence of timber sarking beneath the slates. No bats or bat droppings were observed but it was only possible to inspect the void above the suspended ceiling in three positions.

Building 4b

- 9.3.15 Attached to the east elevation of Building 4a is a timber framed portacabin office with a flat roof and a tightly sealed timber fascia, refer to **Photo 13**. Building 4b has no opportunities for use by roosting bats.
- 9.3.16 In summary, Building 4 has low suitability for use by roosting bats owing to the presence of limited features comprising the missing fascia at the north end and the lifted lead flashing.

Building 5: North Lights

- 9.3.17 Building 5 is divided into three sections:
- 5a is a stone building with a north lights and slate covered roof. Gaps are frequent in the elevation stonework. Internally the building has no roof void. Timber sarking is present beneath the roof slates;
 - 5b is similar to 5a and comprises a stone building with pitched slate covered roofs with hipped ends to the east. Gaps are present between the elevation stones. Gaps suitable for bat access are also present beneath the stone window lintels between the lintel and the concrete blockwork, particularly on the south elevation, refer to **Photo 20**; and
 - 5c is a single storey stone building with a multi-pitched slate covered north-lights roof. The glass panes on the roof are dilapidated and holes are frequent. Gaps are present in the stone elevation walls.
- 9.3.18 Buildings 5a to 5c support numerous gaps and opportunities for access by crevice roosting bat species; the buildings are assessed to have a high suitability for use by roosting bats.

Building 6: Workshop

- 9.3.19 Along the eastern boundary of the site is a dilapidated stone workshop with a north-lights slate covered roof. The wall ends have parapets that are capped with stone copings. The building has timber framed windows bordered by stone lintels and sills.
- 9.3.20 The window apertures on the east elevation are entirely bricked up; no gaps or opportunities for bat access were observed, refer to **Photo 17**.
- 9.3.21 Gaps suitable for bat access are present at the west elevation and possibly beneath the roof slates and ridge copings.
- 9.3.22 Building 6 is assessed to have a high suitability for use by crevice roosting bats.

Building 7: Warehouse

- 9.3.23 Building 7 is a stone built warehouse with north lights and slate covered roofs with hipped ends. Frequent gaps are present in the stonework on all elevations. Gaps are also present around the stone window lintels where the lintels meet the stones and where a gap has been left above concrete blockwork at bricked up windows, refer to **Photo 21**. Gaps were also observed around dilapidated timber window frames.
- 9.3.24 Building 7 is assessed to have a high suitability for use by crevice roosting bats.

Building 8: Warehouse

- 9.3.25 Building 8 is a single storey steel framed and brick warehouse with a shallow pitched corrugated sheeting covered roof, refer to **Photo 22**. Fascia over hang the gable ends at the east and west elevations and a gap is present above the doorway at the west elevation but closer inspection did not detect any evidence of use by roosting bats.
- 9.3.26 An internal inspection confirmed that the roof is unlined and a large hole is present in the roof, refer to **Photo 23**. Evidence of use of the building by feral pigeon was recorded.
- 9.3.27 Building 8 has negligible suitability for use by roosting bats.

Building 9: Offices

- 9.3.28 The offices comprise a two storey stone building with a hipped slate covered roof that supports stone chimney stacks with lead flashing at the base. The edge of the roof has a parapet wall, refer to **Photo 24**.
- 9.3.29 The window frames are pvc and a timber framed porch with a sloping felt covered roof is present at the south elevation. No bat droppings were found around the external elevations of Building 9.
- 9.3.30 A single roof void is present over the whole footprint of the building, refer to **Photo 25**. The underside of the slates are unlined and the pargework is visible. The ridgeboard, all roof trusses and floor of the void were carefully searched for bats and droppings; none were found. The void is dusty and draughty owing to the presence of large holes in the slate roof at the east side. No insulation is present.
- 9.3.31 Building 9 is assessed to have a moderate suitability for use by crevice roosting bats but the use of the roof void by free hanging bats such as brown long-eared is reasonably discounted owing to the absence of suitable conditions.

Building 10: Offices

- 9.3.32 Building 10 is a two-storey brick building with a flat roof and timber and pvc framed windows, refer to **Photo 26**. No opportunities for use by roosting bats were found and the building is assessed to have negligible suitability.

Building 11a to 11d: Offices

- 9.3.33 Building 11 is divided into four parts. Buildings 11a and 11b are similar in construction to Building 10 and have no suitability for use by roosting bats, refer to **Photo 29**.
- 9.3.34 Building 11d, refer to **Photo 28**, comprises a single storey timber cabin with a pitched tile covered roof. No opportunities for use by roosting bats were found and the building is assessed to have no suitability.
- 9.3.35 Building 11c is a stone built structure with a pitched slate covered roof with parapet walls at the south facing gable end (the north elevation keys into Building 11b). Gaps are present in the stone elevation wall and where 11c meets 11b at the east elevation. Building 11c is assessed to have a moderate suitability for use by roosting bats.

Building 12: Gatehouse

- 9.3.36 The gatehouse at Building 12 is a single storey brick building with a flat roof, refer to **Photo 30**. No opportunities for use by roosting bats were found and the building is assessed to have negligible suitability.

Building 13: Derelict Workshop

- 9.3.37 Building 13 is a single storey stone building with a slate covered north lights roof, refer to **Photo 31**. The building is very dilapidated and holes are frequent at the broken window panes and roof. A brief internal inspection confirmed that the internal stone walls are well-sealed; no gaps of opportunities for bat access were found.
- 9.3.38 Owing to the presence of a slate covered roof and ridge copings, Building 13 is assessed to have a low suitability for use by crevice roosting bats owing to the draughty and exposed conditions present.

Building 14: Store

- 9.3.39 Building 14 is a brick built store with a pitched corrugated sheeting covered roof with skylights, refer to **Photo 33**. Steel lintels are present on the elevation walls. The window apertures along the east elevation are bricked up. A gap is present at the top but closer inspection confirmed the gap only extends approximately 0.03m to 0.08m and does not lead into a deeper cavity and has no opportunity for bat access.
- 9.3.40 Building 14 is assessed to have a low suitability for use by crevice roosting bats owing to the limited value of the features present.

Building 15: Store

- 9.3.41 Building 15 is a metal hopper with a brick outbuilding with a single pitched roof at the western side, refer to **Photos 34 and 35**. No opportunities for use by roosting bats were found.

Building 16: Sub-station

- 9.3.42 The sub-station is a brick building with a flat felt covered roof and a timber fascia, refer to **Photo 36**. No opportunities for use by roosting bats were found.

Stone Culverts

- 9.3.43 The stone culverts beneath the buildings, refer to **Photo 38**, were not accessed. From examination of the culvert from the exterior it is concluded that the culverts support cracks and crevices and opportunities for bat access, particularly at the underarch.

Trees

- 9.3.44 Tree 1 (**Photo 37**), a Pedunculate Oak, located immediately south-west of Building 10 supports dense Ivy cover which can obscure opportunities for bat access. Tree 1 is assessed to have a low suitability for use by roosting bats.
- 9.3.45 None of the other trees within the footprint of the proposed re-development support potential roost features (PRFs) suitable for use by roosting bats.

Dawn Re-entry Surveys

- 9.3.46 Refer to the raw data at **Tables 9.5 to 9.8**, appended.

First Survey: 16th August 2017

- 9.3.47 Three common pipistrelle bats were observed entering a hole in the stone wall (Roost 1) at the northern elevation of Building 3 between 05:23 and 05:31 (25 to 17 minutes before sunrise). The roost is annotated on **Figure 9.1**.

9.3.48 No other bat re-entry or emergence activity was recorded.

Second Survey: 30th August 2017

9.3.49 Three common pipistrelle bats were observed entering Roost 1 at Building 3 (two at 05:55 and one at 06:01).

9.3.50 No other bat re-entry or emergence activity was recorded.

Third Survey: 14th September 2017

9.3.51 Two common pipistrelle bats were observed entering Roost 1 at Building 3 at 06:26.

9.3.52 No other bat re-entry or emergence activity was recorded.

Fourth Survey: 12th July 2018

9.3.53 One common pipistrelle bat entered Roost 1 at Building 3 at 04:53 (1 minute before sunrise).

9.3.54 No other bat re-entry or emergence activity was recorded.

Bat Activity (All Surveys)

9.3.55 Other bat activity recorded at the survey area is summarised as follows:

- a. Common pipistrelle was the only species recorded flying over the buildings at the site on the survey dates;
- b. Common pipistrelle social calls were detected;
- c. The bat detector on the south side of the lodge recorded two brief *Myotis* sp, bat passes on 30th August 2017;
- d. No bat activity was recorded at the culvert entrances;
- e. Bat activity levels is regarded to be 'low' at the site, as it was limited to single passes or single bats present in an area for only a few minutes (compared with 'high' bat activity levels, which would be indicated by constant bat activity throughout the survey period / until re-entry time); this is comparable with the survey data recorded during the transect surveys carried out in August 2018; and
- f. The bat activity (species diversity) recorded in 2017 is similar to that reported in the 2010 and 2015 bat survey reports.

9.3.56 Surveyor notes are reproduced at **Tables 9.5 to 9.8**. Analysis of the Anabat Express and SD2 recordings confirmed all surveyor observations; no other bat species was recorded at the surveyor positions.

Assessment of Habitats Suitability for Use by Foraging and Commuting Bats

9.3.57 In accordance with guidance at Table 4.1 of the *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)* (Collins, J. (ed), 2016) and **Table 9.2**, above, the built area of the site is assessed to have low suitability for use by foraging and commuting bats. The established woodland and the lodge are more suitable and are assessed to have a moderate suitability.

9.4 Interpretation and Evaluation

Bats

Building 3: Roost 1

9.4.1 The bat surveys in 2017 and 2018 have confirmed that the northern elevation of Building 3 supports a common pipistrelle bat day roost, with a maximum count of three bats. An appropriate Natural England licence is required to legally demolish Building 3 and destroy the roost.

Buildings 5a and 7

- 9.4.2 No evidence of use of the previously recorded Roosts A to C (recorded in 2010) at Buildings 5a and 7 was found in 2015, 2017 or 2018; it is reasonably concluded that these roost positions are in longer 'in use'. No further actions are necessary but precautionary, best practice measures will be applied during the demolition.

Buildings 5a/5b and 6

- 9.4.3 No evidence of use of the possible roosts at Roosts D and E (detected in 2015) was recorded in 2017 or 2018; it is reasonably concluded that these roost positions are in longer 'in use'. No further actions are necessary but precautionary, best practice measures will be applied during the demolition.

Other Buildings / Culvert

- 9.4.4 No evidence of use of the other buildings and culvert by roosting bats was found; no further actions are necessary, although best practice precautionary measures will be applied during the demolition at relevant buildings, refer to **Section 9.10**.
- 9.4.5 Following surveys in summer 2010, 2015, 2017 and 2018, the presence of a maternity roost is reasonably discounted.
- 9.4.6 No evidence of use of the culverts by bats was recorded in summer 2017 or 2018 but the stone underarch may provide opportunities for use by hibernating bats. Precautionary measures to exclude bats, if present, from the culvert prior to removal are necessary and are described in this report.
- 9.4.7 Appropriate and proportionate survey effort, in accordance with standard survey guidelines (*Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)* (Collins, J. (ed), 2016)) has been applied. No further surveys are necessary to comply with the survey guidelines or best practice or to inform the demolition notice application / planning decision and licence application / registration.
- 9.4.8 The bat survey data presented in this report are only valid until May 2019. In accordance with best practice and Natural England guidance, if a licence application is delayed beyond May 2019 an updated bat survey will be required to support the licence application.
- 9.4.9 Importantly, appropriate and proportionate mitigation for roosting bats which will be mandatory in the event of the loss of Roost 1 is entirely feasible, refer to **Section 9.11**.

Birds

- 9.4.10 The buildings and vegetation within the site are suitable for use by nesting birds; breeding birds are protected under the *Wildlife and Countryside Act 1981* (as amended). **Section 5.9** of this Ecological Survey and Assessment report provides guidance in relation to nesting birds.

9.5 Assessment of Impacts

Brief Description of Proposals

- 9.5.1 This assessment of impacts on bats has considered of the loss of Roost 1 as a result of the demolition of Building 3 and then redevelopment proposals.
- 9.5.2 Guidance in relation to the preparation of a site layout that aims to conserve, and create, opportunities for the attraction of foraging and roosting bats to the site in the long-term is provided in **Sections 5.2** and **5.8** of this Ecological Survey and Assessment report.

Short-term Impacts: Disturbance

- 9.5.3 The proposals will involve the disturbance and loss of Roost 1.

- 9.5.4 In the absence of mitigation, the scale of impact is assessed as *low*; a maternity roost has not been identified and the roost has only been recorded to be used by a low (max. 3) number of common pipistrelle bats.

9.6 Long-term Impacts: Roost Modification and Roost Loss

- 9.6.1 In the absence of mitigation, the loss of Roost 1 is assessed to be of a *low* scale of impact, in accordance with the *Bat Mitigation Guidelines* (2004) and the status of the bat species in the local area.
- 9.6.2 The mitigation measures proposed will ensure that there is no loss of suitable roost opportunity at any point in the scheme and importantly, secure the creation of permanent opportunities for access by roosting bats at the site.

9.7 Long-term Impacts: Fragmentation and Isolation

- 9.7.1 The bat surveys identified use of the site by common pipistrelle bats and brief *Myotis* sp. passes.
- 9.7.2 As detailed in **Section 5.2** of this Ecological Survey and Assessment report, measures such as the sensitive use of lighting at the redeveloped site, conservation of woodland, open water and landscape planting using native species aim to conserve opportunities for the attraction of foraging bats at the site in the long-term. No significant impacts on the local bat population as a result of isolation and fragmentation are expected.

9.8 Post-development interference impacts

- 9.8.1 The level of human activity in the local area is not likely to cause a significant impact on the roost opportunities to be provided.
- 9.8.2 The sensitive use of lighting, as specified in **Section 5.8** of this Ecological Survey and Assessment report will avoid any adverse effects on opportunities to attract bats to the site.
- 9.8.3 No significant post-development interference impacts are expected.

9.9 Predicted Scale of Impact

- 9.9.1 In the absence of mitigation, the predicted scale of impact is assessed to be *low* as a result of the loss of one common pipistrelle bat day roost.
- 9.9.2 In the long-term, the impact at the local level is assessed to be *neutral*, as opportunities for roosting and foraging bats will be conserved at the site.
- 9.9.3 At the Greater Manchester and regional level the impacts are assessed to be *low*, as all efforts to retain the bats at the site are detailed in the mitigation strategy (refer to **Section 9.11**).
- 9.9.4 The site, the roost status and the proposed works meet the criteria to be registered under the Natural England Bat Mitigation Class Licence (BMCL).

9.10 Recommendations at all Buildings / Features Except Building 3

Buildings 1, 2, 4, 8, 10, 11a, b & d, 12, 13, 14, 15 and 16

- 9.10.1 Subject to the absence of nesting birds, there is no timing constraint on the commencement of works at Buildings 1, 2, 8, 10, 11a, b & d, 12, 15 and 16 in relation to bats.

Buildings 5, 6, 7, 9 and 11c

- 9.10.2 It is recommended that the slates and other features such as bricks beneath the stone lintels at the relevant buildings are removed, by hand, under the supervision of the licensed ecologist.
- 9.10.3 As precaution, during demolition works, all contractors must wear gloves.

- 9.10.4 If at any time a bat is found or suspected, all works in the area must stop and ERAP (Consultant Ecologists) Ltd must be contacted for guidance.

Tree 1

- 9.10.5 In accordance with best practice, current guidelines (Collins, J. (ed), 2016), if Tree 1 is scheduled for removal it is recommended that the following actions are applied:

Timing

- 9.10.6 The optimal time for tree removal is between September and late February inclusive.

Working Procedure

- 9.10.7 Tree 1 must be section / soft felled under the supervision of a licensed bat surveyor. The licensed bat surveyor will be present to supervise the following works:
- Careful section-felling of the tree. The sectioning must avoid cutting through or close to any cavities, this is likely to involve climbing the tree;
 - Cut sections will be lowered to the ground with the use of ropes;
 - Once on the ground the cavity will be inspected by the licensed bat surveyor and guidance issued; and
 - Allow all felled sections to lie on the ground for 24 hours before removing Ivy.

Culvert Entrances

- 9.10.8 As a precaution, the culvert will be excluded to bats during the bat activity season using the sheeting exclusion method. The exclusion works can only be carried out in the bat activity season. Note: Owing to the possible use of the culverts by nesting bird such as dipper an grey wagtail, this work must either be carried out outside the bird nesting season or following a pre-works inspection and confirmation of the absence of nesting birds.

9.11 Bat Mitigation Strategy: Building 3 / Roost 1

Natural England Licence and the Three Tests

- 9.11.1 The demolition works at Building 3 must only be carried out under an appropriate Natural England European Protected Species Mitigation (EPSM) licence granted under Regulation 55 of *The Conservation of Habitats and Species Regulations 2017*. The licence permits the destruction of bat roosts which would otherwise be an offence.
- 9.11.2 The site meets the criteria to be registered under the Natural England BMCL. Victoria Burrows is a Registered Consultant under the BMCL (RC038).
- 9.11.3 To comply with the terms and conditions of the BMCL it is necessary to demonstrate that the following three tests of Regulation 55 (as stated below) are addressed and satisfied:

Test 1: *That the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range* [Regulation 55 (9)(b)];

Test 2: *Demonstration that the proposals for which a licence is sought are for the purposes of 'preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment'* [Regulation 55(2)(e)]; and

Test 3: Consideration '*That there is no satisfactory alternative*' including the implications of the 'do-nothing' option [Regulation 55 (9)(a)].

- 9.11.4 Test 1 is addressed below under the Mitigation Strategy section below.

- 9.11.5 In consideration of Tests 2 and 3, the proposal is an imperative reason of over-riding public interest (IROPI).
- 9.11.6 The principle of the redevelopment of the site to residential accommodation has been agreed by the previously approved outline planning permission for the site, achieved in 2012 (Bury Council reference: 53762).
- 9.11.7 The statements made in the planning statement submitted with the former application remain applicable. For example, Tetrosyl has operated from the site off Walmersley Old Road for c. 50 years, during that time two other sites within the Bury area have been established and are working to capacity owing to their modern facilities and appropriate location. The Walmersley Old Road site is restricting the ability of the company to grow as the buildings are incapable of being brought up to date to provide the form and standard required to accommodate new production systems.
- 9.11.8 To enable the company to grow, provide competitive prices to the market and its customers and also serve the international market, more modern facilities are required in a more sustainable and accessible location.
- 9.11.9 It is understood that disposal of the site for residential purposes would provide significant capital receipt, which, when accompanied by significant investment via working capital from Tetrosyl would enable the delivery of new modern and suitable facilities to ensure the continued and future success of the company.
- 9.11.10 In consideration of alternatives, including the 'do-nothing' option, it was agreed at Public Inquiry held for an earlier planning application at the site for residential development in 2003 that the old mill buildings are beyond further economic use as manufacturing or storage buildings. The 'do nothing' option is not viable and would not enable Tetrosyl to relocate, continue to invest in the business and to provide competitively priced products.
- 9.11.11 The topography, age condition and nature of the Walmersley Old Road site does not enable Tetrosyl to meet its accommodation needs at a reasonable cost or within the prospect of economic return on any further investment to try and upgrade the facilities at the site. Tetrosyl needs to relocate the remaining production and other activities from this site to more suitable locations.
- 9.11.12 In consideration of the suitability of the site for residential use, it is confirmed that the site lies within an existing urban and residential area. The proposals provide an opportunity to contribute towards sustainable communities. In addition, through the previous planning applications it has been agreed that the site currently has adequate infrastructure to serve a residential site.
- 9.11.13 In consideration of alternatives to the site design, the proposed site layout is the most viable option that utilises the existing developed land and protects the green belt.
- 9.11.14 It is concluded that, in combination with the measures outlined below, the three tests of the Regulations are satisfied.

Mitigation Strategy: Works to be Carried Out Prior to / In Advance of Demolition

- 9.11.15 The works described below must only be carried out under the advice of the Registered Consultant and terms and conditions of the BMCL.
- 9.11.16 This mitigation strategy draws on the following available information:
- Natural England guidance;
 - Information presented in the *BCT Mitigation Conference Proceedings* (BCT, 2007), arranged by the Bat Conservation Trust;
 - Implemented and monitored activities/specifications carried out by ERAP (Consultant Ecologists) Ltd at other sites / properties; and
 - Information presented on the 'Roost' website provided by the Bat Conservation Trust.

Bat Box Installation

- 9.11.17 To compensate for the loss of Roost 1, and prior to the commencement of demolition and the likelihood of the construction of any new buildings, it is essential that one tree-mounted bat box is installed within the site

(more than one box will be provided but this is treated as enhancement in accordance with the licensing process, refer to **Section 5.8** of this Ecological Survey and Assessment report).

9.11.18 Installation of the box will be overseen by the Registered Consultant. The box must be positioned a height of over four metres from ground level, ideally facing east, south or west and away from dense understorey or risk of future Ivy cover. This specification will be provided in more detail once the scheme is finalised.

9.11.19 In accordance with the terms and conditions of the BMCL, the box must be in place within two months of the confirmation of site registration.

Toolbox Talk

9.11.20 Prior to the commencement of demolition works (including asbestos works) the Registered Consultant will inform all contractors of the following:

- a. The wildlife legislation and protection afforded to bats and their roosts;
- b. The presence of the licence and method statement and the need to abide by the content;
- c. The licensable actions;
- d. Good working practices;
- e. The presence of the bat box(es) and the need for them to remain undisturbed;
- f. The protocol to be followed if a bat is discovered when the licensed bat worker is not on site; and
- g. An outline of the proposals and timescales.

Mitigation Strategy: Works to be Carried Out Immediately Prior to / During Demolition

Retention and Protection of Existing Roosts

9.11.21 No existing roosts will be retained.

Capture and Exclusion

Roost 1

9.11.22 As Roost 1 has a discrete and single access it is feasible to install a one-way exclusion device. Once the device has been in place for 5 consecutive nights in the bat active season and during suitable weather conditions the Registered Consultant will supervise the soft strip / demolition, by hand, of the stone wall around Roost 1, as needed. If a bat is found it will be carefully collected and moved to a bat box at the site.

9.11.23 The Registered Consultant will also supervise the removal of other potential roost features around the building, as needed.

9.11.24 Once the Registered Consultant is satisfied that all soft demolition works have been carried out the instruction will be provided to continue the demolition in accordance with the Toolbox Talk guidance.

Discovery of a Bat

9.11.25 If at any time during the works a bat is discovered, or suspected, when the Registered Consultant is not on site, all contractors must withdraw from the area and ERAP (Consultant Ecologists) Ltd or Natural England must be contacted for further advice.

Mechanism for Ensuring Implementation / Success

9.11.26 If the licensed bat surveyor / Registered Consultant has any concerns regarding the quality of workmanship or there is non-compliance with the Natural England BMCL, this Mitigation Strategy and / or guidance provided by the licensed bat worker than this will result in additional site visits to make inspections.

9.11.27 It is always the intention to ensure all parties are aware of the importance of the Natural England licence and compliance with the Mitigation Strategy and this is achieved through good communication. However in extreme / significant cases of non-compliance the licensed bat surveyor will report the issue to Natural England and further action may be taken.

Monitoring

9.11.28 There is no requirement for any post-development monitoring under the BMCL, nor in accordance with Figure 4 of the *Bat Mitigation Guidelines* (Mitchell-Jones, 2004).

Provision of Enhancement

9.11.29 The compensatory measures described above are proportionate and appropriate to the likely impacts and are in accordance with Annex B (Table B) of the BMCL.

9.11.30 However, as the site will remain favourable for the attraction of foraging bats, including common pipistrelle bats, to provide enhanced opportunities for bats and comply with the principles of the National Planning Policy Framework it is feasible to accommodate additional opportunities for roosting bats at the redeveloped site.

9.11.31 This will comprise the installation of bat access panels at the new properties, refer to **Section 5.8** of this Ecological Survey and Assessment report.

Work Schedule

9.11.32 A work schedule can be provided to demonstrate feasibility once the planning permission is obtained.

9.12 Conclusion

9.12.1 An appropriate scope and level of survey has been carried out in 2017 and 2018 to inform the scope of the Bat Mitigation Strategy.

9.12.2 Roost 1 at Building 3, a common pipistrelle day roost, will be removed by the scheduled demolition; this is assessed as a *low* scale of impact.

9.12.3 A Bat Mitigation Strategy (**Section 9.11**) has been prepared to demonstrate that the demolition of Building 3 and all other buildings can be achieved in accordance with wildlife legislation, planning policy, Natural England guidance and good practice.

9.12.4 The site and bat roost status meet the conditions of the Bat Mitigation Class Licence (BMCL) and an application to register the site will be made to facilitate demolition in 2019.

9.12.5 If demolition has not commenced prior to May 2019 the bat activity surveys will need to be updated.

9.12.6 The Bat Mitigation Strategy demonstrates that appropriate mitigation for the roost is entirely feasible. The 'three tests' of *The Conservation of Habitats and Species Regulations 2017* have been met and the appropriate Natural England licence will be obtained to facilitate the works.

9.12.7 Enhancement measures are proposed and importantly, in the long-term, it is the intention that will be no net loss of opportunities for use by roosting and foraging bats at the site.

9.13 Tables

Table 9.4: Photographs



Photo 1: South and east elevation of Building 1

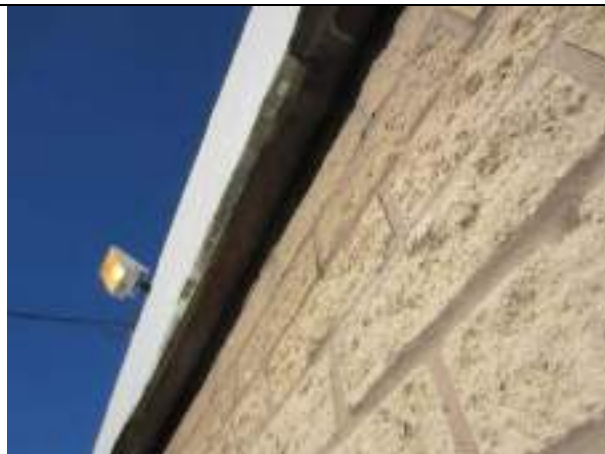


Photo 2: No gaps present beneath the cladding or in the blockwork at Building 1

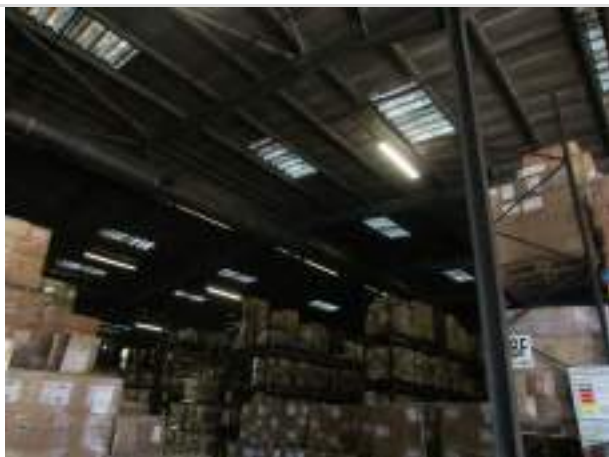


Photo 3: Interior of Building 1 showing steel frame and skylights



Photo 4: South elevation of Building 2



Photo 5: West and south elevation of Building 3



Photo 6: East elevation of Building 3 showing holes in stone elevation wall and cement sheeting fascia at a brick annex



Photo 7: Interior of Building 3 showing sarking, north lights and exposed stone walls



Photo 8: East elevation of Building 4 and lodge (Pond 1)



Photo 9: West and south elevation of Building 4



Photo 10: Minor gaps at lifted lead flashing on Building 4



Photo 11: North elevation of Building 4a and missing fascia



Photo 12: Roof void above suspended ceiling at two-storey section of Building 4a



Photo 13: Building 4b, portacabin attached to the east elevation of Building 3



Photo 14: North elevation of Building 5a



Photo 15: Building 6, 5c and 5b (left to right)



Photo 16: Buildings 5b (left) and 7 (right)



Photo 17: East elevation of Building 6 showing tightly sealed window apertures



Photo 18: West elevation of Building 6; gaps present at broken window panes



Photo 19: West elevation of Building 7



Photo 20: South elevation of Building 7 (5b in background)



Photo 21: Gaps beneath window lintels at south elevation of Building 7



Photo 22: North and west elevation of Building 8



Photo 23: Interior of Building 8



Photo 24: West and south elevation of Building 9



Photo 25: Roof void at Building 9



Photo 26: North and west elevation of Building 10



Photo 27: East elevation of Building 11b



Photo 28: South elevation of Building 11c (11d to the left)



Photo 29: West elevation of Building 11b and north elevation of 11a



Photo 30: Building 12



Photo 31: West elevation of Building 13



Photo 32: Interior of Building 13



Photo 33: North and west elevation of Building 14



Photo 34: Building 15



Photo 35: West elevation of Building 15



Photo 36: Building 16



Photo 37: Tree 1



Photo 38: Culvert entrance near weir

Table 9.5: Bat Activity Detected During Dawn Re-entry Survey on 16th August 2017

Surveyor Position	Time	Species	Observations / Anabat Recordings (assumes one bat unless stated)
1	04:51 to 05:25	P45	Calls on Anabat recordings including social calls
	05:23, 05:26 and 05:31	P45	Three bats entered a gap (one at each time) in the stone wall at the north elevation of the most eastern wall end at Building 3 (Roost 1)
2	04:42	P45	Brief pass
	04:48	P45	Brief pass
3	03:59	P45	Pass
	04:00	P45	Pass
	04:49	P45	Pass
4	04:28	P45	Pass
	04:33	P45	Pass
	04:57	P45	Pass over Building 5c
	05:02	P45	Headed off site
	05:07	P45	Flew over Building 5b and left site
	05:14	P45	Two bats over lodge
	05:27	P45	Flew over Building 5b
5	No bat passes		
6	05:21	P45	Pass recorded on Anabat
	05:22	My.	Pass recorded on Anabat
7	03:56	P45	Pass recorded on Anabat
	04:01	P45	Pass recorded on Anabat
	04:27	P45	Pass recorded on Anabat
	04:33	P45	Pass recorded on Anabat
	04:48	P45	Pass recorded on Anabat
	04:50	P45	Pass recorded on Anabat
	04:55	P45	Pass recorded on Anabat
	04:57	P45	Pass recorded on Anabat
	05:02	P45	Pass recorded on Anabat
	05:04	P45	Pass recorded on Anabat
	05:18	P45	Pass recorded on Anabat
	05:21 to 05:28	P45	Pass recorded on Anabat
8	05:18	P45	Pass and foraging along lane
9	05:18	P45	Pass and foraging along lane
10	04:00	P45	Pass and foraging along lane
	04:40	P45	Pass and foraging along lane
	04:47	P45	Pass and foraging along lane
	04:51	P45	Pass and foraging along lane
	04:52	P45	Pass and foraging along lane
	04:58	P45	Pass and foraging along lane
	04:59	P45	Pass and foraging along lane
	05:00	P45	Pass and foraging along lane
	05:01	P45	Pass and foraging along lane
	05:04	P45	Pass and foraging along lane
	05:05 to 05:21	P45	Pass and foraging along lane
SD2 over southern side of lodge	04:26 to 05:20	P45	Passes

P45 = Common pipistrelle, My. = *Myotis* sp.

Table 9.6: Bat Activity Detected During Dawn Re-entry Survey on 30th August 2017

Surveyor Position	Time	Species	Observations / Anabat Recordings (assumes one bat unless stated)
1	04:57	P45	Pass
	05:11	P45	Pass
	05:14	P45	Pass
	05:17 to 05:30	P45	Pass
	05:54	P45	Entered and immediately left Roost 1 (hole in stonework at north facing elevation of Building 3)
	05:55	P45	One bat entered Roost 1
	06:01	P45	Two bats entered Roost 1
2	05:09	P45	Brief pass
	05:14	P45	Pass
	05:17	P45	Pass
	05:48	P45	Brief pass
3	04:53	P45	Pass
	05:08	P45	Pass
	05:30	P45	Pass
	05:42	P45	Pass
5	04:41	P45	Pass
	05:18	P45	Pass
6	04:12	P45	Pass
	04:36	P45	Pass
	04:44	P45	Pass
	04:52	P45	Pass
	05:50	P45	Pass
	05:06	P45	Pass
7	05:10	P45	Pass
	04:06	P45	Pass recorded on Anabat
	05:15	P45	Pass recorded on Anabat
	04:29	P45	Pass recorded on Anabat
	04:47	P45	Pass recorded on Anabat
	04:49	P45	Pass recorded on Anabat
	04:50	P45	Pass recorded on Anabat
	05:56	P45	Pass recorded on Anabat
	05:07	P45	Pass recorded on Anabat
	05:08	P45	Pass recorded on Anabat
	05:09	P45	Pass recorded on Anabat
	05:10 to 05:35	P45	Passes recorded on Anabat
8	06:00	P45	Pass recorded on Anabat
	04:50	P45	Pass
9	05:48	P45	Pass
	05:49	P45	Pass
10	04:16	P45	Pass and foraging along lane
	04:38	P45	Pass and foraging along lane
	04:55	P45	Pass and foraging along lane
	04:58	P45	Pass and foraging along lane
	05:07	P45	Pass and foraging along lane
	05:11	P45	Pass and foraging along lane
	05:12 until 05:20	P45	Pass and foraging along lane
	05:38	P45	Pass and foraging along lane
	05:40 until 05:51	P45	Pass and foraging along lane
11	04:56	P45	Brief pass
	05:08	P45	Brief pass
	05:13	P45	Brief pass
SD2 over southern side of lodge	04:56 and 05:18	My.	Brief pass
	05:13	P45	Brief pass

P45 = Common pipistrelle, My. = *Myotis* sp.

Table 9.7: Bat Activity Detected During Dawn Re-entry Survey on 14th September 2017

Surveyor Position	Time	Species	Observations / Anabat Recordings (assumes one bat unless stated)
1	06:26	P45	Two bats entered Roost 1
3	No bat passes	-	-
4	06:05	P45	Brief pass
	06:08	P45	Foraging over track outside site boundary
	06:13	P45	Pass
5	No bat passes	-	-
6	No bat passes	-	-
7	05:52 to 05:53	P45	Passes
11	No bat passes	-	-
12	05:51	P45	Pass
	06:15	P45	Pass
SD2 over western side of lodge	05:51	P45	Pass
	05:54	P45	Pass

P45 = Common pipistrelle

Table 9.8: Bat Activity Detected During Dawn Re-entry Survey on 12th July 2018

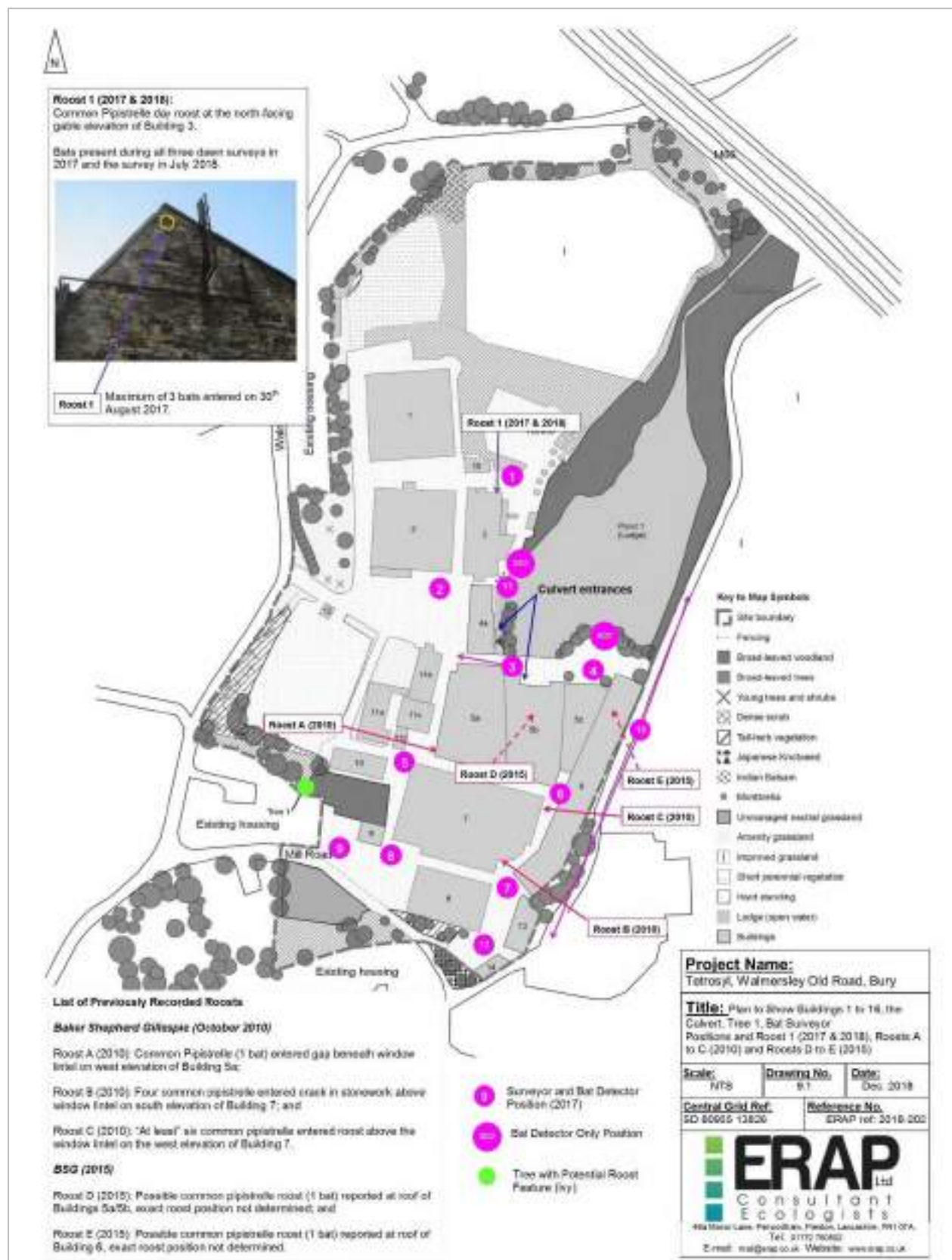
Surveyor Position	Time	Species	Observations / Anabat Recordings (assumes one bat unless stated)
1	03:26	P45	Very brief pass, heard not seen
	03:30	P45	Heard not seen
	03:34	P45	In flight from south-west to north-east
	03:45	P45	Heard not seen
	04:08	P45	Heard not seen
	04:11	P45	Heard not seen
	04:16	P45	In flight from east to north
	04:23	P45	Brief pass, heard not seen
	04:23	P45	In flight from north to south
	04:53	P45	One bat entered Roost 1
2	03:15	P45	In flight north to west
	04:15	P45	Two bats in flight south to west
	04:20	P45	Two bats in flight over lodge
	04:31	P45	In flight north to south
4	03:10 to 03:40	P45	Constant social calls, at least two bats seen circling over buildings.
	03:45	P45	Social calls, heard not seen
	03:52	P45	Social calls, heard not seen
	03:54	P45	Social calls, heard not seen
	04:26	P45	Social calls, heard not seen
	04:37	P45	Very brief pass, heard not seen
	-	P45	The Anabat Express made the following recordings: 12 common pipistrelle recordings between 03:07 and 04:34.
6	03:17	P45	Brief pass, heard not seen
	03:19	P45	Brief pass, heard not seen
	03:21	P45	Brief pass, heard not seen
	03:26	P45	Brief pass, heard not seen
	03:27	P45	Brief pass, heard not seen
	03:28	P45	Brief pass, heard not seen
	03:29	P45	Brief pass, heard not seen
	03:31	P45	Brief pass, heard not seen
	03:35	P45	Very brief pass, heard not seen
	03:38	P45	Brief pass, heard not seen
	03:41	P45	Heard not seen
	02:42	P45	Heard not seen
	03:43	P45	Heard not seen

	03:52	P45	Brief pass, heard not seen
	03:53	P45	Very brief pass, heard not seen
	04:19	P45	Very brief pass, heard not seen
	04:24	P45	Brief pass, heard not seen
	04:36	P45	Brief pass, heard not seen
		P45	The Anabat Express made the following recordings: 18 common pipistrelle recordings between 03:07 and 04:37.
7	03:14	P45	Pass
	03:16	P45	Pass
	03:18	P45	Pass
	03:19	P45	Pass
	03:20	P45	Pass
	03:20	P45	Pass
	03:21	P45	Pass
	04:36	P45	Pass
8	-	P45	The Anabat Express made the following recordings: 291 common pipistrelle recordings between 03:09 and 04:37.
	03:17	P45	Pass
	03:19	P45	Pass
	03:19 to 03:22	P45	Pass
	03:34 to 03:35	P45	Pass
	03:36	P45	Pass
	03:39	P45	Pass
	03:41	P45	Pass
	03:43	P45	Pass
	03:45	P45	Pass
	03:56	P45	Pass
	03:58	P45	Pass
	04:02	P45	Pass
	04:03	P45	Pass
	04:13	P45	Pass
	-	P45	The Anabat Express made the following recordings: 21 common pipistrelle recordings between 03:14 and 04:14.
11	03:10	P45	Pass
	03:10 to 04:20	P45	Occasional passes
	04:20	P45	Two bats flying over weir
	04:15 to 04:30	P45	Constant foraging
	04:30 onwards	No bats recorded	-
	-	P45	The Anabat Express made the following recordings: 76 common pipistrelle recordings between 03:12 and 04:30.
	05:13	P45	Brief pass
SD2 over southern side of lodge	03:36 and 04:24.	P45	9 common pipistrelle recordings between 03:36 and 04:24.
SD2 at weir	03:37 and 04:56	P45	63 common pipistrelle recordings between 03:37 and 04:56

P45 = Common pipistrelle,

9.14 Figure

Figure 9.1: Plan to Show All Buildings, Surveyor Locations and Position of Roost 1 (2017 & 2018), Roosts A to C (2010) and Roosts D to E (2015)





KNOTWEED ERADICATION

**Specialist Weed Control &
Site Vegetation Clearance**

INVASIVE WEED MANAGEMENT PLAN FOR

**URBAN REGEN
FORMER TETROSYL SITE
WALMERSLEY OLD ROAD
BURY**

KNOTWEED ERADICATION

NEW INN FARM

DAWSON LANE

LEYLAND

PRESTON

PR25 5DB

TEL: 01772621013

FAX: 01772623658

info@knotweederadication.co.uk

www.knotweederadication.co.uk



Date	12 th February 2020
Inspected by	G Andrews
Checked by	J Howard
Authorised by	G Andrews
Project	Former Tetrosyl site
Report number	IWMP2172A

LIMITATIONS

Knotweed Eradication has prepared this report with reasonable skill, care and diligence and taking account of the contract terms and conditions and manpower and resources devoted to it in agreement with the client. Knotweed Eradication disclaims any responsibility to the client and others in respect of any matters outside the scope of the above.

This report has been prepared based on the information received during the timescale available and all potential contamination; constraints or liabilities associated with the site may not necessarily have been revealed. The report is only valid when it is used in its entirety.

This report is confidential to the client and Knotweed Eradication accepts no responsibility to third parties to whom the report, or any part thereof, is made known. Any such party using any information contained within the report does so at their own risk.

Site Inspection at Former Tetrosyl site, Bury

For Urban Regen

As a division of Helmrig Ltd, Knotweed Eradication have been involved in the management and treatment of invasive weed species for over 15 years, utilising their knowledge and experience to provide clients with information and advice as to how best to deal with invasive weed issues on land within their ownership.

In February 2020 Knotweed Eradication were commissioned by Anthony Smith of Urban Regen to undertake an inspection of the proposed development site at Former Tetrosyl site, Walmersley Old Rd, Bury. The purpose of the inspection was to identify any invasive weed species that may be present within the boundary of the site or the immediate surrounding area in accordance with the Wildlife and Countryside Act 1981 (as amended), report the findings and propose a solution to any infestations found to be present.

The main species being inspected for are Japanese Knotweed, Giant Hogweed and Himalayan Balsam.

This report sets out the expected treatment of each species identified prior to, during and following completion of the development phase of the works.

Report Contents

1. Objective
2. Findings & Requirements
3. Additional control measures
4. Proposed Method of Treatment
5. Programmed Work
6. Quotation for the Programme of Work
7. Benefits
8. Next Step
9. Warranty Period
10. Guarantee
11. Site Map

Knotweed Eradication Specialist Weed Control Consultants

“The Complete Solution to Invasive Weed Control That Embraces the Legal and Statutory Requirements to Eradicate the Problems and Prevent Costly Prosecution”

1. Site and finding

- 1.1. Site consists of the former head office and main works for Tetrosyl and contains a variety of industrial and commercial buildings together with large hard-standing car parking areas together with green, open spaces including mature trees, vegetation and a large watercourse.
- 1.2. The site is to be demolished, remediated and developed into residential dwellings.
- 1.3. Surrounding areas comprise of agricultural land to the north, east and residential dwellings to the south, west.
- 1.4. The site was inspected on 10th February 2020 outside of the expected growing season with no areas of visible knotweed being identified within the site. However, Knotweed was visible beyond the site boundary wall at the southern point of site in an area immediately adjacent site and Mill Road.
- 1.5. Approx OS co-ordinates for the location of the knotweed

SD 80934 13666
- 1.6. The client has advised that this area of knotweed is to excavated in its entirety and placed within a burial cell created from CuTex geomembrane within a POS area in the northwest corner of the site. Himalayan Balsam is present in this area. The topsoil, which contains the balsam seeds from the area where the burial cell will be created, will be put to one side and be placed in the bottom of the cell prior to the knotweed-contaminated material. The remaining balsam will be subject to a management programme where it will be then treated in-situ with appropriate non-persistent herbicide.
- 1.7. It is worthy of note at this point that in knotweed infested areas the root/rhizome system can grow 7 metres outwards from the visible plant and in excess of 3 metres deep and if the spoils are dispersed on site, re - infestation is likely to occur.
- 1.8. Please note: soil material will continue to be classed as knotweed contaminated even after completion of the knotweed treatment programme and should be dealt with as if still live. If removed from site this must be done in accordance with current waste regulations by a licensed carrier to an appropriate receiving facility. Any unauthorized disturbance of treatment areas will invalidate any warranties and guarantees offered.
- 1.9. This management plan provides background information relating to the main invasive plant species and sets options for control and eradication.

Category	Descriptors
4	Japanese Knotweed is within 7 metres of a habitable space, conservatory and/or garage. Either within the boundaries of this property or in a neighbouring property or space; and/or Japanese Knotweed is causing serious damage to outbuildings, associated structures, drains, paths, boundary walls and fences and so on. Further investigations by an appropriately qualified and/or experienced person are required.
3	Although Japanese Knotweed is present within the boundaries of the property, it is more than 7 metres from a habitable space, conservatory and/or garage. If there is damage to outbuildings, associated structures, paths and boundary walls and fences, it is minor. Further investigations by an appropriately qualified and/or experienced person are required.
2	Japanese Knotweed was not seen within the boundaries of this property, but it was seen on a neighbouring property or land. Here, it was within 7 metres of the boundary, but more than 7 metres away from habitable spaces, conservatory and/or garage of the subject property.
1	Japanese Knotweed was not seen on this property, but it can be seen on a neighbouring property or land where it was more than 7 metres away from the boundary.

2 JAPANESE KNOTWEED, GIANT HOGWEED AND OTHER INVASIVE PLANTS

2.1 Identifying invasive plants (extracted from Netregs website)

2.1.1 Identifying invasive plants on a site early lets developers assess and cost options for destroying, disposing of and managing them.

2.1.2 Managing land infested by invasive plants in a timely and appropriate way can avoid:

- excessive cost
- potential prosecution and compensation claims
- physical damage to buildings and hard surfaces
- harm to the environment

2.2 Identifying Japanese knotweed

2.2.1 Japanese knotweed begins to grow in early spring and can grow in any type of soil, no matter how poor. It can grow as much as 20 centimetres per day, and can reach a height of 1.5 metres by May and 3 metres by June. It does not produce viable seeds in the UK, but instead spreads through rhizome (underground root-like stem) fragments and cut stems. Japanese knotweed:

- produces fleshy red tinged shoots when it first breaks through the ground
- has large, heart or spade-shaped green leaves
- has leaves arranged in a zig-zag pattern along the stem
- has a hollow stem, like bamboo
- can form dense clumps that can be several metres deep
- produces clusters of cream flowers towards the end of July
- dies back between September and November, leaving brown stems

2.3 Identifying giant hogweed

2.3.1 You should take great care when identifying giant hogweed. Contact with the plant, particularly the sap, can lead to severe blistering and scarring.

2.3.2 Giant hogweed closely resembles native cow parsley or hogweed. It can take four years to reach its full height of 3-5 metres and flower. Giant hogweed:

- has a reddish purple stem with fine spines that make it appear furry - like a stinging nettle
- has hollow stems
- has spotted leaf stalks
- has leaves up to 1.5 metres wide
- flowers in June and July
- has flower heads that are usually 50 centimetres wide - each flower head is capable of producing 50,000 seeds every year
- has seeds that can stay in the soil for several years before they develop

2.4 Identifying Himalayan balsam

2.4.1 Himalayan balsam is often found on river banks, growing up to 2 metres in height. Each plant lasts for one year and dies at the end of the growing season. Himalayan balsam:

- has dark green, lance-shaped leaves with jagged edges
- has reddish coloured stems
- flowers from June to October
- has large, brightly coloured flowers that are usually in variable shades from purple to pale pink
- can produce around 2,500 seeds per plant each year
- has explosive seed pods that can throw seeds over 6 metres away from the plant

2.5 Identifying Montbretia

2.5.1 *Crocosmia* species are easily recognised when in flower by the distinct shape and colour of their flower heads. All are non-native in the UK. The hybrid montbretia, with relatively short stems and orange flowers, is the main species to have escaped into the wild; however, a number of other ornamental *Crocosmia* species are grown in gardens and other landscaped areas. When not in flower, *Crocosmia* species are more difficult to identify. Look for rusty brown dead leaves and remains of previous years flowering heads

2.6 Identifying Variegated Yellow Archangel

2.6.1 Yellow Archangel is an herbaceous creeping perennial. It has a square, hairy stem and can grow up to 1 to 2 feet tall. Leaves are opposite, serrated, prominently veined and ovate with silver markings and a green trim. Undersides are lighter green. Shade leaves are larger, thinner and darker than sun leaves. Flowers occur in clusters in the leaf axils, or whorls at the end of the stem. They are helmet-shaped, with a hooded upper petal and a lipped lower petal. Blooming is May-June. Fruit is set June-July and contains 4 nutlets. *L. galeobdolon* is a prolific seed-producer.

2.7 Spraying invasive plants with herbicide

- 2.7.1 Treating invasive plants with herbicide can be a very effective method of treatment. You will have to re-spray. It usually takes at least three years to treat Japanese knotweed until it is dormant. Giant hogweed seeds can continue germinating for 15 years after the last seed fall
- 2.7.2 If the plant is in or near to water you must have agreement from the Environment Agency to use the herbicide. The herbicide must be approved for use in or near water.
- 2.7.3 The herbicide's effectiveness depends on the type used. An advisor certified by BASIS (the registration, standards and certification scheme for pesticides and fertilisers) will be able to advise you on the most suitable type of herbicide for your situation and when best to apply it.
- 2.7.4 *Giant hogweed* and *Himalayan balsam* both drop large quantities of seeds. A control programme will need to continue for several years, with checks carried out throughout the growing season. If you are trying to eradicate these plants from a riverbank it is important to ensure that any plants upstream are also treated to avoid seeds being washed onto the site.
- 2.7.5 *Japanese knotweed* has a large underground network of rhizomes (underground root-like stems). To eradicate the plant you must kill the rhizomes. Picking the right herbicide is essential, as it must travel through the plant and into the rhizome system below. Several herbicides can treat Japanese knotweed successfully - you will need to pick the right herbicide for your situation. Glyphosate is effective because it penetrates through the whole plant.

2.7.6 Using herbicides

The person doing the spraying must hold a certificate of technical competence for herbicide use or work under the direct supervision of a certificate holder. If you plan to spray in or near water, the person carrying out or supervising the spraying must have the appropriate aquatic part of the qualification. The sprayer must also comply with the pesticide product label and meet all of its conditions. Before you spray in or near water you must check that the product is approved for use near water. There are formulations of glyphosate and 2,4-D amine that can be used in or near water and are effective against many invasive plants.

2.8 **Burying invasive plant material onsite**

2.8.1 Taking plant material and soil containing plant material away for disposal off site uses valuable landfill capacity and increases the likelihood of the spread of invasive plants. Another option is to bury this soil and plant material on your own land because, without sunlight, plants cannot survive and seeds will not germinate. However, this material will need to remain buried for several years to ensure that it will not grow again. Giant hogweed seeds can be viable for up to 15 years and Japanese knotweed rhizome (underground root-like stems) is believed to survive for 20 years.

2.8.2 What you must do

2.8.2.1 Before you bury invasive plant waste on your property you must contact the Environment Agency to check you are allowed to do this at your location. The Environment Agency may want to look at your site and may visit while the works are undertaken.

2.8.2.2 Soil and plant material containing Japanese knotweed may need to be buried 5 metres below ground level. You should place a barrier membrane on top of the material and fill the hole with clean soil. Alternatively, the knotweed code of practice describes how you can bury it less deeply

2.8.2.3 Soil containing Himalayan balsam and giant hogweed seeds should be buried at least 0.5 metre below ground level or 0.3m if covered with a geotextile material

2.8.2.4 You must not bury anything other than plant material and soil containing invasive plants that have originated on site.

2.8.2.5 You must make sure that deep burial does not interfere with the ground water level.

2.8.2.6 Buried soil and plant material that have been treated with an herbicide that does not break down in the environment could cause groundwater pollution. If you intend to bury treated material, you should treat it with glyphosate herbicide only. Check with the Environment Agency.

2.8.2.7 Herbicides that do not break down in the environment are described as persistent. Those that do break down are described as biodegradable or non-persistent. The herbicide packaging or safety data sheet will state whether it is persistent or non-persistent.

2.8.3 Good practice

2.8.3.1 You should bury the material in an area where it is not likely to be disturbed. You should keep records of the quantity of material that you have buried and a map showing the location of the burial pit and its depth. Use signs to mark the burial pit and keep heavy tracked machinery off the area.

2.8.3.2 Other legislation relevant to the control of non-native invasive weeds includes the following.

- Town and Country Planning Act 1990.
- Highways Act 1980.
- Water Resources Act 1991.
- The Waste Management and Licensing Regulations 1994.
- The Landfill (England and Wales) Regulations 2002.
- The Control of Pesticides Regulations 1986 (under the Food and Environment Protection Act 1985).
- The Control of Substances Hazardous to Health Regulations 2001 (COSHH)

3. **Additional control measures:**

- Infested areas (to include buffer zone) should be clearly identified.
- Unauthorized access disturbance or removal of contaminated material should be prevented.
- Restrictions regarding access to the infested areas and any applicable restrictions regarding movement of plant and vehicles, should be communicated to all on-site personnel.
- Vehicles, equipment and footwear should be inspected and cleaned prior to exiting contaminated areas.
- Should access to the area be required during the treatment period, advice should be sought prior to entering.
- Where invasive weeds are identified on adjacent land, owners should be informed so that appropriate actions can be taken to prevent re-infestation.

4. **Methodology**

- 4.1. Warning signs or fencing should be erected to identify infestations to other site personnel. Additionally, contractors working on site should be briefed to familiarise them with the appearance of the plant. Professional advice should be sought if other possible infestations are noted on site.
- 4.2. Unauthorised access disturbance or removal of contaminated material will be prevented.
- 4.3. Restrictions regarding access to the infested areas and any applicable restrictions regarding movement of plant and vehicles, should be communicated to all on-site personnel.
- 4.4. Vehicles, equipment and footwear should be inspected and cleaned prior to exiting contaminated areas.
- 4.5. Should access to the area be required during the treatment period, advice should be sought prior to entering.
- 4.6. Herbicide selection will be dependent on each area taking into consideration surrounding desirable vegetation and environmental considerations.
- 4.7. PLEASE NOTE: Task and site specific method/risk and COSHH assessments should be carried out for each specific task being undertaken. When filed in conjunction with this management plan they will form a record of actions taken and locations of treated Japanese Knotweed for future users

5. **Proposed Method Of Treatment**

- 5.1 Knotweed Eradication would use a selection of the following MAPP and E.A. approved products on the infested areas. Chemical selection will be made based on location of treatment area surrounding environmental factors.

Product	Mapp	Areas of Use
Round up Pro Vantage	15534	Hard surfaces, Amenity vegetation, Forestry, In or near water, Stem injection.
Garlon Ultra (under Stewardship)	16211	Industrial sites, Motorway embankments, Rail embankments, Cemeteries, Grass land of no agricultural interests.
Synero (under stewardship)	14708	Industrial sites, Motorway embankments, Rail embankments, central reservations, Power stations.

6. **Programmed Work:**

- 6.1 Treatment of Invasive Weed infestations is to be undertaken for a minimum period of three years to effectively eradicate the species. A detailed schedule of works and annual treatment and monitoring programme is given below in Table 1.
- 6.2 Under the supervision of a suitably experienced operative, knotweed is to be excavated, in a controlled manner, placed directly on to dumpers and removed to on-site receptor areas for on-going treatment as part of the site remediation works.
- 6.3 Dumpers are to be parked in designated loading positions during loading. Excavation will utilise half bucket full to ensure no spillage of material during loading with an inspection of the loading area being undertaken prior to Dumpers pulling away. Any spillage is to be cleared and placed into Dumpers for removal to designated receptor area.
- 6.4 On completion of the excavations plant and machinery will be cleaned and inspected prior to continuing other works or removal from site.
- 6.5 Please note: Timings of excavation works are based on site works and will need to be amended should this not be the case.

Table 1

Site Name: Former Tetrosyl site	Job Ref: IWMP2172A	Client: Urban Regen
Location: Bury	Description	
April – Oct 2020	Monitoring of known areas within treatment zone. Herbicide treatment of Japanese Knotweed and Himalayan Balsam	
tbc	Excavation of Japanese Knotweed. Installation of CuTex Geomembrane	
April – Oct 2021	Monitoring of known areas within treatment zone. Herbicide treatment of Japanese Knotweed and Himalayan Balsam	
April – Oct 2022	Monitoring of known areas within treatment zone. Herbicide treatment of Japanese Knotweed and Himalayan Balsam	
October 2022	Survey and sign off on completion and hand over to client.	
Oct 2022 - onwards	Warranty period to 2032	

7. Health and Safety

7.1 Relevant health and safety legislation must be observed in the UK. The relevant regulations are outlined in *The UK Pesticide Guide* produced annually.

7.2 The legislation relevant to the use of herbicides is: -

- *The Control of Substances Hazardous to Health Regulations (COSHH) 2001*. All operatives must comply with the regulations and wear protective clothing and observe a strict code of hygiene of washing hands before drinking and eating.
- *The Control of Pesticides Regulations 1986* under the *Food and Environment Protection Act (FEPA) 1995*.
- *Pesticides: Code of Practice 1990* (Published by MAFF/HSE).

7.3 Health and Safety Guidelines

- All operatives must hold a Certificate of Competence for herbicide application (NPTC) or be under the direct supervision of qualified operative prior to commencing a spraying programme.
- All operatives must act responsibly in the storage and handling of the herbicide. The disposal of the herbicide and empty containers must be carried out by operatives in a responsible way. Any spillage must be guarded against and if occurring shall be dealt with and cleaned up. All operatives must carry a basic first aid kit.
- The area of work should be protected from the general public during the treatment and use of the herbicide.
- The use of herbicides should be carried out in compliance with the product label instructions.
- Advice on herbicide application should be sought for a BASIS registered advisor

7.4 Other legislation relevant to the control of non-native invasive weeds includes the following.

- *Town and Country Planning Act 1990*.
- *Highways Act 1980*.
- *Water Resources Act 1991*.
- *The Waste Management and Licensing Regulations 1994*.
- *The Landfill (England and Wales) Regulations 2002*.
- *The Control of Pesticides Regulations 1986 (under the Food and Environment Protection Act 1985)*.
- *The Control of Substances Hazardous to Health Regulations 2001 (COSHH)*

8. Benefits of appointing Knotweed Eradication:

- Professional Solutions
- Staged Payments at Fixed Costs
- MAPP Approved Chemicals and Solutions
- Over 20 Years' Experience
- Method Statement
- Risk Analysis
- COSHH Assessment
- Safety Data Sheets

9. Next Steps:

- 9.1 Thank you for giving Knotweed Eradication the opportunity to provide its consultancy services and programme of works. Should you decide to go ahead with our recommendations a full Method Statement Risk Assessment, Safety Data Sheets and COSHH Assessment will be produced for the programme of works for the specific site. Timely and appropriate management of land infested with invasive weed species can avoid excessive costs, potential prosecution and prevent physical damage to buildings and hard surfaces. Our solutions can form part of a normal site clearance, are programmable to meet developer's needs, sustainable over a 3 year period, can avoid haulage and land fill costs and are backed by over 20 years weed control experience. If you have any further questions, please do not hesitate to contact Danny Nightingale on 07976 914692 or email info@knotweederadication.co.uk

Alternatively we can be contacted by fax on 01772 623 658 or by post at New Inn Farm, Dawson Lane, Leyland, PR25 5DB

10. Warranty Period

- 10.1 Following completion of the treatment programme, a 10 year warranty period will commence during which time continued monitoring of the site will be undertaken with any reoccurrence of knotweed within the locations specified in this report being treated at no additional cost to the client or subsequent plot owner, subject to the attached terms and conditions.

11. Insurance Backed Guarantee

- 11.1 As members of the Property Care Association Knotweed Eradication are able to offer an insurance backed policy on works undertaken by themselves. Please note that this policy would be subject to a monitoring period at additional cost and would only be available to plots where knotweed remediation works had been undertaken. This policy comes into effect on completion of the treatment programme.
- 11.2 Knotweed Eradication is not able to offer either free or paid advice on insurance products and any information provided is for reference only. Knotweed Eradication may include insurance backed guarantees as part of its services without additional costs. It is the client's responsibility to assess the suitability of such products.
- 11.3 Knotweed Eradication accepts no liability for the performance or suitability of any third party product. It is the client's responsibility to ensure suitability of any insurance offered or to make independent arrangements.



- Site Boundary
- Rhizome Buffer Zone
- JK Within site
- JK Beyond site
- JK Beyond site not to be treated
- Himalayan Balsam
- Giant Hogweed
- Other as identified within report



New Inn Farm, Dawson Lane, Leyland PR25 5DB
www.knotweederadication.co.uk
info@knotweederadication.co.uk

Date: 12th February 2020
 Client: Urban Regen
 Project Ref: IWMP2172A
 Site: Former Tetrosyl Site
 Scale: NTS



Pic 1 – Mill Lane



Pic 2 – JK area adjacent to Mill lane



Pic 3 – JK area view to farm entrance

REFERENCES

Renals, T. and Rene, P. (May 2001) *Code of Practice for the Management, Destruction and Disposal of Japanese knotweed, Version 1*.
The Environment Agency.

Available to download: www.environment-agency.gov.uk

Child, L. and Wade, M. (2000) *The Japanese knotweed Manual*
Packard Publishing Limited, Chichester.

Web Sites

Nature Conservation
www.nationaltrust.org.uk/environment/htm/nat_con/_fspapers/fs_plant01

Japanese Knotweed Control Forum
www.ex.ac.uk/knotweed

Netregs
www.netregs.gov.uk

Client: CLIENT or subsequent affect plot owner within 7m of identified areas of Japanese Knotweed

Property:

Report No:

Report Date:

Date work completed:

TERMS OF WARRANTY

Invasive Weed Warranty

1. Knotweed Eradication hereinafter referred to as "The Company" hereby **WARRANTIES** that, save as hereinafter provided or as provided in the Company's standard terms and conditions of business applicable at the date of the Client's acceptance, in the event of the person entitled to the benefit of Warranty notifying the Company in writing within the warranty period offered from the date of completion of the work if:
 - i. any continuance or recurrence of invasive weed indicated above respectively to the work carried out in the areas identified in the report as the "treatment area"
2. The Company, upon production of this Warranty and all relevant survey reports, quotations, specifications, drawings, plans, completion certificates and receipted invoices, with any amendments thereto issued by the Company will arrange for the land to be inspected at a mutually convenient time upon payment by such person of the Company's then current inspection fee, provided that the continuance or recurrence complained of is of a kind against which the Company carried out control treatment in the area in which such continuance or recurrence has taken place.
3. If upon such inspection it appears to the Company that the treatment carried out by the Company was in any way defective so as to have resulted in re-growth of the invasive weed within the treated areas, the Company will carry out, without further charge, such further treatments as shall to the Company appear to be necessary to control the invasive weed and will reimburse in full the inspection fee paid.
4. This Warranty does not cover any loss (including consequential loss see 1(i) below) or damage sustained by the person entitled to the benefit of this Warranty save as set out in 2 above, whether caused by the Company's negligence or otherwise.
5. This Warranty shall be of no validity or effect and shall be unenforceable against the Company in any one or more of the following circumstances:

- i. where the person entitled to the benefit of this Warranty does not give written notice of the claim under this Warranty to be received by the Company within three months from the date upon which the existence of such a claim could, with the exercise of reasonable diligence by a continuous occupier of the affected premises, have been discovered;
 - ii. where all Works advised or recommended by the Company prior to, at the time of, or subsequent to, treatment carried out by the Company were not fully carried out effectively with good and proper materials and in a workmanlike manner by the Client's contractor;
 - iii. where the Client failed to pay the full price, any properly payable additional costs, and any interest due within six months of the date upon which the same fell due;
 - iv. where the land and property has not been kept in a good and proper state, so as to detect and prevent tipping or the early detection of growth by invasive weeds;
 - v. where any recommendation given by the Company has not been complied with, whether such recommendation was given in the Company's report/quotation, or by separate leaflets. This may relate to cutting or pruning, the removal of waste, site clearance or the exclusion of plant, materials from areas adjacent to the treatment area;
 - vi. where, subsequent to the completion of treatment by the Company, there has been any disturbance to the works carried out by the Company. This may include excavations in areas where herbicide treatments have been undertaken, where root barriers have been installed or contaminated waste has been subject to burial on site;
 - vii. where invasive plants have been re-introduced adjacent to watercourses or areas that have been subject to flooding, or by tipping or the uncontrolled propagation from adjacent land.
6. This Warranty is to be read subject to, and is limited by, the Company's standard Terms and Conditions of business current at the date of the Client's acceptance of the Company's offer to carry out the treatment which shall be deemed to be incorporated herein. Terms and conditions are attached to the original report. In the event of any ambiguity or uncertainty arising the Terms and Conditions of this Warranty shall apply.
7. In the event of disposal of the property, being the subject of this Warranty, this Warranty shall be assignable by the Client above named, to the new owner in which case the provisions hereof set out at 1-5 above shall apply in respect of that new owner as if the name of that new owner were substituted for any reference to the client.
- PROVIDED THAT

Within three months of the change of ownership of the property, the new owner shall have:

- i. given written notice of the change to the Company;
- ii. permitted the Company's surveyor to inspect the property (so as to discover any defects as might prejudice the works carried out by the Company) if the Company in its absolute discretion so require.

8. For the purpose of this Warranty and the Contracts (Rights of Third Parties) Act 1999, the person entitled to the benefit of the rights conferred by this Warranty shall be the owner from time to time of the Property ('the Relevant Third Party') **provided always that** the Relevant Third Party acknowledges and agrees that its rights under this Warranty shall be subject to the terms and conditions set out in this Warranty.
9. The Company shall be entitled in any action or proceedings by any Relevant Third Party to rely on any term in the Warranty and to raise any equivalent rights in defence of liability as it would have against the Client or any previous Relevant Third Party. Furthermore, the Relevant Third Party agrees that it will be bound by any previous acts, omissions or default of the Client or any previous Relevant Third Party.
10. For the avoidance of doubt, the Client and each subsequent Relevant Third Party acknowledges and agrees that when it is no longer the owner for the time being of the Property, it shall no longer be entitled to the benefit of the rights conferred by this Warranty and that furthermore, neither the Client, nor any Relevant Third Party shall be entitled to assign or transfer its rights and/or obligations under this Warranty.
11. All consequential losses are excluded from this Warranty, and for the purposes of this Warranty consequential loss means any indirect, special or consequential damages or losses suffered or incurred by the Warranty holder and for the purpose of this Warranty indirect, special or consequential damages or losses shall include, but not be limited to damages to or losses of data, furniture or equipment, economic loss or damage, damage to or loss of profits, interest, business revenue, anticipated savings, business or goodwill, any losses of cost or expenses which are not directly incurred by the Warranty holder wholly in respect of or which are additional to the remedial work for which indemnity is provided by this Warranty, the costs and expenses of any redecoration, repainting or retiling work, the cost and expenses of removing and/or replacing any cupboards, carpets or other furniture, or any other fixtures or fittings and the incurring of liability for losses or damages of any nature whatsoever suffered by third parties (including in each case incidental and/or punitive damages), even if the Company is advised in advance of the possibility of any such losses and/or damages.

In the event of you wishing to make a claim under the Warranty, a fee (at the rate prevailing at the time of the claim) is payable and the following documents must be produced by you:

- i. Copy of original report
- ii. Receipted invoice or proof of payment from original client
- iii. Certificate or letter of completion
- iv. This Warranty

If the claim is justified, your payment will be returned in full. If your claim cannot be processed due to incomplete documentation or you decide not to pursue your claim, then an administration fee (at the rate prevailing at the time of the claim) will be deducted and the balance will be refunded.

12. In the event of a dispute arising under this Warranty as to the amount to be paid or the work to be performed the dispute may, by agreement between the parties be referred for determination by an expert chosen by mutual agreement between parties. If the parties are unable to agree on an expert within 7 days after the request by one party to another or if the expert agreed upon is unable or unwilling to act either party may apply to the General Manager of the Property Care Association for the appointment of a suitably qualified and experienced expert for the dispute in question.

Signature



Danny Nightingale

KNOTWEED ERADICATION
New Inn Farm
Downs Lane
Leyland
PR25 5DB

Tetrosyl, Mill Lane, Bury, BL9 6RE

REASONABLE AVOIDANCE MEASURES METHOD STATEMENT FOR AMPHIBIANS

March 2020

[ERAP (Consultant Ecologists) Ltd ref: 2019-159b]
[Bury Council ref: 63533 Condition 17]

ERAP (Consultant Ecologists) Ltd
49a Manor Lane
Penwortham
Preston
Lancashire
PR1 0TA

Tel: 01772 750502

mail@erap.co.uk
www.erap.co.uk



CONTENTS

1.0	Introduction	2
1.1	Background	2
1.2	Rationale and Supporting Documents.....	2
2.0	Reasonable Avoidance Measures Method Statement for the Protection of Amphibians.....	3
2.1	Ecologist's Details	3
2.2	Scope of Toolbox Talk	3
2.3	Timing of Works.....	4
2.4	Biosecurity.....	4
2.5	Actions to be Applied Prior to / During Draining Down of Lodge.....	5
2.6	Discovery of a Common Toad and Other Amphibians.....	5
2.7	Best Practice Actions / Site Management to be Implemented During Construction	6
3.0	Conclusion	6
4.0	References.....	6
5.0	Appendix 1: Figure	7
6.0	Appendix 2: Toolbox Talk Declaration.....	8
7.0	Appendix 3: Amphibian Identification Guide.....	9
8.0	Appendix 4: Record of Amphibians Found / Advice Given	13

Document Control

Reporting	Personnel	Date
Author	Victoria Burrows B.Sc. (Hons) M.Sc. CEnv MCIEEM Principal Ecologist	28 th February 2020
Signature(s)		
Checked by	Catie Haworth B.Sc. (Hons) M.Sc.	2 nd March 2020
Reviewed and Issued	Victoria Burrows	2 nd March 2020
Version	1	
Report issued to	Barratt Manchester	

1.0 INTRODUCTION

1.1 Background

1.1.1 Planning consent for 'residential development comprising 268 no. dwellings (Class C3) with associated access, car parking, landscaping and open space' [Bury Council reference: 63533] at the former Tetrosyl site, Bevis Green Works, Mill Lane, Bury BL9 6RE (hereafter referred to as the 'site') was granted in February 2020.

1.1.2 Condition 17 of the planning consent states:

"Prior to the commencement of any earthworks, draw down and infilling of the mill lodge, a reasonable avoidance method statement for amphibians, written by a suitably experienced ecologist shall be submitted to and approved in writing by the Local Planning Authority. The method statement will include full details of:

- *The consultant name and contact details and experience;*
- *Detail of how contractors will be briefed;*
- *Procedures on how to deal with common toad if found on site;*
- *Timing of draw down and site clearance;*
- *Procedures for checking the site prior to work commencing; and*
- *Procedures for management of the site during construction.*

Only the approved method statement shall be adhered to and implemented in full prior to works commencing.

Reason. In order to ensure that no harm is caused to a Protected Species pursuant to policies EN6 – Conservation of the Natural Environment and EN6/3 – Features of Ecological Value of the Bury Unitary Development Plan and Section 11 of the National Planning Policy Framework."

1.1.3 This report / Reasonable Avoidance Measures Method Statement (RAMMS) has been prepared to satisfy the requirements of Condition 17 of the planning consent.

1.2 Rationale and Supporting Documents

1.2.1 The need for a RAMMS was identified in the *Ecological Survey and Assessment* report (ERAP (Consultant Ecologists) Ltd, July 2019), hereafter the '2019 ecology report', prepared to inform the planning application.

1.2.2 The 2019 ecology report identified that breeding common toad (*Bufo bufo*), a Priority Species, use the mill lodge (Pond 1) and records of breeding common toad are known for habitats in the wider area (particularly at Gorse Quarry Site of Biological Importance (SBI), Baldingstone SBI and Gindles Farm Biological Heritage Site (BHS)), which all support large bodies of open water within a radius of 500 metres from the Tetrosyl site.

1.2.3 Owing to the presence of breeding common toad, Pond 1 is recognised as Priority Habitat. The 2019 ecology report identified that mitigation measures in the form of a RAMMS were necessary to protect common toad during the construction period (particularly works at the mill lodge), to provide opportunities for breeding common toad in the long-term and to ensure that the redevelopment proposals comply with the requirements of national and local planning policy and best practice.

- 1.2.4 The timings referred to in this report are in accordance with the programme of works provided by Urban Regen (principal contractor) on 21st February 2020; the preparation of which was informed by ecological guidance.

2.0 REASONABLE AVOIDANCE MEASURES METHOD STATEMENT FOR THE PROTECTION OF AMPHIBIANS

2.1 Ecologist's Details

Lead / Principal Ecologist: Victoria Burrows B.Sc. (Hons) M.Sc. CEnv MCIEEM

- 2.1.1 Victoria has over 20 years experience working as a consultant ecologist. This work has included the preparation and implementation of RAMMS and licensed mitigation works for a range of amphibian species including common toad and great crested newt (*Triturus cristatus*). Victoria is experienced in the identification and handling of all British amphibian species. Victoria has held over 30 Natural England European Protected Species Mitigation (EPSM) licences for great crested newt and is a registered consultant under the great crested newt low impact class licence which is awarded by Natural England through earned recognition whilst working with amphibians.

Ecologist: Amy Sharples B.Sc. (Hons) M.Sc. GradCIEEM

- 2.1.2 Amy Sharples has worked with Victoria at ERAP (Consultant Ecologists) Ltd since 2012. Amy has experience of the completion of great crested newt and amphibian surveys and the implementation of mitigation strategies. Amy has prepared and implemented common toad RAMMS including the draining down and search of breeding ponds and the rescue and translocation of amphibians.

Ecologist Team

- 2.1.3 The ecologists will be assisted by other members of our qualified and experienced ecologist team, as needed.

Contact Details

- 2.1.4 ERAP (Consultant Ecologists) Ltd. 49a Manor Lane, Penwortham, Preston PR1 0TA

Tel: 01772 750502

Email: victoria.burrows@erap.co.uk

Website: www.erap.co.uk

2.2 Scope of Toolbox Talk

- 2.2.1 Prior to the commencement of works at the lodge, the Toolbox Talk to be delivered by the licensed ecologist will cover:
- A brief summary of common toad ecology;
 - The wildlife legislation and protection and conservation status afforded to common toad;
 - The presence of the Reasonable Avoidance Measures Method Statement (RAMMS) and the need to abide by the content (i.e. measures that will be used to protect common toad and other ecological considerations);
 - Good working practices;

- e. Protocol to be followed if a common toad is discovered (particularly when the ecologist is not on site); and
- f. Identification of common toad and other amphibians, refer to Amphibian Identification Guide (**Appendix 3**).

2.2.2 All contractors / site personnel to confirm they have understood the Toolbox Talk by signing the Toolbox Talk record sheet, appended (**Appendix 2**).

2.2.3 A copy of the Toolbox Talk will be available at the site office for reference as needed.

2.2.4 Confirmation that the Toolbox Talk exists and its content will be included within the site manager's induction process / meeting for new site personnel, as needed.

2.3 Timing of Works

2.3.1 Following ecological input into the programme of works and taking into consideration other constraints, the current (21.02.2020) version of the programme of works confirms the following relevant timings:

- | | | |
|--------------|---|----------------------|
| a. Item 12. | Common Toad breeding season restrictions (spawn stage) | 02.03.20 to 30.04.20 |
| b. Item 13. | Fish removal from lodge (under licence) | 11.05.20 to 28.05.20 |
| c. Item 14. | Commence draining of lodge
(under consented permit to discharge) | 01.05.20 to 28.05.20 |
| d. Item 104. | Open the de-culverted diversion along the eastern boundary* | 04.12.20 to 17.12.20 |

*At this time the retained pool at the northern end of the site will be completed and available for breeding common toad in the 2021 breeding season.

2.3.2 This programme of works has been arranged to ensure impacts on common toad are avoided / minimised in the following ways:

- a. Minimising the risk of common toad spawn (typically laid in March) becoming stranded and at risk of drying out / predation on the margins of the lodge as the water levels are scheduled to be lowered after the tadpoles will have hatched; and
- b. Ensuring that common toad on site are not left without a breeding pond (i.e. breeding will be permitted in 2020 and the new pond area at the northern end of the site will be available prior to the 2021 breeding season).

2.4 Biosecurity

Pollution Prevention

2.4.1 The pollution prevention measures and environmental considerations detailed in the *Construction Environment Management Plan (CEMP)*, or similar, will be adhered to.

Biosecurity and Invasive Plant Species

2.4.2 To ensure no invasive or undesirable plant species are introduced to the site and retained habitats / areas of habitat creation it is essential that plant and machinery to be brought to the site is clean and

clear of plant material and excessive mud and other materials. Contractors must not accept any hired plant or machinery onto the site that contains plant material or excessive mud / earth cover.

Amphibian Disease Precautions

- 2.4.3 Prior to the commencement of works all ecologists working on the site will familiarise themselves with the guidance provided by ARG UK entitled *Amphibian Disease Precautions: A Guide for UK Fieldworkers* (ARG UK, March 2017).
- 2.4.4 All equipment and containers used will be clean. The appropriate disinfects (Virkon) will be used prior to entering the pond areas and after works.
- 2.4.5 To avoid the risk of spread of Chytridiomycosis and Ranavirus in accordance with best practice and the *Amphibian Disease Precautions: A Guide for UK Fieldworkers* (ARG UK, March 2017) advice note, amphibians will not be actively transferred off site.

2.5 Actions to be Applied Prior to / During Draining Down of Lodge

- 2.5.1 The draining down of the lodge is expected to occur slowly over a number of days. This approach permits adult amphibians the chance to escape and the tadpoles to move with the retreating water level.
- 2.5.2 Prior to the commencement of draining down an ecologist will search the margins of the lodge for toad spawn. If spawn is present the works will be postponed.
- 2.5.3 The draining down will permit the following actions to be carried out by the ecologists:
 - a. Netting of the lodge margins with the use a long-handled pond net. Any netted amphibians (all life stages) will be deposited in a lidded bucket that contains wet moss;
 - b. The search of the terrestrial vegetation and other debris on the pond margins for amphibians. Any amphibians will be picked up and deposited into the lidded bucket;
 - c. Once draining down commences netting will be carried out periodically. As the pond levels decrease, where it is safe to do so, the shallow water will be netted and the bed and margins of the lodge will be searched for amphibians by the ecologists. Any netted amphibians will be deposited in a lidded bucket which contains rainwater and wet moss;
 - d. Once all reasonable effort has been carried out to rescue any amphibians the ecologists will cease the netting;
 - e. All captured amphibians will be recorded; and
 - f. All captured amphibians will either be deposited beneath suitable debris (log piles and mossy habitats) in the grassland and woodland to be retained in the northern and eastern margins of the site or, particularly in the case of tadpoles, in the retained pool of water at the northern end of the site.

2.6 Discovery of a Common Toad and Other Amphibians

- 2.6.1 Refer to the Amphibian Identification Guide at **Appendix 3**.
- 2.6.2 If a common toad (or other amphibian species) is discovered during the works it is recommended that the animal is carefully picked up and placed in a bucket or other suitable container. The amphibian should then be moved (by hand (not in a machine)) to the grassland and woodland habitats at the

northern and eastern margins of the site. This position has been selected as these habitats are scheduled for retention, they have connectivity to the proposed new pond area and the off-site ponds in the wider area and are away from sources of potential harm such as busy roads.

2.7 Best Practice Actions / Site Management to be Implemented During Construction

During Construction

2.7.1 To avoid the active construction working area becoming suitable for the attraction of sheltering amphibians the following best practice actions are necessary:

- a. Ensure areas of standing water / pools are not permitted to accumulate (as much as possible);
- b. Avoid the accumulation of construction waste and debris in piles (which can create suitable shelters for amphibians) by ensuring skips are available to receive waste;
- c. Store construction materials off the ground as much as is possible (i.e. on pallets);
- d. Avoid leaving trenches / holes open overnight (either complete the works in one day or ensure the holes are suitably covered or fitted with a means of escape (sloping edge or plank) to permit wildlife to escape; and
- e. Piles of crushed demolition rubble and construction materials will not be deposited within 30 metres of the new pond basin. The pond basin will be demarcated with temporary fencing and treated as a 'no-go' area for construction operations.

During Habitat Creation

2.7.2 The ecologist will attend site when the final profile of the new pond area is created. This will enable direction to be provided in relation to the shape of the banks and consideration of amphibian access in future years.

3.0 CONCLUSION

3.1 It is considered that this RAMMS provides all relevant information to inform the commencement of works and to satisfy the requirements of Condition 17 of the planning consent.

4.0 REFERENCES

ARG UK, March 2017. *Amphibian Disease Precautions: A Guide for UK Fieldworkers.*, UK: Amphibian and Reptile Groups of the United Kingdom.

Bury Council , August 1997. *Bury Unitary Development Plan (UDP)* , Bury: Bury Council .

ERAP (Consultant Ecologists) Ltd, December 2018. *Tetrosyl, Walmersley Old Road, Walmersley, Bury BL9 6RG. Confidential Addendum: Badger Survey and Assessment*, Preston: ERAP (Consultant Ecologists) Ltd.

ERAP (Consultant Ecologists) Ltd, July 2019. *Tetrosyl, Walmersley Old Road, Bury. Ecological Survey and Assessment (including a Licensed Bat Survey and Assessment and Mitigation Strategy)*, Preston: ERAP (Consultant Ecologists) Ltd.

Great Britain, 1981. *Wildlife and Countryside Act*. London: H.M.S.O.

Great Britain, 2006. *Natural Environment and Rural Communities Act*. London: H.M.S.O.

5.0 APPENDIX 1: FIGURE

Figure 5.2: Phase 1 Habitat Survey to Show Location of Lodge



6.0 APPENDIX 2: TOOLBOX TALK DECLARATION

DECLARATION:

It is confirmed that the Ecologist provided the Toolbox Talk. I and all relevant contractors understand the Toolbox Talk and will abide by the content and guidance provided:

Signed:				
Print Name:				
Position:				
Date:				

Signed:				
Print Name:				
Position:				
Date:				

7.0 APPENDIX 3: AMPHIBIAN IDENTIFICATION GUIDE

Amphibian Identification

Common frog

Adults 6-7 cm. Smooth skin, which appears moist.

Coloration variable, includes brown, yellow and orange. Some females have red markings on lower body.

Usually has a dark 'mask' marking behind the eye.

Breeding male

Grey/pale blue throat.

Thick front legs.

Dark (nuptial) pad on inner toes of the front feet.

Markings also variable, including varying amounts of black spots and stripes.

Spawn is laid in gelatinous clumps.

Young froglets look like smaller versions of the adults.

Common toad

Adults 5-9 cm. Rough skin. Brown with darker markings. Less commonly, some individuals are very dark, almost black, others are brick-red.

Breeding pair

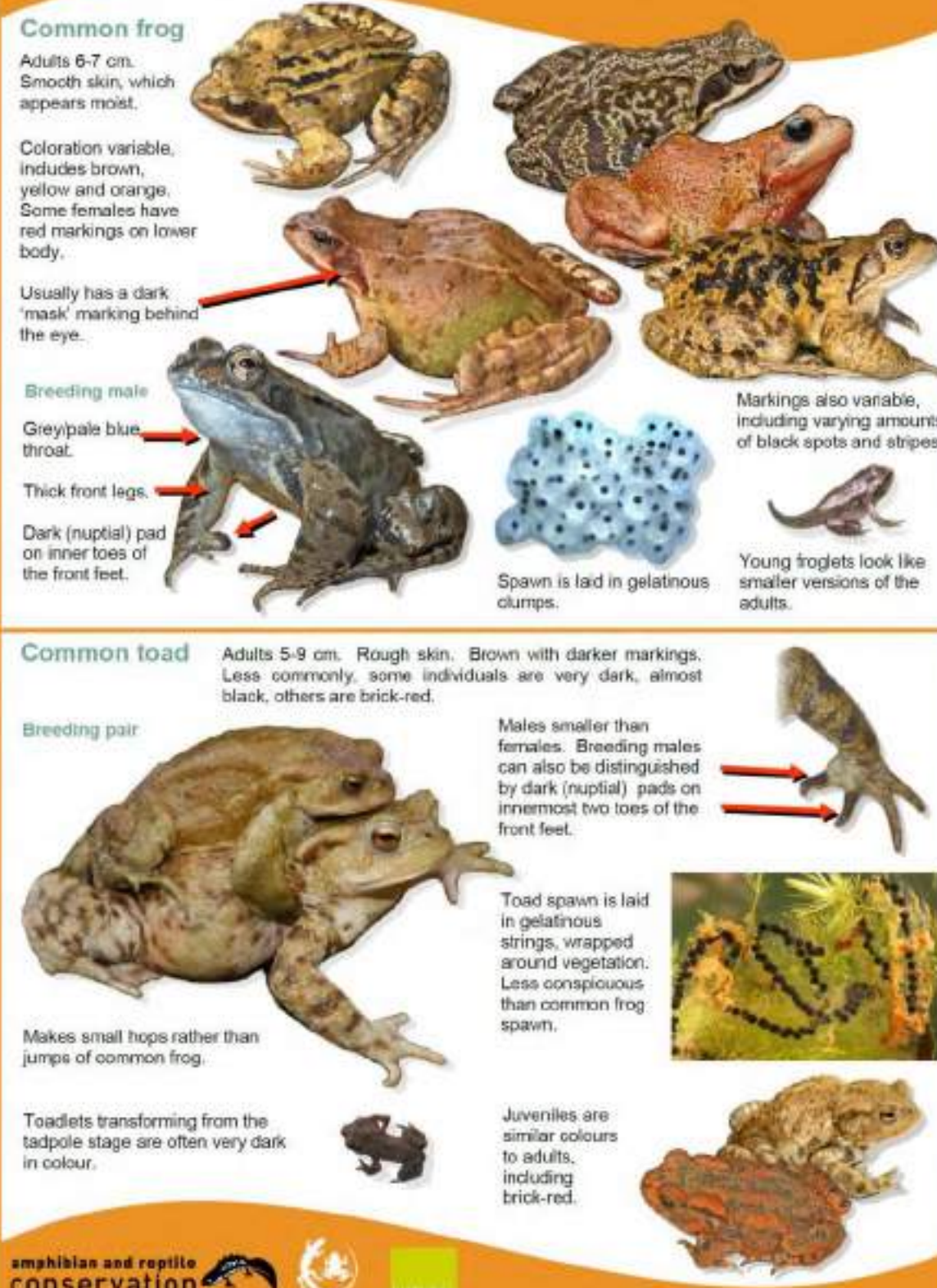
Males smaller than females. Breeding males can also be distinguished by dark (nuptial) pads on innermost two toes of the front feet.

Toad spawn is laid in gelatinous strings, wrapped around vegetation. Less conspicuous than common frog spawn.

Makes small hops rather than jumps of common frog.

Toadlets transforming from the tadpole stage are often very dark in colour.

Juveniles are similar colours to adults, including brick-red.



The illustrations show various stages and forms of the amphibians. For the Common frog, there are several adult frogs with different patterns of brown, yellow, and orange, some with dark 'mask' markings. A breeding male is shown with a grey/pale blue throat and thick front legs. A dark nuptial pad is highlighted on the inner toe of a front foot. A cluster of blue, gelatinous frog spawn is shown, along with a small, dark-colored young froglet. For the Common toad, a large illustration shows a breeding pair. A male toad is shown with dark nuptial pads on its front feet. A string of toad spawn is shown wrapped around vegetation. A small, dark-colored toadlet is shown, along with a juvenile toad that is similar in color to the adults.

amphibian and reptile conservation

ARG UK

ENGLAND

Great crested newt

Grows to 16 cm, but usually smaller. Crest in male has break at base of tail. Silvery-white stripe towards rear of tail conspicuous.

Both sexes have rough, granular skins and yellow/orange bellies with irregular black spots.

Female has no crest and an orange/yellow stripe running along the lower edge of the tail.

Outside the breeding season the male's crest shrinks to a ridge along the back.

Juveniles look like smaller versions of the female and may live on land or in the water.

Orange/yellow coloration on underside extends to flanks (not confined to central stripe). This continues along lower edge of tail in females.

Strictly protected species, requiring a licence to handle or disturb.



Alpine newt



Adults 8-11 cm, females often much larger than males. A non-native species restricted to few sites, but becoming increasingly common. Most likely to be found in garden ponds, or ponds near to gardens.

Females have a marbled pattern on the back.

Underside is bright orange, without spots (although there may be black spots on the throat in some cases).



Smooth newt

A widespread species which breeds in a variety of water bodies. Often found in garden ponds.



Male

Female

Both sexes have an orange or yellow belly stripe and rounded spots, which are larger in the male.



Male



Female

Grows to about 10 cm. Breeding male has an undulating crest running from head to tail tip.



Non-breeding male

Non-breeding adults live mostly on land. Juveniles live entirely on land.



Juvenile (eft)

Palmate newt

Grows to 9 cm. Breeding male has a ridge running along the back, rather than a crest. Dark, webbed hind feet, and tail ends in filament.



Non-breeding male



There are two pale coloured nodules on the underside of the hind feet of the female.



Palmate



Smooth

Throat of palmate newt has no pigment (looks pink). Throat of smooth newt is off-white and usually spotted.



Breeding male

Female



Female looks similar to smooth newt.



Underside (male)

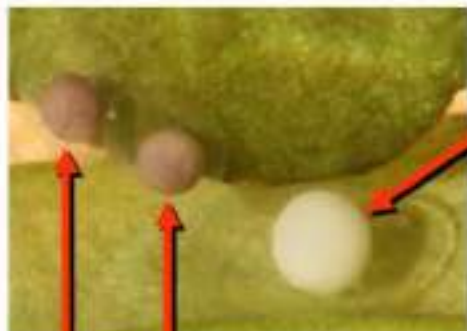
Juveniles live on land.



Juvenile (eft)

Newt eggs

Newt eggs are usually wrapped, singly, in vegetation. Leaves folded around great crested newt eggs are particularly conspicuous. To identify, unfold the leaf. Identification of undeveloped eggs is easiest.



Great crested newt eggs are white, sometimes with a tint of green or orange (jelly capsule 5 mm).



Eggs of smooth and palmate newts cannot be distinguished by eye, but they are smaller (jelly capsule 3 mm) than great crested newt eggs and are grey or beige when newly laid.



Several great crested newt eggs folded into a single blade of flote grass, giving a 'concertina' effect.

Newt larvae

Examine well-developed larvae (late May to July, or to August for great crested newts).



Great crested newt larvae (above) have long toes and blotches of dark pigmentation on tail fins. Grow to approximately 5 cm.

Palmate and smooth newt larvae (above) are indistinguishable in the field—but do not have the long toes or spotted tail fins of great crested newt larvae. Grow to approximately 3 cm.

Overwintering and neoteny



Young newts usually leave the water in late summer or autumn, although sometimes they remain as larvae over the winter (e.g. smooth newt, right).



Neotenic smooth newt

Exceptionally newt larvae grow to adult size, able to breed, but retaining their gills.

Further information Howard Inns (2009, reprinted 2011). *Britain's Reptiles and Amphibians*. WILDGuides.

Amphibian and Reptile Conservation & Fred Holmes (2014)

Additional photographs courtesy of Jon Cranfield, Ray Cranfield, Chris Glead-Owen, Howard Inns, Mark Jones, Phyl King, Liam Russell, Duncan Sweeting and Rose Tichner.

Revised with financial assistance from Natural England.

Amphibian and Reptile Conservation www.arc-trust.org

amphibian and reptile
conservation



8.0 APPENDIX 4: RECORD OF AMPHIBIANS FOUND / ADVICE GIVEN

To be completed by the Ecologist, as needed.

Authorisation to fish using instruments (other than rod and line) under section 27A Salmon and Freshwater Fisheries Act 1975.

Permit Reference EP/EW081-S-814/17907/01 Date of Issue 03 March 2020

1. Authorisation Holder

Name Mr Craig Burns

Enterprise Blue Slate Fishery

Position Owner

Address Greystones,
Broadfield,
Oswaldtwistle,
ACCRINGTON,
Lancashire

Post code BB5 3RY

2. Fishing Instruments

Authorisation has been granted to the above named authorisation holder to use the following fishing instruments:

Instrument	Number	Additional Notes
Seine Net		
Electrofishing		

3. Species for Removal

It is a condition of this authorisation that only the following fish species may be removed:

- Coarse Fish > 1 Spp.

At: Tetrosyl Plant Reservoir (EW081-S-814); BURY; SD81001390

From: 04 March 2020

To: 04 September 2020

4. Conditions

Subject to the following condition(s):

- Check, Clean, Dry. All traps, nets and ancillary equipment must be disinfected with an appropriate disinfectant, then air dried, before being used on a different body of water.
- If any non-native species are caught the Environment Agency must be notified
- If the operation does not go ahead the Environment Agency should be notified.

5. Contact Details

If you wish to discuss your authorisation please contact the Environment Agency Fish Movements Team on 02084 745243.

6. Authorising Officer

Signed: _____

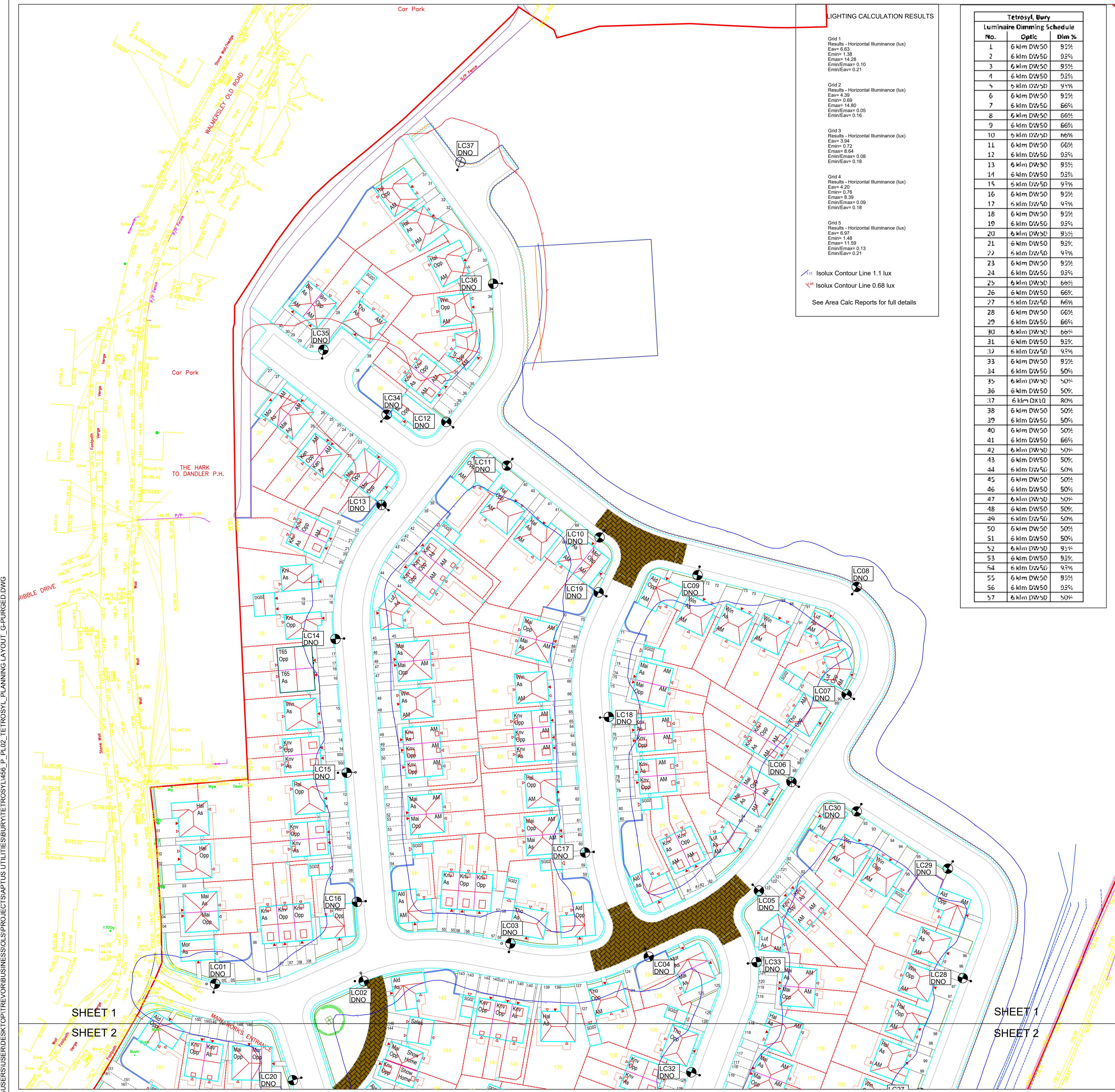
Paul Siddle Fisheries, Biodiversity and Geomorphology Team Leader

7. Guidance Notes

Being granted this authorisation does not give you the right or authority to remove fish from private waters; only to use the named instruments in those waters. You should obtain separate permission from the fishery owner and any relevant controlling angling club. Failure to obtain the relevant permissions could leave you liable to legal action.

Appendix 5

C:\Users\user\Desktop\TETROSYL\BUSINESS\PROJECTS\UTILITIES\BURY\TETROSYL486_P_PL02_TETROSYL_PLANNING LAYOUT_G-purged.DWG



LIGHTING CALCULATION RESULTS

Grid 1
Results - Horizontal Illuminance (lux)
Eav= 6.63
Emin= 1.38
Emax= 14.28
Emin/Emax= 0.10
Emin/Eav= 0.21

Grid 2
Results - Horizontal Illuminance (lux)
Eav= 4.39
Emin= 0.89
Emax= 14.80
Emin/Emax= 0.05
Emin/Eav= 0.16

Grid 3
Results - Horizontal Illuminance (lux)
Eav= 3.94
Emin= 0.72
Emax= 8.64
Emin/Emax= 0.08
Emin/Eav= 0.18

Grid 4
Results - Horizontal Illuminance (lux)
Eav= 4.20
Emin= 0.76
Emax= 8.39
Emin/Emax= 0.09
Emin/Eav= 0.18

Grid 5
Results - Horizontal Illuminance (lux)
Eav= 6.97
Emin= 1.48
Emax= 11.59
Emin/Emax= 0.13
Emin/Eav= 0.21

Isolux Contour Line 1.1 lux
Isolux Contour Line 0.68 lux

See Area Calc Reports for full details

Tetrosyl, Bury		
Luminaire Dimming Schedule		
No.	Optic	Dim %
1	6 klm DW50	95%
2	6 klm DW50	95%
3	6 klm DW50	95%
4	6 klm DW50	95%
5	6 klm DW50	95%
6	6 klm DW50	95%
7	6 klm DW50	66%
8	6 klm DW50	66%
9	6 klm DW50	66%
10	6 klm DW50	66%
11	6 klm DW50	66%
12	6 klm DW50	95%
13	6 klm DW50	95%
14	6 klm DW50	95%
15	6 klm DW50	95%
16	6 klm DW50	95%
17	6 klm DW50	95%
18	6 klm DW50	95%
19	6 klm DW50	95%
20	6 klm DW50	95%
21	6 klm DW50	95%
22	6 klm DW50	95%
23	6 klm DW50	95%
24	6 klm DW50	95%
25	6 klm DW50	66%
26	6 klm DW50	66%
27	6 klm DW50	66%
28	6 klm DW50	66%
29	6 klm DW50	66%
30	6 klm DW50	66%
31	6 klm DW50	95%
32	6 klm DW50	95%
33	6 klm DW50	95%
34	6 klm DW50	50%
35	6 klm DW50	50%
36	6 klm DW50	50%
37	6 klm DW50	80%
38	6 klm DW50	50%
39	6 klm DW50	50%
40	6 klm DW50	50%
41	6 klm DW50	66%
42	6 klm DW50	50%
43	6 klm DW50	50%
44	6 klm DW50	50%
45	6 klm DW50	50%
46	6 klm DW50	50%
47	6 klm DW50	50%
48	6 klm DW50	50%
49	6 klm DW50	50%
50	6 klm DW50	50%
51	6 klm DW50	50%
52	6 klm DW50	95%
53	6 klm DW50	95%
54	6 klm DW50	95%
55	6 klm DW50	95%
56	6 klm DW50	95%
57	6 klm DW50	50%

LIGHTING APPARATUS LEGEND

Lighting Column: 
Proposed galvanised tubular steel lighting column of 6.0 metre nominal height with a planted base as supplied by Maltitite to Bury Metropolitan Council Street Lighting Specification.
Manufacturer Reference: 0106MDPT

Luminaire:
Proposed post top mounted Philips DigiStreet luminaire

Manufacturer Ref: BGP760 20LED DW50

Lumen Output: 6.00klm

Colour Temperature: Cool White

Luminaire Tilt Inclination: 0°

Control Gear: DALI enabled driver

Control Type: Philips CityTouch node 35lux (1:0.5 ratio)

Dimming Profile: SEE SCHEDULE

Supply: DNO

Primary Isolator: DNO Approved Double Pole

Secondary Isolator: N/A

Internal Wiring: Wiring to luminaire shall be 1.5mm² PVC insulated flexible cable

Door Orientation: Side Road - Facing road

Lighting Column: 
Proposed galvanised tubular steel lighting column of 6.0 metre nominal height with a planted base as supplied by Maltitite to Bury Metropolitan Council Street Lighting Specification.
Manufacturer Reference: 0106MDPT

Luminaire:
Proposed post top mounted Philips DigiStreet luminaire

Manufacturer Ref: BGP760 20LED DX10

Lumen Output: 6.00klm

Colour Temperature: Cool White

Luminaire Tilt Inclination: 0°

Control Gear: DALI enabled driver

Control Type: Philips CityTouch node 35lux (1:0.5 ratio)

Dimming Profile: 80%

Supply: DNO

Primary Isolator: DNO Approved Double Pole

Secondary Isolator: N/A

Internal Wiring: Wiring to luminaire shall be 1.5mm² PVC insulated flexible cable

Door Orientation: Side Road - Facing road

Lighting Column: 
Existing lighting column to be replaced.

Manufacturer Reference: N/A

Luminaire:
N/A

Manufacturer Ref: N/A

Lumen Output: N/A

Colour Temperature: N/A

Luminaire Tilt Inclination: N/A

Control Gear: N/A

Control Type: N/A

Dimming Profile: N/A

Supply: DNO

Primary Isolator: DNO Approved Double Pole

Secondary Isolator: N/A

Internal Wiring: Wiring to luminaire shall be 1.5mm² PVC insulated flexible cable

Door Orientation: Side Road - Facing road

- NOTES.
1. THIS DESIGN HAS BEEN PREPARED IN ACCORDANCE WITH THE CDM REGULATIONS 2015 REGULATION 9.
 2. NO ACCOUNT IS TAKEN FOR THE BLOCKING EFFECT CAUSED BY BUILDINGS, TREES ETC.
 3. THE CALCULATION SHOWN BY THIS DRAWING ASSUMES THAT THE WHOLE AREA BEING CONSIDERED IS IN THE SAME PLANE, I.E. THERE ARE NO CHANGES IN GRADIENT OR ELEVATION.
 4. ALL NEW UNITS TO HAVE INDIVIDUAL DNO SERVICE CONNECTIONS WITH DOUBLE POLE CUT OUTS.
 5. ALL EQUIPMENT TO BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH BURY COUNCIL SPECIFICATION.
 6. ALL COLUMN POSITIONS TO BE AGREED WITH SITE ENGINEER.
 7. UNIT REFERENCES FOR INSTALLATION USE ONLY.

REVISION	DESCRIPTION	DATE	BY
DEVELOPMENT			
TETROSYL, BURY			
DRAWING PROPOSED S38 STREET LIGHTING DESIGN			
DEVELOPER			
LAND OWNER			
DRAWING NUMBER	456_P_PL02_Tetrosyl_Planning Layout_G-purged	REVISION	-
CONTRACT NUMBER	AP0524-571	SCALE: 1:500	@A1
DRAWN BY: T. POWELL		DATE: 22 NOV 19	
APPROVED: FOR COMMENT ONLY			

C:\USERS\USER\DESKTOP\TREVOR\BUSINESS\PROJECTS\UTILITIES\BURY\TETROSYL\466_P_PL02_TETROSYL_PLANNING_LAYOUT_G-purged.DWG



Tetrosyl, Bury		
Luminaire Dimming Schedule		
No.	Optic	Dim %
1	6 kl m DW50	95%
2	6 kl m DW50	95%
3	6 kl m DW50	95%
4	6 kl m DW50	95%
5	6 kl m DW50	95%
6	6 kl m DW50	95%
7	6 kl m DW50	66%
8	6 kl m DW50	66%
9	6 kl m DW50	66%
10	6 kl m DW50	66%
11	6 kl m DW50	66%
12	6 kl m DW50	95%
13	6 kl m DW50	95%
14	6 kl m DW50	95%
15	6 kl m DW50	95%
16	6 kl m DW50	95%
17	6 kl m DW50	95%
18	6 kl m DW50	95%
19	6 kl m DW50	95%
20	6 kl m DW50	95%
21	6 kl m DW50	95%
22	6 kl m DW50	95%
23	6 kl m DW50	95%
24	6 kl m DW50	95%
25	6 kl m DW50	66%
26	6 kl m DW50	66%
27	6 kl m DW50	66%
28	6 kl m DW50	66%
29	6 kl m DW50	66%
30	6 kl m DW50	66%
31	6 kl m DW50	95%
32	6 kl m DW50	95%
33	6 kl m DW50	95%
34	6 kl m DW50	50%
35	6 kl m DW50	50%
36	6 kl m DW50	50%
37	6 kl m DX10	80%
38	6 kl m DW50	50%
39	6 kl m DW50	50%
40	6 kl m DW50	50%
41	6 kl m DW50	66%
42	6 kl m DW50	50%
43	6 kl m DW50	50%
44	6 kl m DW50	50%
45	6 kl m DW50	50%
46	6 kl m DW50	50%
47	6 kl m DW50	50%
48	6 kl m DW50	50%
49	6 kl m DW50	50%
50	6 kl m DW50	50%
51	6 kl m DW50	50%
52	6 kl m DW50	95%
53	6 kl m DW50	95%
54	6 kl m DW50	95%
55	6 kl m DW50	95%
56	6 kl m DW50	95%
57	6 kl m DW50	50%

LIGHTING CALCULATION RESULTS

Grid 1
Results - Horizontal Illuminance (lux)
Eave= 6.83
Emin= 1.38
Emax= 14.28
EminEmax= 0.10
EminEave= 0.21

Grid 2
Results - Horizontal Illuminance (lux)
Eave= 4.39
Emin= 0.89
Emax= 14.80
EminEmax= 0.05
EminEave= 0.16

Grid 3
Results - Horizontal Illuminance (lux)
Eave= 3.94
Emin= 0.72
Emax= 8.64
EminEmax= 0.08
EminEave= 0.18

Grid 4
Results - Horizontal Illuminance (lux)
Eave= 4.20
Emin= 0.76
Emax= 8.30
EminEmax= 0.09
EminEave= 0.18

Grid 5
Results - Horizontal Illuminance (lux)
Eave= 6.97
Emin= 1.48
Emax= 11.59
EminEmax= 0.13
EminEave= 0.21

LIGHTING APPARATUS LEGEND

Lighting Column: 
Proposed galvanised tubular steel lighting column of 6.0 metre nominal height with a planted base as supplied by Maltatite to Bury Metropolitan Council Street Lighting Specification.
Manufacturer Reference: 0106MDPT

Luminaire:
Proposed post top mounted Philips DigiStreet luminaire

Manufacturer Ref: BGP760 20LED DW50

Lumen Output: 6.00klm

Colour Temperature: Cool White

Luminaire Tilt Inclination: 0°

Control Gear: DALI enabled driver

Control Type: Philips CityTouch node 35lux (1:0.5 ratio)

Dimming Profile: SEE SCHEDULE

Supply: DNO

Primary Isolator: DNO Approved Double Pole

Secondary Isolator: N/A

Internal Wiring: Wiring to luminaire shall be 1.5mm² PVC insulated flexible cable

Door Orientation: Side Road - Facing road

Lighting Column: 
Proposed galvanised tubular steel lighting column of 6.0 metre nominal height with a planted base as supplied by Maltatite to Bury Metropolitan Council Street Lighting Specification.
Manufacturer Reference: 0106MDPT

Luminaire:
Proposed post top mounted Philips DigiStreet luminaire

Manufacturer Ref: BGP760 20LED DX10

Lumen Output: 6.00klm

Colour Temperature: Cool White

Luminaire Tilt Inclination: 0°

Control Gear: DALI enabled driver

Control Type: Philips CityTouch node 35lux (1:0.5 ratio)

Dimming Profile: 80%

Supply: DNO

Primary Isolator: DNO Approved Double Pole

Secondary Isolator: N/A

Internal Wiring: Wiring to luminaire shall be 1.5mm² PVC insulated flexible cable

Door Orientation: Side Road - Facing road

Lighting Column: 
Existing lighting column to be replaced.

Manufacturer Reference: N/A

Luminaire:
N/A

Manufacturer Ref: N/A

Lumen Output: N/A

Colour Temperature: N/A

Luminaire Tilt Inclination: N/A

Control Gear: N/A

Control Type: N/A

Dimming Profile: N/A

Supply: DNO

Primary Isolator: DNO Approved Double Pole

Secondary Isolator: N/A

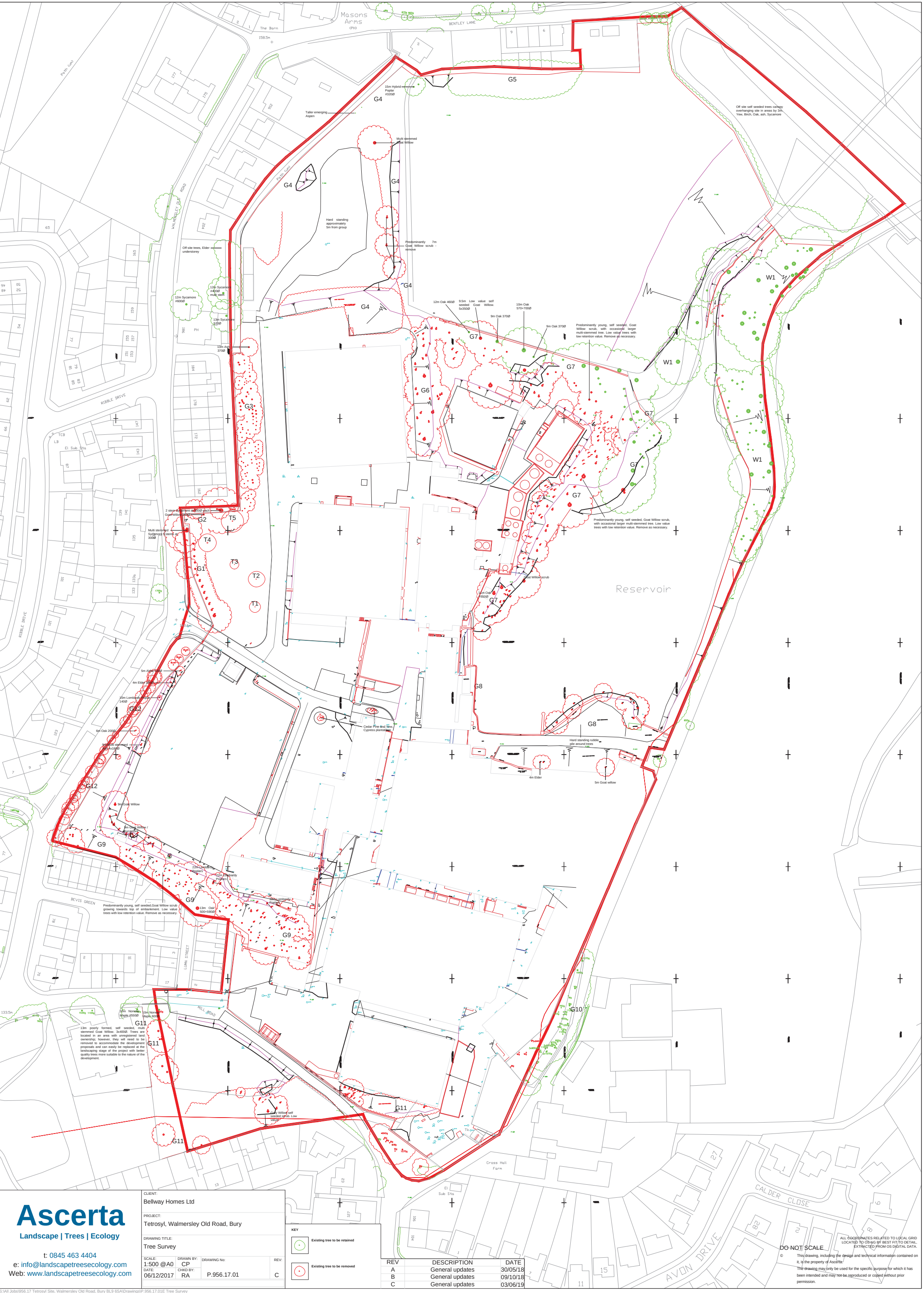
Internal Wiring: Wiring to luminaire shall be 1.5mm² PVC insulated flexible cable

Door Orientation: Side Road - Facing road

- NOTES:
1. THIS DESIGN HAS BEEN PREPARED IN ACCORDANCE WITH THE CDM REGULATIONS 2015 REGULATION 9.
 2. NO ACCOUNT IS TAKEN FOR THE BLOCKING EFFECT CAUSED BY BUILDINGS, TREES ETC.
 3. THE CALCULATION SHOWN BY THIS DRAWING ASSUMES THAT THE WHOLE AREA BEING CONSIDERED IS IN THE SAME PLANE, I.E. THERE ARE NO CHANGES IN GRADIENT OR ELEVATION.
 4. ALL NEW UNITS TO HAVE INDIVIDUAL DNO SERVICE CONNECTIONS WITH DOUBLE POLE CUT OUTS.
 5. ALL EQUIPMENT TO BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH BURY COUNCIL SPECIFICATION.
 6. ALL COLUMN POSITIONS TO BE AGREED WITH SITE ENGINEER.
 7. UNIT REFERENCES FOR INSTALLATION USE ONLY.

REVISION	DESCRIPTION	DATE	BY
DEVELOPMENT			
TETROSYL, BURY			
DRAWING			
PROPOSED S38 STREET LIGHTING DESIGN			
DEVELOPER			
LAND OWNER			
DRAWING NUMBER	466_P_PL02_Tetrosyl_Planning Layout_G-purged	REVISION	
	SHEET 2 OF 2	-	
CONTRACT NUMBER	AP0524-571	DRAWN BY: T POWELL	SCALE: 1:500 @A1
		APPROVED:	DATE: 22 NOV 19
		FOR COMMENT ONLY	

Appendix 6



Ascerta
Landscape | Trees | Ecology

t: 0845 463 4404
e: info@landscapetreeseecology.com
Web: www.landscapetreeseecology.com

CLIENT:
Bellway Homes Ltd

PROJECT:
Tetrosyl, Walmersley Old Road, Bury

DRAWING TITLE:
Tree Survey

SCALE: 1:500 @A0
DATE: 06/12/2017
DRAWN BY: CP
CHECKED BY: RA
DRAWING No: P.956.17.01
REV: C

- KEY
- Existing tree to be retained
 - Existing tree to be removed

REV	DESCRIPTION	DATE
A	General updates	30/05/18
B	General updates	09/10/18
C	General updates	03/06/19

DO NOT SCALE
This drawing, including the design and technical information contained on it, is the property of Ascerta.
The drawing may only be used for the specific purpose for which it has been intended and may not be reproduced or copied without prior permission.

Appendix 7



**Bevis Green Works (Tetrosyl)
Mill Road, Bury BL9 6RE**

**Development for Residential Use
(Planning Ref. 53762, 2012)**

OUTLINE REMEDIATION STRATEGY

For: Barratt Manchester

May 2019

R2174-R01-v2

DOCUMENT CONTROL SHEET

Report Title: Bevis Green Works (Tetrosyl) Development for Residential Use
(Planning Ref. 53762, 2012): Outline Remediation Strategy

Client: Barratt Manchester

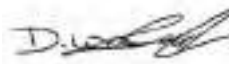
Report Reference Number: R2174-R01

Issue Final

Version: Version 2

Report Date: 02nd May 2019

Signed For Smith Grant LLP

	Name	Position	Signature	Date
Author	A F Smith BSc PhD MCIWM SiLC	Partner	pp 	02.05.2019
Reviewer	B J Thomas BSc, MSc, CMCIWEM, C.Env SiLC 	Partner		02.05.2019

Document Revision Record

Version	Report Status	Date	Details of Revision
v1	draft	30.10.2018	issued for client comment
v1	final	07.11.2018	issued for consultation with regulators
v2	final	02.05.2019	Amended in response to BMBC comments

This report has been prepared by Smith Grant LLP for the sole and exclusive use of Barratt Homes Manchester. All reasonable skill, care and diligence has been exercised within the terms of the contract with the client. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above. This report may be relied upon or transferred to any other parties only with the express written authorisation of Smith Grant LLP, such consent not to be unreasonably withheld or delayed. If any Third Party comes into possession of this report, they rely on it at their own risk and the authors owe them no duty or care of skill.

Smith Grant LLP reserves the right to alter any of the foregoing information in the event of new information being disclosed or provided and in the light of changes to legislation, guidelines and responses by the statutory and regulatory authorities.

CONTENTS

1. Introduction
2. Information Sources
3. Site Characterisation
4. Scope of Remediation
5. Health, Safety and Environmental Management
6. Inspection and Verification
7. Stage 2 Development Phase Remediation
8. Conclusions and Recommendations

DRAWINGS

- 001 Site Investigation Locations
- 002 Key Areas of Interest
- 003 Site Conceptual Model Diagram
- 004 Proposed further investigations

APPENDICES

- A SGP Monitoring Records and Photographs

1. Introduction

- 1.1. The Bevis Green Works on Mill Road, Walmersley, Bury, currently operated by Tetrosyl Ltd., has been granted outline planning consent for residential redevelopment with associated infrastructure and open space. Barratt Homes (Manchester) intend to develop the site and have instructed Smith Grant LLP (SGP) to assist in preparing a Contamination Remediation Strategy for the site. It is understood that Barratt is making a new planning application that modifies the previous development arrangement for the site whilst retaining a mix of residential housing and open space to the north.
- 1.2. The site comprises the entirety of the Tetrosyl works together with a mill lodge and adjacent, previously undeveloped, open land. The works complex includes nineteenth century cotton mill and textile print works buildings together with more recent plant, warehouses and office buildings. The works has latterly been used by Tetrosyl Ltd. for the manufacturing, packaging, storage and distribution of car-care products including a wide range of items such as antifreeze, cleaning-materials, waxes and paints. Tetrosyl also previously operated a solvent recovery process under an Industrial Pollution Control (IPC) authorisation.

1.3. Site details are:

Address	Bevis Green Works, Mill Road, Bury BL9 6RE
National Grid Reference	380950, 413950
Local Authority	Bury Metropolitan Borough Council
Site Area	10.4 ha total - development area 7.2 ha (72%), ~2.8 ha (28%)
Current Use	office, warehouse and packaging operations
Site Access	entrances off Walmersley Old Road and Mill Road
Planning Reference	53762, 30th January 2012 (Outline)
Proposed Use	residential and open space

Figure 1.1: Site Location



Reproduced with the permission of the Ordnance Survey @Crown Copyright Licence No. 100005799

- 1.4. This Remediation Strategy is based upon previous site investigations carried out by other consultants, walkover inspections by SGP staff with limited sampling and analysis of waters and vapours, and upon relevant existing planning conditions and the anticipated requirements of Bury Council and the Environment Agency with respect to contaminated land and water quality issues. The factual information from the previous site investigations has been reviewed by SGP. Where appropriate, recommendations are made for additional investigations as an integral part of the remediation strategy, which can be updated as necessary dependent upon the additional findings.
- 1.5. This report details the Remedial Strategy to be implemented by specialist demolition, remediation and earthworks engineering contractors (Remediation Phase) and by the house-builder and their sub-contractors (Construction Phase). The assessment methodology follows the framework described in the EA / DEFRA Contaminated Land Report 11: 'Model Procedures for the Management of Land Contamination' 2004.
- 1.6. It is intended that this Remedial Strategy be issued for consultation purposes to the various stakeholders including contractors and regulators (the latter as part of a forthcoming Planning Application) to allow early engagement and consultation with respect to Land Contamination issues.

2. Information Sources

2.1. The principle sources of information consulted in the preparation of this Strategy include:

Table 2.1: Information Sources

date and reference	author and title	purpose and information content
Report No. 10468-1(01) January 2003	ENSR International Ltd. "Phase I and Phase II Environmental Site Assessment Tetrosyl, Bevis Green Works"; for Tetrosyl Ltd.	environmental desk study, site inspection and intrusive site investigations including identification of 32 areas of potential concern regarding contamination, with targeted investigations (11 trial pits, 45 window sampler boreholes, 11 cable percussion boreholes; 17 gas/groundwater monitoring installations, analysis of soil and water samples) report includes summary details of 3 previous geotechnical site investigations in specific locations in 1976, 1981 and 1996 prior to developments by Tetrosyl at, or adjacent to, the current solvents tank farm and the office building
Ref: 16565-R1(00) February 2011	RSK STATS Geoconsult Ltd. "Revised Environmental Site Assessment Tetrosyl, Bevis Green Works"; for Tetrosyl Ltd.	review of ENSR 2003 desk study and intrusive investigation, with updated comparison of analytical data against relevant environmental standards, with further walkover site inspection
report 10-110-r1, May 2014	e3p "Phase i and Phase II Geo-environmental Site Investigation Bevis Green Works (Tetrosyl)"; for Tetrosyl Group Ltd.	environmental desk study, site inspection and intrusive site investigation at targeted locations (14 window sampler boreholes with gas/groundwater monitoring installations, analysis of soil and water samples)
report 11-500-R1; February 2017	e3p "Remediation and Enabling Works Strategy Bevis Green Works"; for Countryside Properties	factual information concerns supplementary targeted ground investigation works (4 rotary boreholes, 23 window sampler boreholes, 13 trial pits in car park, with gas/groundwater monitoring installations, analysis of soil and water samples); report includes reference to 5 rotary boreholes drilled in 2014 - logs not provided, with groundwater analyses from RB103 and RB104
15/BHM/006/MJF/GS/L R1, October 2015	Betts Associates 'Mill Road, Walmersley, Bury Mining Report'; for Barratt Homes	desk study review of Coal Authority and geological information concerning mining and underground quarrying risks and requirements for investigation

2.2. Review of Investigation Coverage

2.2.1. The desk studies within the above reports together with a recent culvert survey provide a basis of information concerning the development and uses of the site, in particular concerning the locations of Tetrosyl liquid storage facilities and production plant, tanks, pipes and drains most likely to serve as contamination sources and pathways.

2.2.2. The combined site investigations have provided a reasonable assessment of shallow contamination in the made ground across the site, although some areas of the site including Tetrosyl operational areas inside buildings remain to be investigated, and some potential or known areas of hydrocarbon contamination require further assessment. Whilst the investigations have mainly been targeted at particular areas of interest, the total of 112 borehole and trial pit entries over 10.4 ha is roughly equivalent to an average 30m spacing across the entire site, with closer spacing in specific parts of the site where contamination has been found or suspected. Previous investigation locations are presented in drawing 001.

2.2.3. The investigations have been carried out for the specific purpose of assessing contamination liabilities and geotechnical constraints to redevelopment for residential housing, but to varying standards. The ENSR investigations have been limited in terms of the number of samples and suitability of the analytical suite adopted for soil samples, however the more recent e3p site assessments appear to have been carried out generally in accordance with the guidance principals of BS10175:2001, BS5930:1997 and CLR11, although again some potential contaminants have been omitted from the test suites.

2.2.4. The following site investigation entries are recorded as not fully penetrating the made ground, due to obstructions from old foundations, boulders, buried slabs or services, although some entries may have reached sandstone bedrock:

Table 2.2: Constrained Investigation Entries

Date and Company	Entry ref.	Depth reached (m)
ENSR 2001	PH11	1.5m
	PH13	concrete at 0.3m
	PH14	concrete at 0.5m
	PH34	obstruction at 0.3m
	PH39	concrete from ground level to >0.27m
	PH40	sandstone or concrete at 1.75m
	PH41	possible concrete at 1.8m
	BH8	concrete with slag from 1.4 - >1.6m
e3p 2014	WS101	3.45m
	WS105	3.37m
	WS106	3.59m
	WS108	5.45m
	WS109	5.45m

	WS110	1.21m
	WS112	2.45m
e3p 2016	TP101	sandstone boulders at 1.10m
	TP102	sandstone boulders at 1.60m
	TP103	sandstone boulders at 2.10m
	TP104	sandstone boulders at 1.00m
	TP107	sandstone boulders at 1.30m
	TP110	sandstone at 0.65m
	TP111	sandstone cobbles at 1.60m
	TP112	sandstone at 0.70m
	WS201	cobbles at 1.45m
	WS203	1.25m (sandstone?)
	WS204	2.15m (sandstone?)
	WS205	1.45m (sandstone?)
	WS207	1.45m (sandstone?)
	WS209	1.45m (sandstone?)
	WS210	1.45m (sandstone?)
	WS211	sandstone at 4.45m
	WS212	1.45m (sandstone?)
	WS213	sandstone at 4.45m
	WS214	0.85m (sandstone?)
	WS215	1.05m (sandstone?)
	WS217	sandstone at 3.45m
	WS218	0.85m (sandstone?)
	WS219	0.95m (sandstone?)

2.2.5. Some e3p 2016 window sampler logs contain remarks on depths of refusal on obstructions that do not match the described stratigraphy, and where such conflicts occur it has been assumed that the maximum logged borehole depth is the depth of the obstruction.

2.2.6. The following additional site investigation entries are recorded as not fully penetrating the made ground; caution should be used in some interpretations of natural ground at shallow depths particularly towards the southern end of the site where the infilled stream valley is known to be present at a depth of up to around 11m.

Table 2.3: Other Investigation Entries Not Fully Penetrating the Full Thickness of Made Ground

Date and Company	Entry ref.	Depth reached (m)
ENSR 2001	TP6	1.4m (wet / collapsing)
	TP7	3.8m (limit of excavation)
	PH9	5.0m (limit of excavation)
	PH12	4.0m? possible fill
	PH17	4.0m? possible fill
	PH24	3.0m (wet granular fill)

	PH29	5.0m (old quarry fill)
	PH42	3.7m
	PH44	6.0m
	PH45	3.0m collapsing
	BH2	6.5m (possible natural?)
	BH5	4.5m
e3p 2014	WS101	3.45m
	WS105	3.37m
	WS106	3.59m
	WS108	5.45m
	WS109	5.45m
	WS110	1.21m
	WS112	2.45m
e3p 2016	TP105	3.0m
	TP106	3.1m
	TP108	2.0m
	TP109	2.2m
	TP113	1.7m
	WS206	5.25m
	WS208	5.45m

2.2.7. The areas currently occupied by buildings, the former quarry footprint and some other parts of the site have received limited spatial coverage.

2.2.8. ENSR (2003) conducted limited gas monitoring at the site, with significant concentrations of methane recorded as follows: BH10 (near USTs in south) up to 39% v/v; BH2 (car park fills) up to 1.6%; PH24 (car park fills) up to 1.2%, and PH42 (near USTs in south) up to 7.4%. The ground gas regime on the site on the basis of this monitoring may be divided into 3 categories - severe risks associated with areas of fuel / solvent contamination, areas of minor risk associated with minor hydrocarbon or organic contamination of car park (former reservoir) fills, and low risk areas associated with the remainder of the site, however little or no monitoring was carried out at the backfilled quarry or solvent tank farm and solvent plant, which is regarded as a high risk area as far as risks from vapour intrusion to buildings are concerned.

2.2.9. The e3p (2004) investigation refers to gas and VOC vapour monitoring for boreholes, however results are omitted from the report (which is missing the relevant Appendix 7). There is also reference to a 2014 addendum report on gas monitoring to be produced, but which has not been provided. The e3p (2016) report specifically refers to elevated methane and carbon dioxide in the area of the solvent tank farm (WS103 and WS104) and the general requirement for gas and vapour remediation including provision of gas protection in new buildings.

2.2.10. Because further investigations have been recommended by e3p, the limitations of the existing investigations and requirements for additional works to inform the remediation strategy are discussed in Section 3.5 with proposals for additional investigations discussed in Section 4.5.

3. Site Characterisation

3.1. Historical Development and Use

3.1.1. The site occupies the valley of a tributary to Pig Lee Brook which was dammed to form a mill lodge discharging to two further lodges and a culvert below the southeast part of the site. Bentley and Lumn Cotton Mills were the original development within the site. Part of the site extends south of Mill Road and is referred to as 'The Croft'. An abandonment survey for Lumn Mills Mine dated 1877 shows 2 adit entrances (one as an incline) located in the south east corner of the site connecting with workings in the Sand Rock coal seam off-site to the east. An extract from the 1844 Ordnance Survey 6"/mile scale map is provided below showing the mills at an early stage of development.



Figure 3.1: 1844 map

3.1.2. The mills were redeveloped or expanded before the date of the 1877 mine abandonment plan, and the main mill lodge extended northwards, presumably by raising the height of the dam. The 1890 Ordnance Survey 25"/mile scale map (see figure 3.2) shows the current masonry-constructed mill buildings were largely in place, annotated 'Lumn Mills (Cotton and Logwood Dyes)', with two small lodges still present in the south, and a new earth-retained reservoir in the southwest; the central lodge enclosed by buildings was reduced in size compared to the 1844 plan. An air shaft is shown on the northwest side of the main lodge, and a well in the southwest corner of the site. Two round structures (marked as chimneys on the 1908 revision) were shown alongside the mill buildings.



Figure 3.2: 1890 Map

- 3.1.3. The 1910 map marks the Lumn Mills as 'disused', and the 1928 map describes the mills as 'Bevis Green Print Works; the central reservoir is built over by this date and the air shaft is no longer shown. A rock quarry measuring ~33m east-west by ~60m north-south is recorded about 50m west of the main lodge, with a spoil heap between the quarry and former air shaft. The two chimneys previously shown are absent whilst a new building and chimney signifying a boiler house are shown on the eastern side of the southwestern reservoir.
- 3.1.4. The 1960 map records the quarry as disused with a pond present in the base, and the 1971 maps shows the quarry as part-infilled and a refuse tip is indicated in the southern part.
- 3.1.5. Tetrosyl acquired and developed the site in the mid-1960s, and the 1971 map annotates the site as 'Car Accessories Factory'. The boiler house chimney was no longer shown, presumed demolished, and some storage tanks were indicated. The timings of site investigations referenced by ENSR indicate that the solvent tank farm was constructed after 1981, and the current office and reception building was constructed after 1996. The small lodge in the southeast corner of the site is shown as infilled on the 1984 map, and two large portal frame warehouses are shown in the northwest of the site. According to ENSR, Tetrosyl personnel advised that the warehouses were constructed in the 1970s and that the excavation required to construct the northern warehouse generated rock and soil that was used to infill the large reservoir in the southwest and to form the present car park. The 1984 map does not show the quarry which is presumed to have been fully infilled by this date. Two areas of fill on the southern and western sides of the main lodge are shown on the 1999 map.

3.1.6. A variety of wells and pumps are depicted on the various maps in several locations and at different dates indicating probably shallow and small structures drawing water from the shallow sandstone bedrock below the site.

3.1.7. Asbestos containing materials (ACMs) were used within the site, including structural asbestos cement boarding and insulation; asbestos survey reports are reportedly available for the site buildings.

3.2. Geology

3.2.1. The site is mapped by BGS as being covered by superficial deposits of glacial till (boulder clay), with bedrock exposed just outside the northern boundary. Site investigation information shows that the glacial till is generally thin sandy gravelly clay, usually less than 2m thick, and absent over significant parts of the site.

3.2.2. The presence of widespread made ground can be anticipated given the industrial development and use of the site, featuring the damming of the valley, coal mining and spoil disposal in the southeast, quarrying, use of coal-fired boiler houses with ash disposal. Significant thicknesses must have been deposited to infill the valley in the south of the site. Progressive development and replacement of buildings must also have generated significant volumes of demolition rubble, and relatively recently the construction of the warehouses generating rock and soil fill. This is confirmed by the intrusive site investigations that have recorded variable depths of made ground throughout the developed parts of the site. It follows that the generally undeveloped northern third of the site appears to contain only natural soils other than a veneer of hardcore in the northwest. The deepest area of fill is recorded as lying to the south of Mill Lane ('The Croft') where historical mapping shows a fill embankment over the culverted stream; BH9 in this area recorded 11m of predominantly ash fill.

3.2.3. The site investigations record a local area of silt below part of the solvent recovery area to the west of the lodge; this may be natural or might represent made ground resulting from the removal of alluvium from the stream valley during construction or maintenance of the lodge and dam.

3.2.4. Bedrock is mapped as the Rough Rock, a sandstone of the Millstone Grit series (Namurian age). Close to the western boundary this gives way to the underlying Upper Haslingden Flags, sequences of sandstones and mudstones.

3.2.5. The Rough Rock is typically around 20m thick, and contains the Sand Rock coal seam, typically around 0.6m thick at about 12m above the base of the Rough Rock; the seam may be underlain by mudstones. The Sand Rock coal seam is shown outcropping adjacent to the southeast site boundary and dipping away from the site to the southeast; this is consistent with the Lumn Mills

Colliery mine abandonment plan. There is no record of the Sand Rock coal present elsewhere below the site, and the purpose of the former 'air shaft' west of the lodge is unknown. Local faulting might have resulted in the Sand Rock Coal being present in this area but is equally possible that this was a trial or was used to access an underground stone quarry - the Upper Haslingden Flags were quarried extensively in the region, however there is no record of underground quarry at or adjacent to the site. The later development of the stone quarry near to the air shaft may signify some possible connection with the shaft.

3.2.6. A fault crosses the centre of the site southeast-northwest, displacing the strata down to the southwest. There are no records of the dip of strata within the site, however the outcrop pattern suggests that the centre of the site has relatively shallow dip to the south and east, with this increasing towards the eastern boundary. Rotary drilled boreholes within the site indicate a more complex pattern than suggested by the geological mapping, with thick mudstones present in places (either mudstones possibly associated with the Sand Rock coal, or Rossendale Formation mudstones between the Rough Rock and Upper Haslingden Flags); this suggests the existence of further unrecorded faulting. None of the available e3p rotary-drilled borehole logs (RB201 - RB204) recorded coal seams, although a small void (50mm) was reported in RB203 within sandstone bedrock at 3.7m below rockhead.

3.2.7. The typical stratigraphy derived from information in the ENSR and e3p site investigation logs is summarised below:

Table 3.1 Summary of Site Stratigraphy

stratum	typical thickness (m)
made ground	0.5 - 1.0m generally below main mill buildings (likely to deepen adjacent to culverted former stream) 1-2m below solvents tank farm area 4-6m car park area >5.25m in backfilled quarry (full depth unknown) 11m in "The Croft"
glacial till (boulder clay)	0 - 4m (deepest on western side of site, thinnest in centre/north of site)
Rough Rock	>10m

* estimated based on many entries not fully penetrating the made ground or drift

3.3. Hydrogeology

3.3.1. The hydrogeology is likely to largely reflect the original surface topography, which falls from around 154maod to 135m aod across the development area. Typical levels of groundwater appear to be around 2-3m below the sandstone rockhead, sloping down to the south, with localised flows expected to be southwest from the western side of the site. e3p (2017) estimated the average groundwater gradient to be 0.02. The Rough Rock is likely to exhibit significant secondary permeability via bedding planes and joints and faults and is classified by

the Environment Agency as a Secondary A aquifer. The presence of historical wells and pumps in the area indicate sufficient transmissivity for local abstraction for industrial use. There are no current licensed abstractions within 500m.

- 3.3.2. The culverted stream (tributary of Pig Lee Brook) is likely to be the principle point of discharge and receptor for groundwater flows from the site; it is assumed that the culvert generally follows the original base of the valley but may have been diverted to the west of the original valley in the southern part of the site. The culvert appears to be generally of masonry construction often with a flagstone roof below the mill, becoming a brick arch or tube downstream. A culvert survey carried out for the Environment Agency in 2012 noted infiltration to the culvert at various points along its length.
- 3.3.3. There is no record of mine drainage from the old mine adits or former air shaft however these locations await inspection.
- 3.3.4. Mudstone strata are likely to limit the depth of groundwater movements within the site, and groundwater flows are expected to be predominantly sub-horizontal and shallow in depth (say up to 10m), potentially reducing in the south of the site where rotary drilling has recorded lower permeability mudstones replacing the sandstones. A spring is recorded to the southeast of the site which may represent the boundary exposure of sandstones and underlying mudstones.
- 3.3.5. There is some evidence for southward flow of groundwater from the solvent tank farm and solvent filling room, with strong solvent odours reported ~50m south in BH4 in 2003, in sandstone and mudstone bedrock from 2.3m to the base of the hole at 3.2m (water level at 2.4m depth); groundwater from BH4 contained elevated concentrations of solvent compounds. In 2017 monitoring, low levels of solvent compounds were detected in BH203 about 50m southwest of the likely source areas. However, it is possible that BH4, and maybe BH203, could have been impacted by more localised historical leaks from disused USTs in the vicinity of BH4; the USTs had been concrete filled at the time of the ENSR 2003 investigation and their previous contents was not recorded. There has been no monitoring of BH4 since 2003, and due to the complex of mill buildings there are no further monitoring boreholes directly to the south of the solvent processing area and tank farm before reaching RB201, located within the yard area about 200m to the south. RB201 was monitored by SGP in 2018 and was uncontaminated by solvent chemicals, as was the downstream culvert outfall (off-site).
- 3.3.6. The impounded reservoir is likely to locally affect groundwater flows, and it is unclear whether any groundwater flows east from the solvent tank farm area discharge directly into the lodge (water analysis for the Lodge in 2017/18 showed no detectable levels of solvents).

3.3.7. Perched groundwater has been recorded at shallow depth within the made ground in various locations, however the clayey fills and drift deposits are likely to hold limited quantities of groundwater. Parts of the car park / former reservoir fills contain coarse granular fills (including sandstone boulders), and local perched water has been noted in some trial pits here. The ashy fills in the south of the site appear to be relatively free-draining, and groundwater was recorded below the base of the fill (at >9.0m depth) in BH9 in The Croft area.

3.4. Present Land Condition

Table 3.2: Land Condition Summary

Site Description	The site main access is from Walmersley Old Road; the site was still partly operational at the time of the most recent inspection by SGP (September 2018); the solvent tank farm is understood to be disused. Many bulk storage tanks, IBCs and drums continue to be used within the site containing a wide range of substances; a detailed Tetrosyl inventory has not been provided. Specific substances stored in bulk tanks at the site have included: • white spirit (paint thinner - light petroleum distillate) - USTs • monoethylene glycol (antifreeze) - USTs • methanol - USTs • fuel oil (diesel and heating oils) - ASTs / USTs • kerosene (paraffin) - AST • methylene chloride (dichloromethane / DCM) - AST • sodium silicate solution - AST • aromatic solvents (toluene/ethylbenzene/xylenes) - ASTs • bitumen AST numerous (estimated at several hundred) IBCs, 45 gallon drums and other containers on site were observed during the SGP walkover inspection a full inventory was not possible, however legible labels including the following: • isopropyl alcohol (propan-2-ol) - solvent • C10 aromatic naphtha solvent (aromatic hydrocarbons predominantly in C8-C12 range, with <1% naphthalene) • 'Semtol' paraffinic white oil • alcohol-based fragrances • 'waste' or unlabelled containers Heavy staining was noted on surfaces in several locations, as were sheens on standing water.
-------------------------	--

Boundaries	north: steel palisade fencing and walls east: masonry walls and steel palisade fencing south: brick/concrete walls and steel palisade fences; the Croft is unfenced onto Mill Road west: steel palisade fences and walls
Services / Wayleaves	surface water culvert runs via lodge overflow channel to south side of dam, then south below mill buildings (invert level 2.22m depth in manhole in south of site), then below Mill Lane and The Croft (invert level at 13.36m depth in manhole near western boundary), flowing to outlet in valley 145m to southwest. A combined sewer runs west below Mill Road from the southern end of the site, at 2.75m depth at the site boundary. 6.6kV electricity mains run through the site between Walmersley Old Road and Mill Road, with low voltage distribution from a substation in the centre of the site. There is no record of gas mains entering the site; water mains and telephone lines enter the site but there are no details regarding internal networks. There is no information concerning other pipelines or fibre optics systems and a full utilities and services survey is outside the scope of this assessment. Other than Mill Road between the Croft and the remainder of the site there are no Rights of way crossing the site.
Structures	A variety of buildings occupy the site, ranging from original single, one and two-storey masonry mill buildings to modern 2-storey offices and steel portal frame warehouses. There are various bulk liquid storage tanks distributed around the site, including underground and above ground tanks (USTs and ASTs) - these are described further below.
Surfaces / Vegetation	The site is sparsely vegetated in the southern part, with some peripheral trees and scrub; around the car park and offices is managed grass and tree landscaping, whilst to the north and surrounding the lodge is scrub woodland and a mowed field area; Japanese Knotweed has previously been reported on the site but has not been observed nor inspected for by SGP.
Surface Waste / Contamination	A walkover inspection by SGP noted numerous tank locations and storage of IBCs (intermediate bulk containers) with a range of contents; no evidence of significant leaks or spills of chemicals or of waste disposal within the site was recorded, although much of the material in drums and IBCs is probably waste material, given the condition of the containers and the storage arrangements. A preliminary survey of manholes in parts of the site and in Mill Road recorded elevated concentrations of volatile organic compounds (VOCs) measured by PID inferring a degree of discharge or emission from the site was taking place at this time.

3.4.1. The aerial photograph below shows the recent land condition.

Figure 3.4. Recent Aerial Photograph



3.5. Contamination

3.5.1. 15 potential or known hydrocarbon contamination source areas have been identified in table 3.3 below, at the approximate positions shown on drawing D02; this information is cross-referenced with the areas of potential concern (APCs) listed by ENSR (2003).

Table 3.3: Potential or Known Contamination "Hot-spots"

ref.	feature	investigation	reported contamination
#1 (APC-1, APC-2, APC-13)	southern corner of site including former reservoir, USTs for white spirit , antifreeze (MEG), methanol, and ASTs including heating oil, antifreeze mixing area	ENSR (2003) BH10, BH11, PH12, PH13, PH42	high TPH/BTEX reported in PH42 soils and groundwater; groundwater in BH10 (down-gradient) contained traces of ethylbenzene and xylenes
		e3p (2014) WS107 (RB102 - no log or monitoring data)	no significant contamination in ashy fill
#2 (APC-4)	drum compound	ENSR (2003) PH40, PH41	elevated lead in PH41 soil (492mg/kg at 0.8m)
		e3p (2017) RB202	trace of aromatic hydrocarbons (C10-C12) in groundwater 48 µg/l
#3 (APC-6)	fuel oil AST in yard	ENSR (2003) PH9, PH44	elevated sulphate in PH9 soil
#4 (APC-7)	diesel AST in yard	ENSR (2003) PH10	possible TPH contamination (but could be coal) and slightly elevated arsenic (43mg/kg at 1.1m)
		e3p (2014) WS114	no significant contamination in ashy fill
		e3p (2017) RB201	sampling by SGP 2018 - no significant contamination
#5 (APC-8)	kerosene AST	ENSR (2003) BH8	no analysis (visually uncontaminated sandstone gravel over concrete)
		e3p (2017) WS201, RB103	no significant contamination of soil or groundwater

ref.	feature	investigation	reported contamination
#6 (APC-9, APC-10)	ASTs for DCM, white spirit, kerosene, sodium silicate, heating oil located between mill buildings	ENSR (2003) PH3, PH4, PH15	elevated TPH in PH15 at 0.2m depth; no other samples analysed due to absence of apparent contamination
		e3p (2014) WS111, WS132	WS113 - moderate TPH (C16+) contamination in soil above 0.5m depth; WS132 - no analysis
		e3p (2017) WS205, WS207	no significant soil contamination
#7 (APC-11, APC-12)	electrical transformer, diesel AST on side of mill building	ENSR (2003) PH5	no PCBs detected in sample from PH5 adjacent to transformer; no other samples analysed due to absence of apparent contamination
#8 (APC-15)	disused AST (contents unknown) on lodge dam	ENSR (2003) PH17	traces of TEX/TPH in sample at 2.4-2.6m
		e3p (2014) WS109	no significant soil contamination
		(RB101- no log or monitoring data)	
#9 (APC-19)	former USTs infilled with concrete near boiler house	ENSR (2003) BH4	moderate levels of TEX in rock at 3.0m; high concentrations of ethylbenzene (550 µg/l) and xylenes (1,600 µg/l) in shallow groundwater
#10 (APC-20)	solvent filling room and ASTs	ENSR (2003) PH37	traces of BTEX in rock at 1.7m - high VOC vapour reading
		e3p (2017) WS215	no significant soil contamination
#11 (APC-21, APC-23)	solvent recovery plant and tank farm (various ASTs and pipework)	ENSR (2003) BH6, PH31, PH32, PH33, PH34, PH35	low levels of BTEX, TPH and VOCs in soils; very high BTEX/TPH in groundwater from BH6 (benzene 18, toluene 8,300, ethylbenzene 780, xylenes 1,900 µg/l); also, similar contamination in aquifer 50m to south at BH4 in 2003 (toluene 35, ethylbenzene 550, xylenes 1,600 µg/l)
		e3p (2014) WS103, WS104, WS106 (RB104 - no log; RB105 no log or monitoring data)	WS103 - no significant contamination WS104 - groundwater contamination by benzene 86, toluene 21,008, ethylbenzene 513, xylenes 1759 µg/l WS106 - groundwater contamination by benzene 123, toluene 24,297, ethylbenzene 943, xylenes 4,549 µg/l

ref.	feature	investigation	reported contamination
		e3p (2017) WS210, WS212, WS217, RB104	WS212 & WS217 - no significant soil contamination; WS210 - no analysis; RB104 groundwater heavily contaminated (benzene 19, toluene 10, ethylbenzene 3,140, xylenes 2,440 µg/l)
#12 (APC-28)	diesel AST alongside warehouse	ENSR (2003) PH19	no analysis due to apparent absence of contamination
		e3p (2017) RB204	no significant groundwater contamination
#13 (APC-24)	waste sludge reclamation plant	ENSR (2003) PH29, PH36	no significant soil contamination
#14 (APC-22)	drum crushing plant	ENSR (2003) BH7, PH30	traces of TEX
		e3p (2017) WS202	no significant soil contamination
#15 (APC-26)	heating oil AST	ENSR (2003) PH20	no analysis due to apparent absence of contamination
		e3p (2017) WS219	no significant soil contamination

MEG - monoethylene glycol, DCM - dichloromethane (methylene chloride), TPH - total petroleum hydrocarbons, BTEX - benzene, toluene, ethylbenzene, xylenes

3.5.2. A number of other operational areas of the site could be associated with contamination resulting from leaks or spills of pollutants. These include:

- Tetrosyl vehicle maintenance shed in south of site (APC-5) - WS209 encountered asbestos, and elevated metals (copper 100, lead 500 and zinc 890 mg/kg) at 0.5m depth;
- Tetrosyl maintenance shop and former printing works mechanics workshop (APC-3) - not investigated;
- former Tetrosyl spraying room (APC-14) - PH39 no samples analysed due to absence of apparent contamination;
- Tetrosyl resin room and former reservoir (APC-17) - PH1 (0.15-0.25m depth) recorded elevated total chromium (977 mg/kg) but hexavalent chromium was <0.1 mg/kg; boron was elevated in PH6 (1.6-1.7m depth) at 181 mg/kg;
- former boiler house site, now part-covered by office building - not investigated.

3.5.3. The history of textiles industry development and use is likely to have been associated with characteristic forms of contamination resulting from construction, maintenance, demolition and waste disposal activities; the typical contaminants will include metals (e.g. lead, zinc, copper, nickel), metalloids (e.g. arsenic), sulphates, asbestos, polyaromatic hydrocarbons (PAHs) and other persistent hydrocarbons associated with oils and greases. Three soil samples collected from made ground (sandstone gravel or ash) from beneath the old mill floors recorded elevated concentrations of contaminants as follows:

- ENSR (2003) PH11 (0.8m) arsenic 70 mg/kg
- ENSR (2003) PH14(0.3m) total cyanide 437 mg/kg
- ENSR (2003) PH21 (0.5m) arsenic 84, chromium 269, copper 336, lead 1528 mg/kg

3.5.4. Asbestos testing of soils has been limited and based in part upon observations of suspect contamination. The following positive identifications of asbestos in soils have been made:

Table 3.4: Asbestos in Soils

Date and Source	Entry ref.	Description
ENSR, 2003	PH14 (0.15-0.50m)	amosite board fragments - 15-20% w/w in fill above concrete
	PH16 (0.26 - 0.45m)	chrysotile fabric - 15-20% w/w in ash and gravel fill
	PH29 (depth unknown)	amosite and chrysotile fibre fragments (0.16-0.3% w/w) in quarry backfill
e3p, 2014	WS106 (0.5m)	chrysotile fibres
e3p, 2017	TP102 (0.4m)	chrysotile fibres (<0.001% w/w) car park reservoir fill
	TP104 (0.7m)	chrysotile and amosite fibres, amosite lagging (0.001% w/w car park reservoir fill
	WS209 (0.5m)	anthophyllite fibres, chrysotile and crocidolite lagging (0.093% w/w) in sub base to car maintenance shed

3.5.5. Building asbestos surveys are reportedly available for the site. External inspection reveals probable cement asbestos sheeting present on the workshop buildings in the south of the site, however given the development history of the site, pervasive asbestos contamination within various structures and in-ground materials, ranging from intact ACM to fully degraded residues, can be anticipated.

3.5.6. Areas of deep fill historically created for engineering purposes and/or associated with waste disposal are listed as follows:

Table 3.5: Principal Areas of Deep Fills

ref.	feature	investigation	description of fill
#A (APC-29)	The Croft area south of Mill Road	ENSR (2003) BH9, TP7, TP8	principally ash fill >100 years old, up to 11m depth proven, overlies culvert
#B (APC-18)	car park on former reservoir	ENSR (2003) BH2, BH3, PH24, PH45	principally inert excavation materials (sandstone boulders, cobbles and gravel

ref.	feature	investigation	description of fill
		e3p (2014) WS108, WS113, TPs101-113	with sand and clay and occasional brick and timber fragments), around 40 years old, probably 3-5m depth, possibly with original clay and masonry lining in places; localised hydrocarbons recorded in WS113 at 0.4m (TPH 1153 mg/kg)
#C (APC-16, APC-31)	earthworks dam, including bitumen AST, and fill area on south side of lodge, used as turning area,	ENSR (2003) BH5, PH18, TP6	turning area fill is mixed construction and demolition waste with hydrocarbon contamination locally, probably around 30 years old; general dam construction features masonry gravity retaining walls and mixed soil and rock fill over 120 years old; bitumen layers noted adjacent to bitumen AST, maximum depths likely to reflect height drop of around 11m, reducing up valley sides to east and west
		e3p (2017) WS211, WS213	
#D (APC-32)	fill area on west side of lodge	inaccessible, not investigated; ENSR (2003) TP9 nearby	not investigated, but fill is possibly associated with removal of former mound located between quarry, airshaft and tramway to works in order to create platform for solvent tank farm construction; nearby TP9 recorded 2.9m of clay fill with brick fragments and organic materials
#E (APC-25)	former rock quarry including old refuse tip	ENSR (2003) PH28, PH29, PH36	quarry back-filling commenced in 1960s and appears complete by 1982; ENSR investigations limited to southern edge of quarry; e3p investigations did not reach quarry floor; maximum depth unknown but in excess of 5.45m; mapping indicates that southern half of quarry is deepest and below water table, with high walls on all sides and with base stepping up in northern third; known fill materials include largely inert granular ash, demolition rubble, gravel and cobbles, timber fragments, asphalt and fines; minor levels of hydrocarbons recorded in WS110
		e3p (2014) WS110	
		e3p (2017) WS204, WS206, WS208	
#F	air shaft location	not located	depth, fill and any capping unknown

3.5.7. Visual and olfactory observations of contamination derived from site investigation logs are summarised below together with records of VOC measurements (limited to probehole samples in ENSR entries):

Table 3.5: Contamination Observations from Site Investigations

Date and Source	Entry ref.	Description
ENSR, 2003	TP6	adjacent to lodge - hydrocarbon odour and sheen on wet fill 0.9-1.4m
	PH10	next to diesel tank - slight hydrocarbon odour 0.25-0.5m depth, PID 41ppm at 0.6-0.7m depth
	PH14	near paint spraying room - suspect asbestos fragment, PID 39ppm at 0.3m depth
	PH15	near fuel AST - hydrocarbon odour at 0.2-0.3m depth, PID up to 50ppm
	PH16	main building - fragment of suspect asbestos at 0.26-0.45m depth
	PH17	near AST by lodge - hydrocarbon from 1.6m to base of hole at 4.0m, PID up to 970ppm and elevated throughout entry
	PH30	near drum crusher - PID 311ppm at 0.3-0.5m depth
	PH32	solvent recovery plant - PID 322ppm at 1.6-1.8m in sandstone bedrock
	PH33	solvent recovery plant - PID 43-60ppm at 0.4-1.0m depth
	PH34	solvent recovery plant - solvent odour and PID 1300ppm at 0.3m beneath slab
	PH35	solvent recovery plant - PID 119-121ppm at 0.6 and 1.8m depths
	PH36	near waste paint compactor and former quarry - PID34-148ppm at 1.6m and 3.7m depths
	PH37	solvent filling room - solvent odour in sandstone at 1.5-2.0m depth, PID up to 720ppm
	PH42	near USTs - hydrocarbon odour at 1.7m to base of entry at 3.7m; sheen on wet gravelly clay below 2.0m depth; PID elevated at all depths to maximum 7889ppm at 1.7m depth
	BH4	near to former boiler house, slight odour and possible staining in made ground at 0.5-1.0m depth; strong solvent odour in bedrock at 2.3->3.2m associated with water table
e3p, 2014	BH6	solvent recovery plant - hydrocarbon odour in concrete slab, and solvent odour in made ground and silt to 1.45m depth
	BH10	adjacent to USTs - hydrocarbon odour at 0.15 - 0.7m depth
e3p, 2017	WS106	solvent tank farm - moderate odour at water table in made ground 1.5-2.2m depth
	WS109	in lodge dam - 'unusual odour' in made ground 2.7-3.1m depth
e3p, 2017	WS206	in backfilled quarry - hydrocarbon 0.15-0.35m depth
	WS210	between solvent tank farm and quarry - hydrocarbon odour 0.15-0.25m depth

3.5.8. On 12th September 2018 SGP carried out a walkover inspection of the site and conducted preliminary monitoring of VOC vapours within accessible boreholes and some drains, and sampled groundwater from boreholes (RB201 and RB203 in the southern part of the site) and the culverted stream at the reservoir overflow and culvert outlet downstream of the site. Water analyses were carried out for a comprehensive range of VOCs, semi-volatile organic compounds (SVOCs), glycols and surfactants (detergents) together with tentatively identified organic compounds (TICs). The purpose of this exercise was to include water monitoring at the key controlled waters receptors for the site (the surface water outfall from the culvert and the downgradient shallow aquifer) to determine if pollution was occurring. The results are presented in Appendix B.

- 3.5.9. Low levels of benzene, vinyl chloride and MTBE were detected in RB203 (2.0, 0.4 and 2.4 µg/l respectively), with 192 µg/l of C5-C6 aliphatic hydrocarbons (e.g. pentane/hexane). A significant level of dichlorodifluoromethane ('Freon-12') was detected in RB203, at 3488 µg/l, and 128 µg/l of ethyl ether was tentatively identified (90% certainty).
- 3.5.10. Propylene glycol was recorded in RB201, RB203 and the upstream culvert at concentrations of 11, 12 and 13 µg/l respectively, but was not detected downstream of the culvert.
- 3.5.11. Anionic surfactants were detected in all samples: RB201 0.7 mg/l; RB203 1.4 mg/l; upstream culvert 1.3 mg/l; downstream culvert 1.2 mg/l. Moderate foaming was noted at the culvert exit downstream.
- 3.5.12. No VOC/SVOC contamination was detected in groundwater in RB201 and culvert water samples.
- 3.5.13. Apart from records of a sheen on groundwater and in some saturated soils, no floating product layers have been observed in any investigation within the site. The aromatic solvents recorded within groundwater at the site (in particular toluene, ethylbenzene and xylenes) are light non-aqueous phase liquids (LNAPLs) in their free states, however none of the concentrations recorded in groundwater exceed their respective solubility limits. Apart from a low level of the breakdown compound vinyl chloride, no chlorinated hydrocarbon solvents have been detected during any investigation.
- 3.5.14. A comprehensive sweep of drains, containers and structures was not carried out during the SGP inspection; however, some readily accessible sub-surface voids were checked, again at the downgradient and of the site to establish if off-site emissions were occurring. Elevated PID readings were detected in a number of manhole covers, including some off-site locations near residential housing.
- 3.5.15. On the basis of the above information, the proven or likely contamination sources that will need to be considered when redeveloping the site are as follows:
- the general made ground, including ash and clinker, with localised inclusions of heavy hydrocarbons or organic materials (timber fragments), and possible cyanides (at a single location);
 - soils, shallow rock and groundwater below and around former and existing storage facilities for solvents and solvent processing operations (white spirit / toluene, ethylbenzene and xylene)
 - other storage and handling/dispensing areas for liquids including white spirit, fuel oils, antifreeze, detergents and other chemicals, in particular, the area of USTs in south of site (BH10 area);

- all drains, channels and ducts crossing the site where historical or contemporary leaks and spills may have collected, migrated and discharged;
- boiler house and former USTs (potential hydrocarbon contamination at BH4);
- wet and dry waste materials storage;
- asbestos building materials and demolition materials / laggings in fills, in particular car park fills;
- isolated “hot-spots” e.g. Freon in groundwater at RB203, and total cyanide in made ground at PH14;
- potentially methanogenic organic matter in fills within the former sandstone quarry, area of fill on western side of lodge;
- possible Japanese Knotweed infestation (to be confirmed).

3.5.16. The numerical values of soil concentrations for the above contaminants can be compared against accepted limits that cause no significant harm to human health or controlled waters. The use of these standards normally requires a statistical approach to be taken based upon averaging areas. However, there has been insufficient sampling and analysis in order to adopt this approach and both confirmed and anticipated, highly localised impacts, and preferential migration pathways emanating from sources which cannot be fully assessed due to exiting constraints, necessitate the assumption that at least some of the soils will present unacceptable risks to future residential use of the site without mitigation.

3.6. Conceptual Site Model

3.6.1. The conceptual site model is summarised below and presented in diagram form in drawing D03.

Table 3.7: Summary of Pollutant Linkages under development and residential use

receptors	Pathways	contaminant sources
human health (future residents) (transient risks to construction workers addressed under HSWA 1974 / COSHH)	consumption of contaminated vegetables	asbestos, metals/metalloids and PAHs in made ground, asbestos residues, VOCs in made ground and natural soils / bedrock: <i>probably widespread throughout site, although regrading may locally remove sources from specific areas</i>
	soil and dust ingestion	
	inhalation of dust / vapours	
	dermal uptake	
	migration and accumulation of ground gas in buildings	methane and carbon dioxide, locally VOC vapours emanating from made ground and natural soils / bedrock (or possibly shallow groundwater) VOCs <i>have been confirmed by high PID readings and represent a significant risk of intrusion into future dwellings</i>
	infiltration of water supply pipes	VOCs, PAHs and sulphates in made ground and groundwater
buildings	migration and accumulation of explosive gas in buildings	Methane emanating from made ground and hydrocarbon impacted natural soils / bedrock, possible mine-gas <i>subject to various assessment with varying degrees of confidence, precautionary mitigation measures will be required in a significant proportion of the site</i>
	contact with aggressive soil or groundwater	sulphate in made ground -assessed
plants	root uptake of phytotoxic metals	boron, copper, nickel, zinc in made ground, <i>although concentrations not indicative of severe risks</i>
groundwater and Pig Lee Brook	migration of dissolved substances	metals, hydrocarbons, detergents, alcohols (antifreeze), Freon in groundwater <i>receptor is not particularly sensitive, discussions with regulators required to determine realistic and defensible targets</i>
	surface water run-off / drain discharges	suspended solids (silt), hydrocarbons, detergents and antifreeze mobilised from drain sediment or loose deposits on site surface <i>only current impact appears to be some foaming from surfactants detected at low concentrations, risk s will increase as site is disturbed during works</i>

4. Scope of Remediation

4.1. Remediation Objectives

4.1.1. The remediation objectives, strategy and implementation plan described below address the contamination identified to date and the likely requirements should further contamination be identified during the remediation works. The results of all additional investigations will be submitted to the Regulatory Authorities. If additional contamination is encountered, and subsequent investigations/risk assessment indicates the requirement for any substantial revisions to the strategy, these will be submitted to the Regulatory Authorities for approval.

4.1.2. The key remediation objectives are to:

- carry out further ground and groundwater investigations to update and complete gaps in the existing investigation coverage and confirm whether any alterations to the strategy are required;
- break significant or potentially significant future pollutant linkages resulting from the change of land use, in particular, related to shallow garden soils and human exposure, and to prevent potential pollution of Pig Lee Brook;
- remove/remediate significant pollution sources such as hydrocarbon hot-spots, if present, that pose a risk to man and the environment;
- respond appropriately to contingencies, in particular, the discovery of previously undisclosed contamination;
- remove development constraints and prepare the site physically to enable residential development;
- manage all emissions to air and water to protect surface waters and groundwater and the atmosphere during the remediation works;
- provide appropriate additional protection measures to be implemented during construction, including building gas barriers, water mains protection, and garden / open space soil quality and thickness.

4.1.3. The potential risks identified will be managed in order to break any potential pollution linkages and allow development of the site for its intended residential use without harm to human health, property and the environment. Each of the potential contaminant linkages identified in the site conceptual model and risk assessment will be addressed for the remediation strategy to be considered appropriate for the site and to allow construction to commence. The latter will take place on a phased basis.

4.1.4. During the remediation works, various contaminated materials will be exposed and mitigation to prevent exposure of site workers, local residents and site visitors to harmful or nuisance substances is a fundamental requirement of the remediation strategy. Similarly, the works must

not cause pollution of water by discharge of silt or other materials to the surface water receptors on, and adjacent to the site.

- 4.1.5. Risks to human health associated with the identified contamination by asbestos, metals, PAHs and non-volatile hydrocarbons can be managed by isolation of affected soils from future residents and, to lesser extent, maintenance workers (whose exposure is likely to be limited). It is assumed that these substances may be widespread in the made ground across the site. Re-graded fills will be covered in part by permanent hard standing or buildings to provide physical isolation of any residual contamination. Specific measures to isolate humans from direct exposure to such contamination are only required in areas where gardens or soft landscaping is proposed or where future disturbance can be readily anticipated, such as utility corridors.
- 4.1.6. The other exposure pathway with the potential to affect human health is the volatilisation, migration and indoor inhalation of volatile hydrocarbons associated with fuel, white spirit or other solvent spills or leaks. Other than Freon, the substances previously detected are readily degradable and are likely to have dispersed and have been attenuated to an unknown degree. Therefore, additional investigations will be undertaken to confirm whether this pathway requires further risk assessment and to delineate areas requiring remediation. Remediation is expected to combine elements of source reduction with barriers, the latter comprising the use of petroleum-resistant barrier membranes. It is assumed that all new buildings on deep fill or hydrocarbon-impacted parts of the site will have passive gas protection measures including methane/VOC-resistant membranes and ventilated sub-floors.
- 4.1.7. The potential for exposure of concrete to aggressive ground conditions and water supply pipes to damaging substances is considered to be generally low but may be subject to further assessment during or following the remediation works. In areas of the site impacted by solvent hydrocarbons or fuels it is very likely that precautionary pipeline protection will be required for water supply mains.
- 4.1.8. The requirement for substantial soil and groundwater remediation of hydrocarbons is anticipated in key risk areas, notably hot-spots 1, 10 and 11, (and any down-gradient plumes) with the possible inclusion of other areas subject to additional and up to date investigations and monitoring. Decommissioning and demolition will need to be progressed in the relevant areas of the site prior to such further investigations and any subsequent remediation to ensure the removal of potential further sources and to facilitate access to these areas.
- 4.1.9. It is envisaged that specialist groundwater and soil remediation will then be the subject of further remediation statements to be agreed with the Regulatory Authorities before further development takes place in these areas.
- 4.1.10. As a priority the general remediation works proposed must not cause the release of any

polluting substances to controlled waters, either via sub-surface or overland flows. Careful consideration of the phasing of the site demolition, investigation, assessment, remediation and verification is required with sufficient time for consultation with the regulators allowed in the programme.

4.1.11. The remediation works will also physically prepare the site for the proposed development.

This entails modifying ground levels including infilling of the existing lodge, improvement of the engineering properties of the ground by removing obstructions to foundations and services, and removal or treatment of deleterious materials, provision of supporting structures and suitable founding surfaces for infrastructure.

4.2. Options Appraisal

4.2.1. Options for the remediation of the identified and potential contamination sources are summarised below:

Table 4.1: Remedial Options Outline

Method	Advantages	Disadvantages.	Feasibility
Do nothing	No cost	Potential long-term human health risk remains from exposure to impacted soils in garden areas, and VOC vapours from shallow depth contamination.	Not acceptable given the future residential use of the site.
Physical Barriers	Well understood technology.	Requirement to source, place and maintain cover layers, and accommodate cover thickness within development levels; covers to hydrocarbon vapour sources may require high-specification gas protection	Practical option for garden and landscaped areas where direct exposure is a possibility and for breaking the indoor migration pathway if required. However, some localised source concentrations are too high or too mobile for sole reliance to be placed on barriers
In-situ treatment (thermal/chemical/biological)	Treat contamination at source, reducing disposal cost and waste generation; suitable for VOCs in bedrock aquifer via either enhanced degradation techniques	Destructive techniques only suitable for relatively degradable organic residues. Timescales for the treatment of more recalcitrant substances are unlikely to fit development programme	Biological/chemical treatment is an option where significant soil / groundwater contamination by light petroleum hydrocarbons is confirmed, where contamination is not accessible (i.e. within the sandstone bedrock/aquifer) this may be the only feasible means of source reduction

Method	Advantages	Disadvantages.	Feasibility
In-situ treatment (stabilisation)	Stabilisation is an effective means of isolating inorganic or low volatility/low solubility organic substances which are not amenable to treatment using destructive techniques	Likely to be a feasible option for inorganic or low-volatility hydrocarbon impacted soils to be reused below development areas	Most contaminants requiring treatment on the site are organic; if stabilisation of localised asbestos containing soils is proposed a high intensity (solidification) solution may be suitable; it is more practical that these are isolated at depth when such treatment would not be required
Excavation / extraction followed by ex situ treatment or disposal	Well understood technologies. Methods can reduce source volumes and contaminant levels and can be validated on short timescale for soils (longer for groundwater). Suitable as pump and treat solution for solvent treatment in groundwater.	VOC contamination appears to have migrated into sandstone bedrock below and down-gradient of solvent sources areas; not feasible to excavate bedrock and groundwater treatment by extraction can be lengthy depending upon extent and accessibility of solvent plume(s)	Practical option for defined hot-spot shallow soils and groundwater containing volatile / semi-volatile petroleum hydrocarbon contaminants, disposal is the only likely option for inorganic or highly recalcitrant contaminants which are not suitable for treatment or retention below a cover system

4.2.2. The ground on the site locally contains concentrations of contaminants that, in the absence of mitigation, could pose an unacceptable risk to the health of future site users if present in garden soils and where residents may be exposed by inhalation of harmful vapours. The "do nothing" option, containing no specific measure to remediate ground contamination or deal with further mobile substances, is therefore not acceptable.

4.2.3. A strategy involving removal of all site fills for off-site treatment or disposal has the benefit of removing all potential contamination sources. However much of the material present on the site is unlikely to pose an unacceptable risk to human health or controlled waters. This option would require the use of significant resources in the form of replacement fill materials and landfill space, and large additional lorry movement numbers, and is therefore regarded as unsustainable both economically and environmentally. The regrading requirements to develop the site are likely to require a balance or net import of fills and therefore any removal of material from the site should be minimised.

4.2.4. Risks to future site users from direct exposure to any residual low-mobility contamination can be managed by the use of barrier systems. Use of a suitable thickness of clean cover material over the site surface in areas where low-mobility residual contaminants will remain and where human exposure could occur following remediation would provide physical isolation and break the relevant pollutant linkages. Gas protection measures can afford a high degree of protection from some mobile sources, although the degree of reliance that can be placed on these is dependent on the quality of the materials and the installation. Minor risks to site users from

tainting of water supplies could be managed by the use of high specification resistant materials or locating water mains within clean trench fills or clean uncontaminated strata.

4.2.5. The presence of significant hydrocarbon contamination in the areas where potential sources of these substances were present is confirmed, and the results of the additional investigations and validation works proposed will delineate any current contamination by these substances. It is envisaged that low concentrations can be mitigated through the use of barrier systems as described, although this should be combined with source reduction or removal in some instances. Further risk assessment will be needed to assess whether isolation, treatment or removal offer the best solution. It will be necessary to demonstrate that any residual contamination does not pose a significant risk to controlled waters.

4.2.6. The preferred option involves elements of all of the previously described techniques. This will entail:

- removal of effectively un-treatable contaminated / deleterious materials (organic wastes, bulk asbestos, free product or heavy hydrocarbon contamination) for off-site treatment / disposal;
- screening all other contaminated materials identified during the works and selection of those which present unacceptable risks to human health or are potentially significant long-term diffuse pollution source; removal of these segregated materials for either on-site treatment or off-site treatment / disposal;
- in areas of the site where low-level residual contamination such as the metal and arsenic affected fill materials are already characterised, provision of clean cover system for gardens and landscape areas;
- it is not feasible to excavate and remove or treat solvent contamination in bedrock, therefore groundwater / rock treatment methods will be required where necessary to reduce future vapour concentrations and ground level and in groundwater down-gradient; such methods may include aeration/oxidation techniques to enhance natural degradation processes, dual vapour extraction from soil, rock and groundwater, and/or groundwater extraction and treatment (e.g. separation, aeration and activated carbon filtration);
- the provision of gas/vapour barriers to built development will be reviewed following the further investigations and monitoring, but passive building gas protection (e.g. CIRIA CS2) measures are likely to be required for deep fill areas (>2m depth), with CIRIA CS3 / hydrocarbon vapour barriers in areas over residual solvent contamination in soils, bedrock and shallow groundwater.

4.2.7. The remediation strategy involves provision for the removal of selected asbestos wastes and contaminated soils and liquids (where encountered), in situ remediation of petroleum hydrocarbons/solvents in soils, rock and groundwater where appropriate, and the isolation of

residual low-level contamination by barrier systems to each potential migration pathway identified.

4.2.8. Screening and testing of any site-won, treated materials, including recovered aggregates, will be required where it is proposed to reuse such materials; the screening of samples of recovered aggregate for asbestos fibres will be undertaken. If hydrocarbon impacted soils are treated, then the appropriate permits will be obtained in advance, and validation testing of the resultant products will be undertaken to enable comparison with target levels for the protection of human health and controlled waters.

4.2.9. At present it is assumed that all parts of the development area will require clean cover, and that there is limited recoverable topsoil present, necessitating the import of clean topsoil. No specific remediation or provision of clean soil cover is considered to be required in the previously undeveloped POS areas. It may be possible to generate some clean subsoil from the shallow natural soils where accessible. All site-won or imported soils to be used as part of the garden or landscaping cover layer will require validation.

4.3. General Approach

4.3.1. The general approach to the site preparatory / remediation works (Stage 1) is described below:

Table 4.2: Remedial Options Outline

Site security and supervision	The site will be securely fenced throughout the works; the remediation contractor will provide a full-time Engineer on site.
Access	Access will be formed through an existing entrance off Walmersley Old Road
Tree protection	Trees subject to preservation orders will be fenced off to prevent root damage; where residual contamination may be present within the root zones of protected trees, then clean cover depths may be feathered out to avoid damage to the trees.
Ecological clearance	Ecological clearance works (fish removal from Lodge) will progress in accordance with a method statement provided by the specialist sub-contractor; surveys will take place as necessary and measures taken to mitigate any harm from the proposed works to other protected species, e.g. badgers. A survey for invasive weeds (e.g. Japanese Knotweed) will be carried out and any affected zones quarantined before works on site commence; treatment measures will be carried out in accordance with an approved method statement, and contaminated soils either removed or buried at depth outside the development area.

Asbestos clearance / decommissioning demolition	Asbestos stripping from existing buildings will be undertaken by a specialist sub-contractor under carefully controlled conditions; where stripping is impossible due to the unstable nature of the buildings these will be demolished under strict conditions of dust control; asbestos cement sheet fragments will be hand-picked during systematic walkover inspections by the specialist sub-contractor using suitably trained staff and in accordance with the remedial plan; asbestos will be double-bagged and placed in secure temporary storage (covered hazardous waste skip) pending off-site disposal; site staff will be trained in asbestos recognition and may hand pick further bonded asbestos where observed during the earthworks; in the event of significant unexpected deposits of asbestos containing materials being encountered then the specialist sub-contractor will revisit the site to carry out decontamination. As the site is currently operational it is assumed that Tetrosyl will retain responsibility for the emptying and cleaning of all fixed pipework, tanks, catch pits and sumps, and removal of all mobile tanks, IBCs and other containers prior to release of the site. If liquid product or sludges are found or suspected in pipes or tanks these will be tested, removed and disposed of off-site prior to removal of the plant.
Vegetation strip	The vegetation strip will entail flailing to remove tall plants, grass and turf stripping to a nominal 50mm depth; stripped vegetation will be stockpiled for reuse or disposal by the developer
Further investigations	Further investigations will be completed in areas of suspect contamination, notably former storage tank positions, recorded locations of spills / leaks, former process areas, and suspect solvent plume to the south of the solvents hot-spot 10 and 11 and BH4 areas, as set out in Drawing 004. Other investigations will include the location and assessment of former mine entries (the air shaft and adits – the latter to follow demolition of the mill buildings), and rotary drilling to check for shallow mineworkings in accordance with previous recommendations (Betts Associates). Investigation will also be required to identify former quarry high walls and fill materials throughout the quarry depth.
Breaking out paved surfaces, foundations and sub-structures	Existing concrete slabs, tarmac roads, relict foundations, manholes and other sub-structures will be grubbed out by hydraulic excavator. Where underground storage tanks, pipes, etc are encountered these will be assessed in accordance with established Environment Agency pollution prevention practices, with the contents assessed in advance of emptying and cleaning/purging (by specialist contractors where appropriate) before removal.

Ground Engineering	As far as practicable made ground/fills will be excavated to their full depth to allow complete removal of obstructions, oversized and deleterious materials, and identify uncharacterised contamination sources. For any areas where this cannot be achieved for any reason, an assessment of the area of constraint must be fully recorded, and an assessment made of the implications for achieving the remediation objectives and geotechnical specifications for the preparatory earthworks. Any such areas / constraints are to be fully detailed in the verification reporting for the site.
Lodge Treatment, Stream / Culvert Diversion	The engineering development of the site requires the emptying and filling of the lodge, and diversion of the stream course / culvert into an open channel running from north to south around the eastern side of the site; this will be carried out prior to removal or grouting up (subject to depth) of the existing culvert). Soft and organic sediments within the lodge will be excavated and stockpiled for drying, testing and re-use subject to suitability in landscaping works.
Materials recovery / Waste Treatment	All hard materials will be crushed and stockpiled for re-use by the developer; crushing and screening plant will be operated under a valid permit with appropriate controls over noise and dust and will be located at least 100m from existing housing; hard materials feedstock stockpiles will be inspected for potential asbestos-containing materials before crushing, with any suspect materials being removed for disposal. All materials processing will be carried out in accordance with an approved Dust Management Plan. If treatment of hydrocarbon contamination is required on site then the appropriate environmental permitting shall be obtained, and a separate method statement produced detailing environmental controls, monitoring methods and target criteria
Handling / treatment of hazardous materials / liquid wastes	Secure skips will be retained on site for the receipt of any small volume hazardous materials such as liquid waste / asbestos / chemical wastes encountered on site; contaminated waters will be pumped to vacuum tanker for removal to a specialist treatment facility; petroleum hydrocarbon contaminated soils or sludges will be temporarily stored in polymer-lined lagoons designed to prevent leaching or runoff pending treatment or disposal; any underground storage tanks or fuel / oil / solvent pipelines encountered will be carefully examined in situ, emptied and purged as appropriate prior to removal

Earthworks completion	On completion of the remediation and enabling works, the site will be re-graded to design plot levels less 750mm in areas of residual made ground, to allow for the placing of 600mm of soil cover in future gardens. It is anticipated that a surface layer of compacted aggregate will be placed at formation level following completion of the earthworks in order to protect the site surface and reduce future mixing between retained soils and clean cover etc. Such a layer would not however form part of the recommended clean cover system for gardens and would not therefore be subject to validation testing with the exception of the general screening for asbestos fibres recommended for all site generated aggregates. A suitable geotextile placed at formation level prior to the application of garden soils would further reduce mixing and the likelihood of penetration of the cover system by future site users, however the cover system specification, and the requirement for any such 'break' layers would be confirmed following completion of preparatory earthworks, when more detailed information on the distribution of contaminated and uncontaminated material at formation is available.
------------------------------	--

4.4. Further Investigations and Monitoring

4.4.1. Further site investigations will have the objectives of:

- filling gaps in the existing non-targeted coverage (largely on the footprints of existing buildings following their demolition and clearance;
- additional targeting of potential hot-spot areas where previous investigation has been limited or constrained by structures and services or is out of date (table 3.3) - expected to concentrate VOC vapours in the shallow ground;
- further investigation of the identified hydrocarbon or solvent plume areas to determine down-gradient spread in aquifer or into culvert; update the previous groundwater concentration data and refine the hydrogeological data for the purposes of flow and transport modelling, with the ultimate aim of determining appropriate clean-up targets for soils and groundwater to prevent pollution of controlled waters (compliance points expected to be adjacent to the site boundary).

4.4.2. A detailed scope of works and specifications for the further investigations will be submitted to the regulators for comment. It is anticipated that a phased approach to the additional investigation will be required in order to allow commencement of works in areas of the site identified for early completion as significant enabling and demolition works are required to access some areas where further investigation is necessary.

4.5. Contamination

4.5.1. Any contamination "hot-spots" such as asbestos, oil, fuel or other free product, and deleterious materials such as scrap metal and timber are likely to require removal if present. Asbestos containing materials on the site surface, or within the fabric of buildings/structures, or where

forming discrete sub-surface deposits exposed during earthworks, will be removed wherever they are observed.

- 4.5.2. All above or below ground containers including drums, pipe-work, tanks and bunds will be checked for liquid product and tar residues or sludge; an intrinsically safe PID will be used to assess the potential for flammable or toxic VOC vapours. Residual product will be identified by laboratory testing to confirm the appropriate waste classification and disposal route.
- 4.5.3. Intact drums containing liquid wastes will be removed directly from the site. Storage tanks and associated pipe work will be drained or pumped to secure containers or tanks and removed from the site to a permitted Waste Facility. Tanks will be purged and de-gassed flushed with water also removed by tanker before the structure is removed and disposed of or recycled off-site, after which any secondary containment or supporting structures will be broken out using appropriate plant. Any leaks or spills of liquid product will be dealt with under the provisions set out in the general environmental management for the site.
- 4.5.4. Where contamination of brick or concrete is suspected such materials will be segregated by placing in temporary stockpiles for testing prior to processing for aggregate. Where solid residues (tars) are encountered these will be removed using excavators during breaking out of the containing structure. In all cases inspection of the underlying and surrounding soils will take place in accordance with the provisions set out for hydrocarbon hotspot treatment below.
- 4.5.5. The hydrocarbon soil contamination hotspots identified to date, and any further hydrocarbon contamination identified in the additional investigations, will require specific measures to reduce or remove sources. These will entail the identification of impacted soils primarily using a PID and visual inspection. Impacted soils will be removed to a secure stockpile placed in a bunded area on an impermeable membrane liner (possibly on one of the modern warehouse floors); the stockpile will be covered to minimise leachate generation and odour. The volume of material to be treated and/or disposed of will be minimised by segregation of contaminated and non-contaminated materials where possible. The side walls and bases of excavations where contaminated materials are removed will be sampled to verify that contamination has been reduced to acceptable levels (section 6.2). Where contamination extends to the level of bedrock then excavation will cease in intact rock; further remediation by means of groundwater and/or vapour extraction may be taken according to risks to controlled water resources.
- 4.5.6. The natural superficial deposits are unlikely to be contaminated outside potential hydrocarbon / solvent hot-spots, and in areas where the natural strata are exposed at the formation surface following levelling works, and then the surfaces will be inspected for evidence of contamination. The Developer will be responsible for validating the natural soils and providing any additional topsoil needed as a growing medium for plants in gardens and landscaping, as described in

section 7 below.

4.5.7. Requirements to remediate the groundwater on the site will be confirmed following the further site investigation, monitoring, quantitative risk assessment and modelling.

4.6. Materials Management Plan

4.6.1. A Materials Management Plan will be produced by the remediation contractor for the remediation phase of the redevelopment; this will particularly address soils treatment and recovery operations, the crushing and reuse of hard materials (concrete, brick and masonry), and general cut and fill operations. The MMP will be produced in accordance with the Definition of Waste: Development Industry Code of Practice. All waste transfer records will be retained for reference. The MMP will then be taken forward by the housebuilder to address construction arisings generated during development works and recovery of clean soils for use in the cover system.

4.6.2. Materials management will be carried out so as to ensure that contaminated materials/runoff or discharge do not affect clean areas of the site or surroundings (in particular soils and materials from any hydrocarbon remediation excavations will be segregated and placed inside lined bunds where appropriate.

4.6.3. In the interests of maximising the sustainable use of resources, suitable recovered aggregates (crushed demolition rubble) or recovered soils will be used within the site wherever possible, and within the scope of the planning consent and where significant harm to man or pollution of the environment is avoided.

4.7. Unexpected Contamination

4.7.1. If previously uncharacterised materials or contamination sources (i.e. buried wastes / tanks etc.) are identified during the works, a decision must be made as to whether these can be dealt with using the techniques selected to manage the contamination characterised to date. Materials must be inspected by an appropriately qualified and experienced Environmental Consultant and, if appropriate, samples collected and analysed. The local authority will be immediately informed in writing following any such discovery.

4.7.2. It is anticipated that immobile (low volatility/solubility) contaminants similar to the types described in the site characterisation would be retained below the proposed barrier system in garden areas and that other contaminants including asbestos, volatile or liquid hydrocarbons, drums, tanks or pipes will be excavated for waste treatment or disposal using the techniques set out within Section 4.4. If any substantive alterations to this strategy are required, then these will be agreed with the regulators at the earliest opportunity and before completion of the remediation earthworks.

4.8. Programme and Phasing

4.8.1. It is anticipated that phasing of the works will be required in order to release part of the site for early use by the developer, although details of phasing and programmes are currently unconfirmed.

4.8.2. In order to expedite the early release of specific phases for construction, interim remediation earthworks phase verification reporting will be prepared and submitted to the local authority to facilitate approval for the start of development activities.

5. Health, Safety and Environmental Management

5.1. Health and Safety Roles / Responsibilities

5.1.1. The Remediation Contractor will be Principal Contractor under the Construction Design and Management Regulations and is responsible for managing health and safety during the remediation/ preparation works and for producing a risk assessment and method statement for the Stage 1 Remediation Works. Following handover of the site to the Developers, Barratt Homes will take on the role of Principal Contractor.

5.1.2. Protection of site workers, local residents and visitors during the remediation works will be achieved by the adoption of appropriate health and safety practices, environmental management and site security. All site workers will be given a comprehensive health and safety induction including notification of hazards associated with contamination and required to use appropriate personal protective equipment.

5.1.3. Asbestos clearance on the site will be carried out in accordance with the Control of Asbestos Regulations and Approved Code of Practice. The initial phase of clearance will be carried out by a specialist sub-contractor using suitably trained personnel in accordance with the remediation plan and may include licenced and notifiable works. The provision of monitoring and control measures for dealing with asbestos will be set out in separate working plans to be provided by the contractors involved.

5.2. Environmental Management Issues

5.2.1. Given the potential for disruption and odours (particularly associated with remediation and treatment of volatile hydrocarbon contamination), a communications plan will be developed to keep residents informed of the potential for odours or nuisance.

5.2.2. The scope of remediation works is unlikely to have a significant impact upon the surrounding housing and environment provided that due care is taken to control dust, odour, noise and vibration, and to prevent surface runoff onto land to the west or south of the site (Mill Road, Lumn Street, Bevis Green and Walmesley Old Road and into the drainage system leading to Pig Lee Brook.

5.2.3. Noise emissions will be managed through the observation of approved working hours, use of silenced plant, and appropriate location of crushing plant.

5.2.4. It is anticipated that works to excavate and/or treat organic contamination at the site may result in odorous vapour emissions. While these are expected to be transient, occurring mainly during physical disturbance and dissipate rapidly through dilution and dispersion, monitoring of odours at the site boundary and modification of working methods to prevent nuisance will be

implemented. Any soils treatment areas will be located away from neighbouring residential dwellings.

- 5.2.5. Monitoring for VOC vapour concentrations will be required during most of the contamination remediation activities and a hand-held photo-ionisation detector with a lamp appropriate for the range of substances present will be available. Short-term concentrations will be compared to workplace exposure limits; for mixtures of VOC contaminants, limits for the most toxic member will be adopted with provision for appropriate Respiratory Protective Equipment available where exposure limits are exceeded.
- 5.2.6. Dust management will be a key requirement, and a separate Dust Management Plan will be produced for the site. Dust will be routinely monitored, and if unacceptable emissions of any substance beyond the site boundary are noted then the element of the works contributing to this will be halted until appropriate mitigation (damping down, road sweeper, etc) can be deployed. A tractor and bowser with rain gun will be maintained ready for use if required to damp down dusty surfaces during the earthworks.
- 5.2.7. The generation of contaminated perched water or free product is unlikely to occur outside of excavations, however early measures will be taken to ensure that old drains crossing site boundaries are traced and cut off at an early stage in the works. All discharges of dewatering or surface runoff to surface waters will pass through settlement ponds of sufficient capacity. Uncontaminated or marginally contaminated perched water may be discharged to foul sewer in agreement with the utility provider.
- 5.2.8. Construction of the stream open channel will route drainage largely away from key hot-spot areas but will pass through or close to the area of former USTs within hot-spot #1. This area will require prior remediation and the construction of a fully lined channel to isolate stream water from potential residual sources. The proposed water course also passes close to the presumed locations of the two mine adits; these will be investigated following demolition of the mill buildings and any openings found will be properly sealed to the approval of the Coal Authority and Environment Agency to prevent the potential for leakage or cross-contamination.
- 5.2.9. Contractor's plant fuel and lubricant storage will take place using suitable containers, bunds and secured filling points. An oil spill kit and adsorbent materials will be provided to manage any accidental release of liquid pollutants from these sources, and also from any accidental discharge of liquid product occurring from decommissioning of relict tanks and pipe work. Where discharges soak into the ground the impacted soils will be excavated immediately, under the provisions for removal of historical hydrocarbon contamination set out in Section 4.5.

- 5.2.10. Suitable sealed skips and containers will be used for the temporary storage of small quantities of asbestos or other hazardous solid wastes, and appropriate tanks or drums will be used to temporarily hold liquid product prior to removal from the site.

6. Inspection and Verification

6.1. Targeted Additional Investigation

6.1.1. The additional investigations will be carried out as early as possible following the start of remediation works. The initial phase of investigations will involve the solvent plume area and USTs area, requiring borehole installations. The further investigations will require the removal of buildings and stockpiles of aggregate and may be phased according to the overall works programme. However, all investigations will be undertaken at the earliest available opportunity so as to minimise interruptions to the overall remediation programme. The investigations will include the following elements:

- Groundwater monitoring to establish whether groundwater pollution is occurring, delineate impacted areas and provide information for risk assessment to determine Remediation Targets for the protection of controlled waters;
- Further surface water monitoring;
- Ground gas monitoring to include VOC vapour analysis of all areas where built development is proposed.

6.1.2. All additional investigations and site inspections will be supervised by an appropriately experienced and qualified specialist Contaminated Land Consultant. It is likely that a series of short reports will be produced detailing the investigations in each area, describing any requirement for modifications to the remedial strategy.

6.2. General Inspections

6.2.1. In order to provide support to the contractor and undertake verification inspections and testing, a specialist Contaminated Land Consultant will be required to attend the site. While full-time attendance for the full programme of works is not considered necessary, continual attendance will be required for large parts of the works to implement the verification plan and identify currently uncharacterised contamination.

6.2.2. It is envisaged that full-time attendance will be required following completion of demolition of above-ground structures while floor-slabs, foundations and redundant drainage are being broken out and excavated. Outside these activities and scheduled investigations and testing, a minimum weekly visit will be required.

6.2.3. A record of descriptions, supplemented by photographic records, of the exposed strata in all areas where contamination remediation excavations are carried out will be maintained by the Environmental Consultant, together with detailed logs of PID readings, sample locations, drawings and other relevant information for inclusion in final verification reporting.

6.3. Verification Testing

6.3.1. Stripped surfaces within any hydrocarbon hotspot areas following removal of unacceptable contamination will be validated by visual inspection and PID screening to provide assessment of the efficiency of the works; additionally, soil samples will be collected for laboratory analysis. A minimum of 5 entries/samples will be taken where validation is required following any stripping of contaminated soils, with spacing across larger areas on a nominal rate of 1 sample per 25m².

6.3.2. Given that most of the contaminants of concern are hydrocarbons (variously aromatic and aliphatic compounds), Tier 1 soils screening criteria (as set out below) will be adopted to assess any requirement for additional remediation or risk assessment for the protection of human health.

Table 6.1: Hydrocarbon screening criteria (residential use)

Contaminant	Tier 1 Assessment criteria (mg/kg unless stated)
Aliphatic C5-C6	42 (S4UL)
Aliphatic C6-C8	100 (S4UL)
Aliphatic C8-C10	27 (S4UL)
Aliphatic C10-C12	130 (S4UL)
Aliphatic C12-C16	1,100 (S4UL)
Aliphatic C16-C21	65,000 (S4UL)
Aliphatic C21-C35	65,000 (S4UL)
Aromatic C6-C7	70 (S4UL)
Aromatic C7-C8	130 (S4UL)
Aromatic C8-C10	34 (S4UL)
Aromatic C10-C12	74 (S4UL)
Aromatic C12-C16	140 (S4UL)
Aromatic C16-C21	260 (S4UL)
Aromatic C21-C35	1,100 (S4UL)

NAD: No asbestos detected

S4UL: LQM/CIEH Suitable for Use Levels (S4ULs), residential with homegrown produce land use, (at 1% SOM, 6% SOM for metals). Copyright Land Quality Management Ltd. Reproduced with permission publication number S4UL 3102. All rights reserved.

6.3.3. It is anticipated that a second set of soils criteria of the protection of controlled waters will be produced following completion of the additional groundwater monitoring programme and supplementary risk assessment, and that these will be applied to residual (or treated) soils within the unsaturated zone on the site.

6.3.4. The assessment will also inform the decision whether remediation of groundwater is appropriate for the site, in which case it may be appropriate to determine remedial targets for dissolved phase hydrocarbons. It is not proposed to derive groundwater targets for the protection of human health as a vapour migration pathway upwards from the sandstone via the overlying soils cover in gardens (outdoors inhalation pathway) or via VOC resistant buildings in building

floors (indoor inhalation pathway) is unlikely to be significant compared to sources in the unsaturated soil zone.

6.3.5. It is intended that the crushed demolition and foundation arisings may be used for various purposes including protection of the site surface on haul routes, as a sub-base for hard standing, and in the construction of roads. If sufficient volumes are available this material may be placed at formation in gardens as well, however it is not currently proposed that this material is used to form part of the cover system in garden areas; therefore, testing of the material will be restricted to screening for asbestos fibres at a frequency of one sample per 500m³. Aggregate recovery should be undertaken in accordance with the WRAP protocol and particle size analysis is also required to demonstrate compliance with the required specification.

6.3.6. Subsoils recovered during the works will be tested for an appropriate contamination suite (to include all contaminants of concern identified in the relevant source areas, i.e. metals, PAHs and asbestos as a minimum) at an initial screening frequency of one sample per 500m³. Analysis and acceptability criteria will be as set out below (using LQM/CIEH S4ULs and DEFRA C4SL). Samples will be submitted to a laboratory with MCERTS accreditation as available.

Table 6.2: Cover soil screening criteria (residential use)

Contaminant	Screening criteria for Residential Use (mg/kg unless stated)
Asbestos fibre	<0.001% by mass (limit of detection)
Arsenic	37 (S4UL)
Cadmium	11 (S4UL)
Chromium III	910 (S4UL)
Chromium VI	6 (S4UL)
Copper	2,400 (S4UL)
Lead	200 (C4SL)
Mercury	1.2 (S4UL)
Nickel	130 (S4UL)
Zinc	3,700 (S4UL)
Naphthalene	2.3 (S4UL)
Acenaphthene	210 (S4UL)
Acenaphthylene	170 (S4UL)
Fluorene	170 (S4UL)
Phenanthrene	95 (S4UL)
Anthracene	2,400 (S4UL)
Fluoranthene	280 (S4UL)
Pyrene	620 (S4UL)
Benzo(a) anthracene	7.2 (S4UL)
Chrysene	15 (S4UL)
Benzo(b) fluoranthene	2.6 (S4UL)
Benzo(k) fluoranthene	77 (S4UL)
Benzo(a) pyrene	2.2 (S4UL)
Indeno(123cd) pyrene	27 (S4UL)

Contaminant	Screening criteria for Residential Use (mg/kg unless stated)
Dibenzo(ah) anthracene	0.24 (S4UL)
Benzo(ghi) perylene	320 (S4UL)
Aliphatic C5-C6	42 (S4UL)
Aliphatic C6-C8	100 (S4UL)
Aliphatic C8-C10	27 (S4UL)
Aliphatic C10-C12	130 (S4UL)
Aliphatic C12-C16	1,100 (S4UL)
Aliphatic C16-C21	65,000 (S4UL)
Aliphatic C21-C35	65,000 (S4UL)
Aromatic C6-C7	70 (S4UL)
Aromatic C7-C8	130 (S4UL)
Aromatic C8-C10	34 (S4UL)
Aromatic C10-C12	74 (S4UL)
Aromatic C12-C16	140 (S4UL)
Aromatic C16-C21	260 (S4UL)
Aromatic C21-C35	1,100 (S4UL)

NAD: No asbestos detected

S4UL: LQM/CIEH Suitable for Use Levels (S4ULs), residential with homegrown produce land use, (at 1% SOM, 6% SOM for metals). Copyright Land Quality Management Ltd. Reproduced with permission publication number S4UL 3102. All rights reserved.

C4SL: Category 4 Screening Levels published by CL:AIRE (C4SLs); 'residential with homegrown produce land use' (at 1% SOM)

6.4. Investigation & Remediation / Preparatory Earthworks Completion Reporting

6.4.1. It is envisaged that a series of reports will be prepared following the completion of additional investigations and assessment of the identified specific areas of the site where these are required; Areas 1-15 & A-F, as identified in Drawing R01-002.

6.4.2. Phase reports detailing the works carried out and the results of the validation / verification testing will be prepared by the Environmental Consultant and submitted to the local authority for approval upon completion of the remediation / preparatory phase of works by the Remediation Contractor. Reports will include a full description of the works carried out, findings of all investigations and monitoring, photographic record, details of wastes removed, and any fills imported, and recommendations concerning the development requirements (see below).

7. Stage 2 Development Phase Remediation

7.1. Developer requirements for remediation associated with the development phase of work will be as follows.

7.2. Building Gas Protection

7.2.1. On present information, the majority of the site may be classed as CS2 under CIRIA C665 guidance meaning that basic precautions against ground gases are required.

7.2.2. Areas of residual solvent / fuel contamination after remediation could require a higher specification of membrane and independent verification or integrity testing as a precautionary measure against the potential for VOC vapours. The extent of these areas will be confirmed following the additional investigations and assessment of verification testing results.

7.2.3. Building gas protection and verification proposals will be submitted by the Developer to the local authority for approval prior to the commencement of house-building in the relevant area of the site.

7.3. Garden and Landscaping Soils

7.3.1. The Developer will be responsible for managing soils stockpiles and completed areas of soil cover so as to avoid cross-contamination of clean materials.

7.3.2. The general requirements will be as follows:

- Placement of either a minimum 100mm break layer of compacted recycled aggregate, or a suitable warning/barrier geotextile at the compacted interface of the formation/base of cover layer in all garden areas overlying residually contaminated made ground;
- provision of 600mm of clean soil cover over made ground materials within garden areas, typically comprising 450mm of subsoil, and 150mm of imported topsoil, with a reduced thickness of 450mm in landscape areas;
- materials to be used as the garden/landscape soils must be suitable for use and validated;
- potential cross-contamination of cover soils due to secondary excavations for foundations construction or trenching must be avoided, with appropriate replacement or disposal of arisings and effective materials management to prevent cross-contamination and minimise disposal.

7.3.3. Verification testing frequencies for soil quality will be 1 sample per 100m³ for topsoil, and 1 sample per 250m³ for natural subsoil (equivalent to an overall test rate of 1 sample per 3 plots), with a minimum of 3 samples to be taken from each source of imported soil.

7.3.4. Quality criteria for the garden cover soils will be as set down in the table in 6.2 above. Criteria for public open space areas may be relaxed by agreement with the local authority to reflect the reduced potential for exposure pathways under managed permanent grassland. Soils will be tested at an MCERTS or UKAS accredited environmental laboratory. Sampling and quality and depth validation will be undertaken by independent specialist contaminated land consultants.

7.3.5. Depth validation will be carried out at a frequency of 1 test pit per 3 plots following placing of the final soil cover, or test pits on a 25m grid across public open space areas.

7.4. Water Mains

7.4.1. It is considered likely that protected water mains will be required across substantial parts of the site unless post-remediation testing and risk assessment can demonstrate that protection is not required; United Utilities guidelines require detailed assessments and will be completed prior to development.

7.5. Concrete Protection

7.5.1. Requirements are as specified within the ground investigation reports, although these could be re-assessed following remediation works.

7.6. Validation Reporting

7.6.1. Verification information of the construction phase mitigation measures will be required for each individual plot.

8. Conclusions and Recommendations

8.1. Conclusions

8.1.1. SGP considers that the site has been adequately investigated for the purposes of devising a remediation strategy suitable to prepare the site for residential development and that the likely key development constraints and requirements for remediation are understood.

8.1.2. Additional investigation and assessment will be carried out as described in specific parts of the site and any modifications to the Remediation Strategy will require agreement with Bury Council and the Environment Agency. It is considered that this work will meet the requirements of Planning Conditions. Such assessments must be carried out as early in the programme as can practically be achieved (following demolition).

8.1.3. The proposed management and programme for supplementary site investigation & assessment, remediation and verification / validation testing regime will demonstrate that the proposed remedial works have been carried out and the site made suitable for the proposed development, subject to the execution of the additional requirements on the developer set out above.

8.1.4. The further environmental investigation and verification measures to be adopted are summarised as follows:

Table 8.1: Remediation Summary

Remediation Stage 1 (preparatory earthworks)	
1. further investigations	USTs / ASTs and other pits, sumps, wells, tanks, drains etc. containing residual fluids, sludges or vapours, to be inspected and tested prior to emptying as necessary, purging and dismantling / demolition; former UST / AST / possible spill locations and downgradient site boundary – identified positions to be investigated by boreholes drilled into the aquifer; former tanks / buildings / other potential hot-spots - identified positions to be investigated by trial pits into the made ground / natural soils; boreholes to be used where significant risk of liquid hydrocarbon entry to the aquifer is identified. It is noted that recommendations for further mining investigations have been made by e3p and Betts Associates; these will require approval by the Coal Authority who are likely to have specific requirements concerning drilling and remediation methods.
2. stockpile testing	recovered aggregate – testing for asbestos at 1/500m ³ recovered subsoil – screening tests for soil contaminants at 1/500m ³
3. regular inspections and site attendance	weekly site visits during principal earthworks / remediation with full time attendance during excavations in defined hotspot areas, and where foundations, relict drainage and other sub-surface structures are being broken out and removed

4. response to unexpected conditions / occurrences	Environmental Consultant to be available to attend site and investigate any occurrences at short notice (1 day); the local authority will be advised as soon as possible in event of the discovery of new contamination which has not been characterised as part of the existing conceptual site model and risk assessment and addressed by the provisions of the Remediation Strategy.
5. reporting	The Environmental Consultant will produce a series of supplementary assessment reports for the high-risk areas identified, any additional areas and a final earthworks remediation completion report (or reports if the works are completed using a phased approach)

Remediation Stage 2 (development phase)

6. cover soil verification	contamination testing will be carried out for placed subsoil and topsoil at respective rates of 1 sample / 250m ³ and 100m ³ ; cover soil depths will be verified using test pits at 1 per 3 plots, or a 25m grid over POS; inspection and testing certification will be provided on plots as they are completed, copied to NHBC and the local authority
7. building gas protection installation and inspection	gas protection measures appropriate to CS2 / BS 8485 are required generally; petroleum hot-spots likely to require additional hydrocarbon-resistant membranes and independent CQA / certification; inspection certificates to be provided as plots are completed, copied to NHBC and the local authority
8. water mains risk assessment	a standard water supply pipe risk assessment for the utility provider is required, it is envisaged that protective materials will be required for new water supply pipes

8.1.5. With the adoption of the above normal practices for brownfield development, and on the information available to it, SGP considers that the site can be safely and economically redeveloped, and the existing environmental liabilities managed. It is concluded that submission and approval of this Remediation Strategy will satisfy the requirements of Planning Conditions.

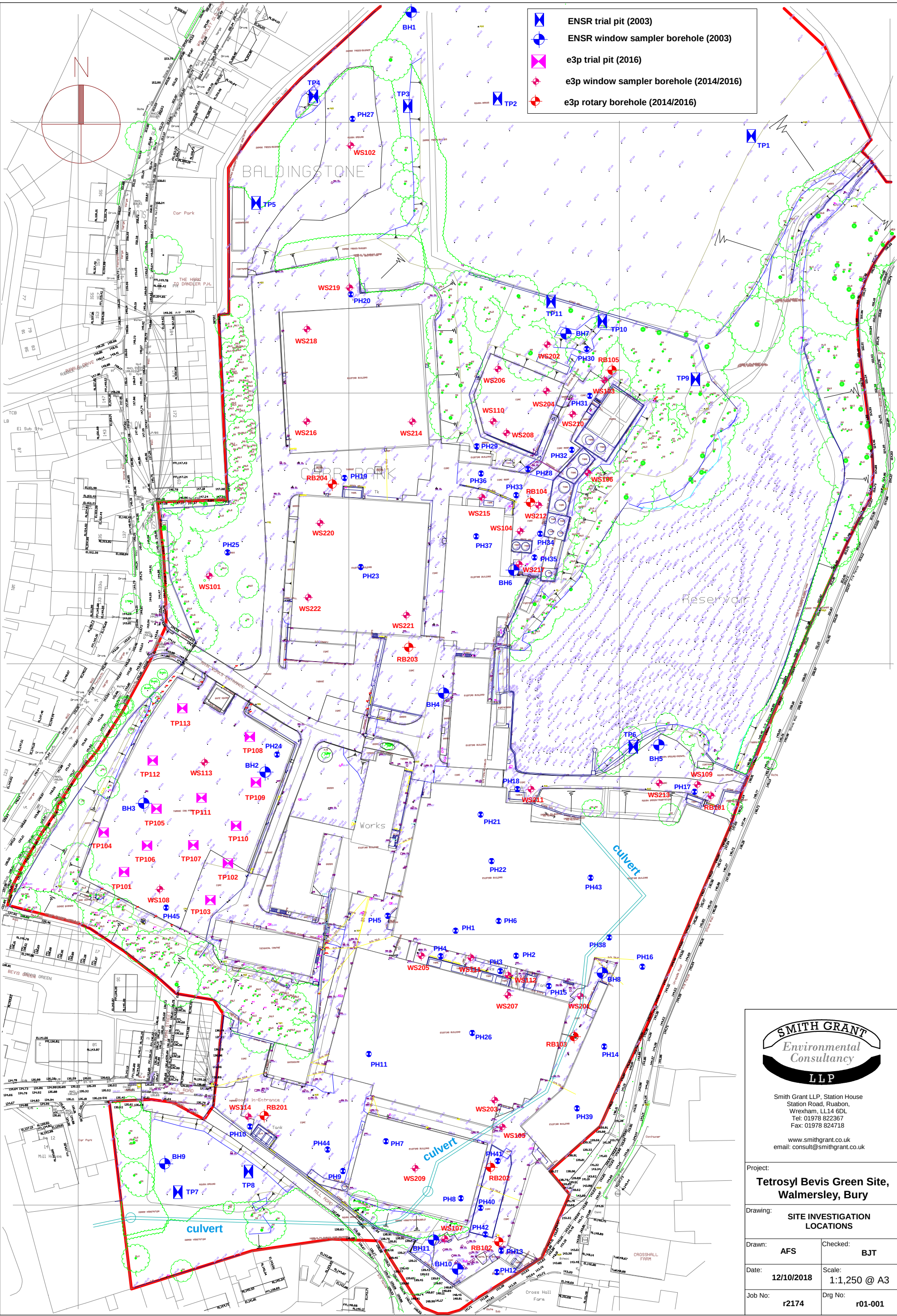
8.1.6. The implementation of the remediation scheme and the scope and content of verification reporting are described above. This remediation strategy also describes how unexpected contamination will be reported, investigated and assessed. Any departure from the approved remediation strategy necessary will be agreed in advance with the local authority. It is considered that there is unlikely to be a requirement for monitoring following completion of the site remediation and development given the low risks associated with any residual contamination. Maintenance duties will be limited to management of public open space areas under normal maintenance procedures.

8.1.7. SGP reserves the right to alter any of the foregoing information in the event of new information being disclosed or provided and in the light of changes to legislation, guidelines and responses by the statutory and regulatory authorities.

8.2. Limitations

- 8.2.1. This report has been prepared by SGP for the sole and exclusive use of Barratt Manchester. Reasonable skill, care and diligence has been exercised within the budget available, and in accordance with the technical requirements of the brief. This assessment makes use of the factual information provided by previous site investigators and is taken in good faith; where errors or conflicting information have been noted this has been identified, however SGP does not accept liability for missing or erroneous information provided by others.
- 8.2.2. Notwithstanding the efforts made by the professional team in undertaking the assessment and preparing this report, it is possible that other ground conditions and contamination as yet undetected may exist. Reliance on the findings of this report must therefore be limited accordingly. Such reliance must be based on the whole report and not on extracts which may lead to incomplete or incorrect conclusions when taken out of context.
- 8.2.3. SGP reserves the right to alter any of the foregoing information in the event of new information being disclosed or provided and in the light of changes to legislation, guidelines and responses by the statutory and regulatory authorities.

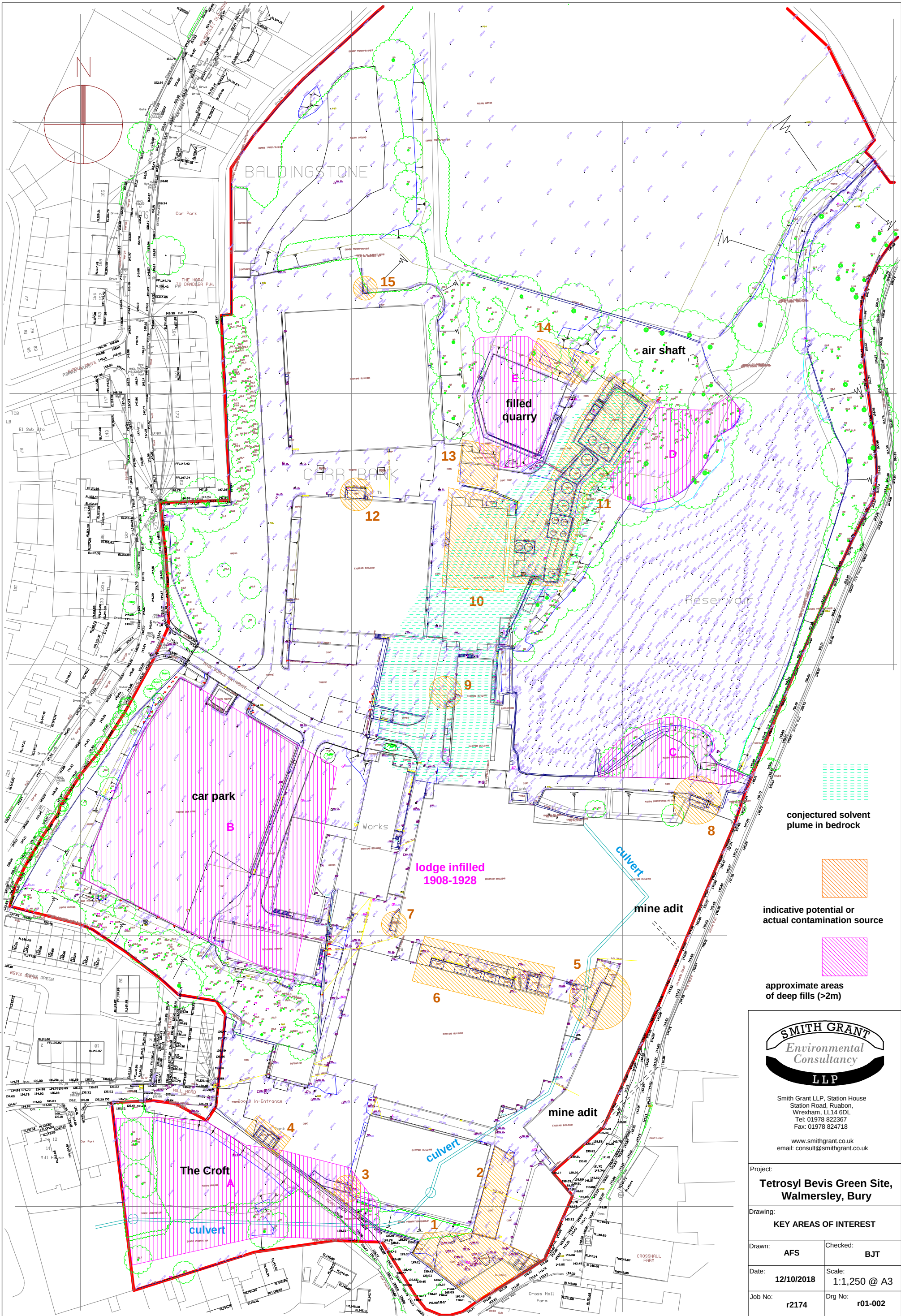
DRAWINGS



Smith Grant LLP, Station House
Station Road, Ruabon,
Wrexham, LL14 6DL
Tel: 01978 822367
Fax: 01978 824718

www.smithgrant.co.uk
email: consult@smithgrant.co.uk

Project: Tetrosyl Bevis Green Site, Walmersley, Bury	
Drawing: SITE INVESTIGATION LOCATIONS	
Drawn: AFS	Checked: BJT
Date: 12/10/2018	Scale: 1:1,250 @ A3
Job No: r2174	Drg No: r01-001



conjectured solvent
plume in bedrock

indicative potential or
actual contamination source

approximate areas
of deep fills (>2m)



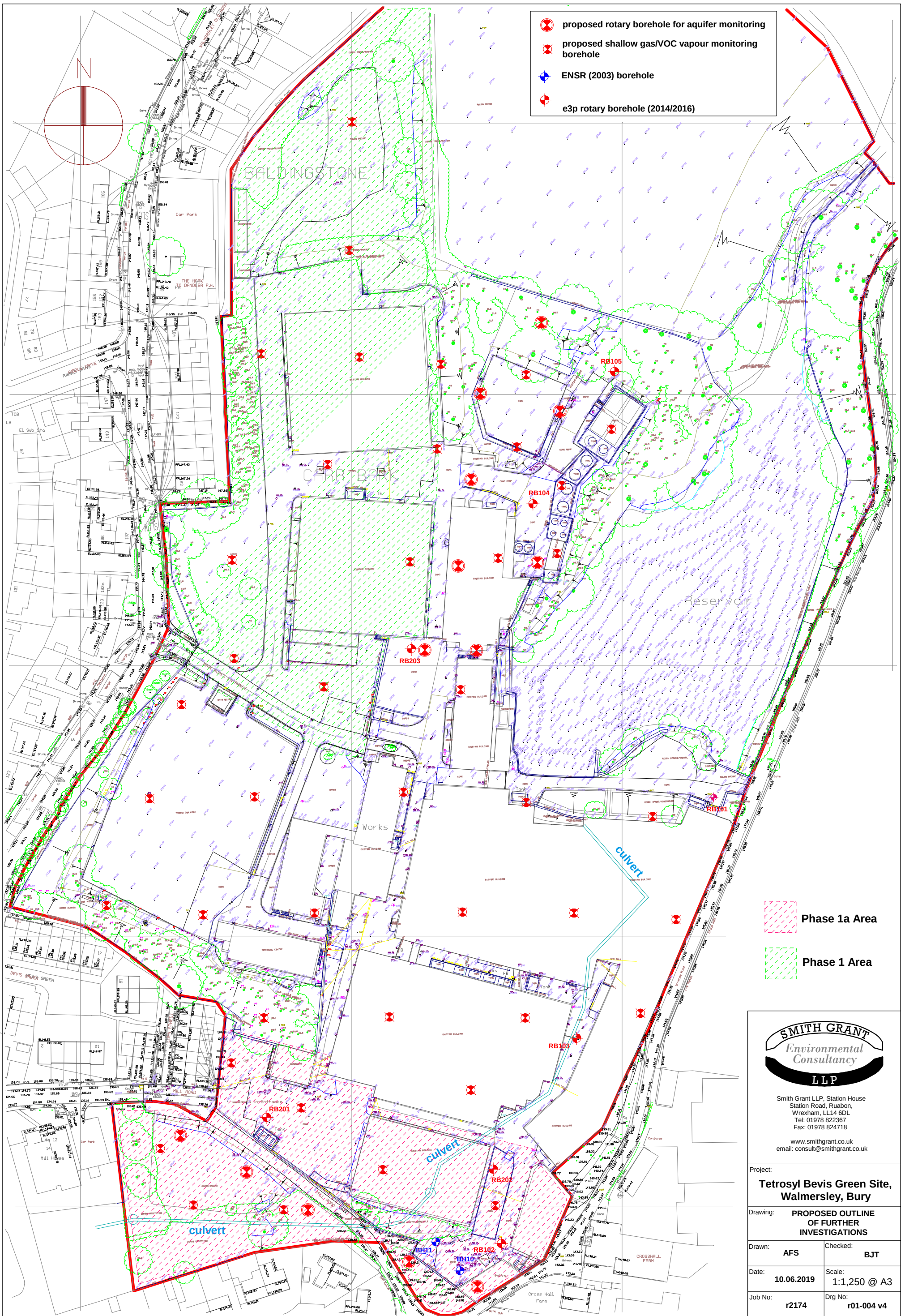
Smith Grant LLP, Station House
Station Road, Ruabon,
Wrexham, LL14 6DL
Tel: 01978 822367
Fax: 01978 824718

www.smithgrant.co.uk
email: consult@smithgrant.co.uk

Project:
**Tetrosyl Bevis Green Site,
Walmersley, Bury**

Drawing:
KEY AREAS OF INTEREST

Drawn:	AFS	Checked:	BJT
Date:	12/10/2018	Scale:	1:1,250 @ A3
Job No:	r2174	Drg No:	r01-002



Phase 1a Area

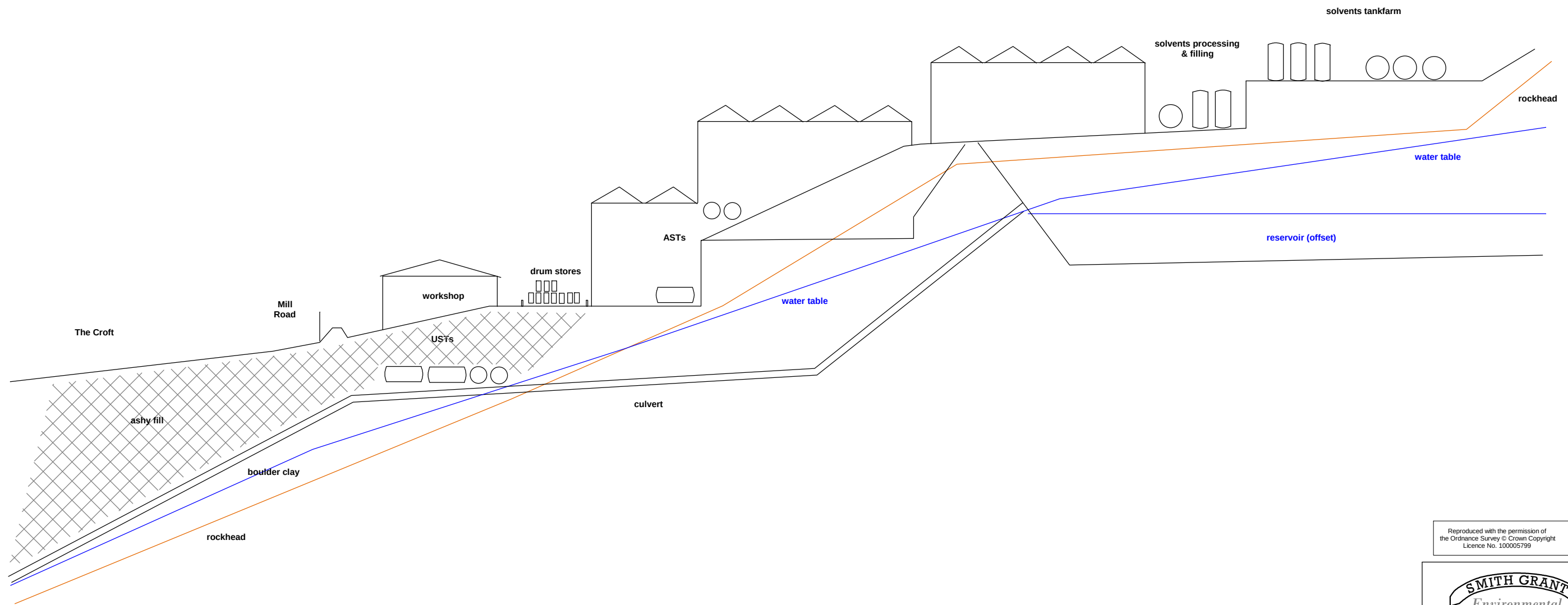
Phase 1 Area



Smith Grant LLP, Station House
Station Road, Ruabon,
Wrexham, LL14 6DL
Tel: 01978 822367
Fax: 01978 824718

www.smithgrant.co.uk
email: consult@smithgrant.co.uk

Project:	
Tetrosyl Bevis Green Site, Walmersley, Bury	
Drawing:	
PROPOSED OUTLINE OF FURTHER INVESTIGATIONS	
Drawn:	Checked:
AFS	BJT
Date:	Scale:
10.06.2019	1:1,250 @ A3
Job No:	Drg No:
r2174	r01-004 v4



Reproduced with the permission of
the Ordnance Survey © Crown Copyright
Licence No. 10005799



Smith Grant LLP
Station House, Station Road
Ruabon, Wrexham LL14 6DL

Tel: 01978 822367
Fax: 01978 8247182

www.smithgrant.co.uk
email: consult@smithgrant.co.uk

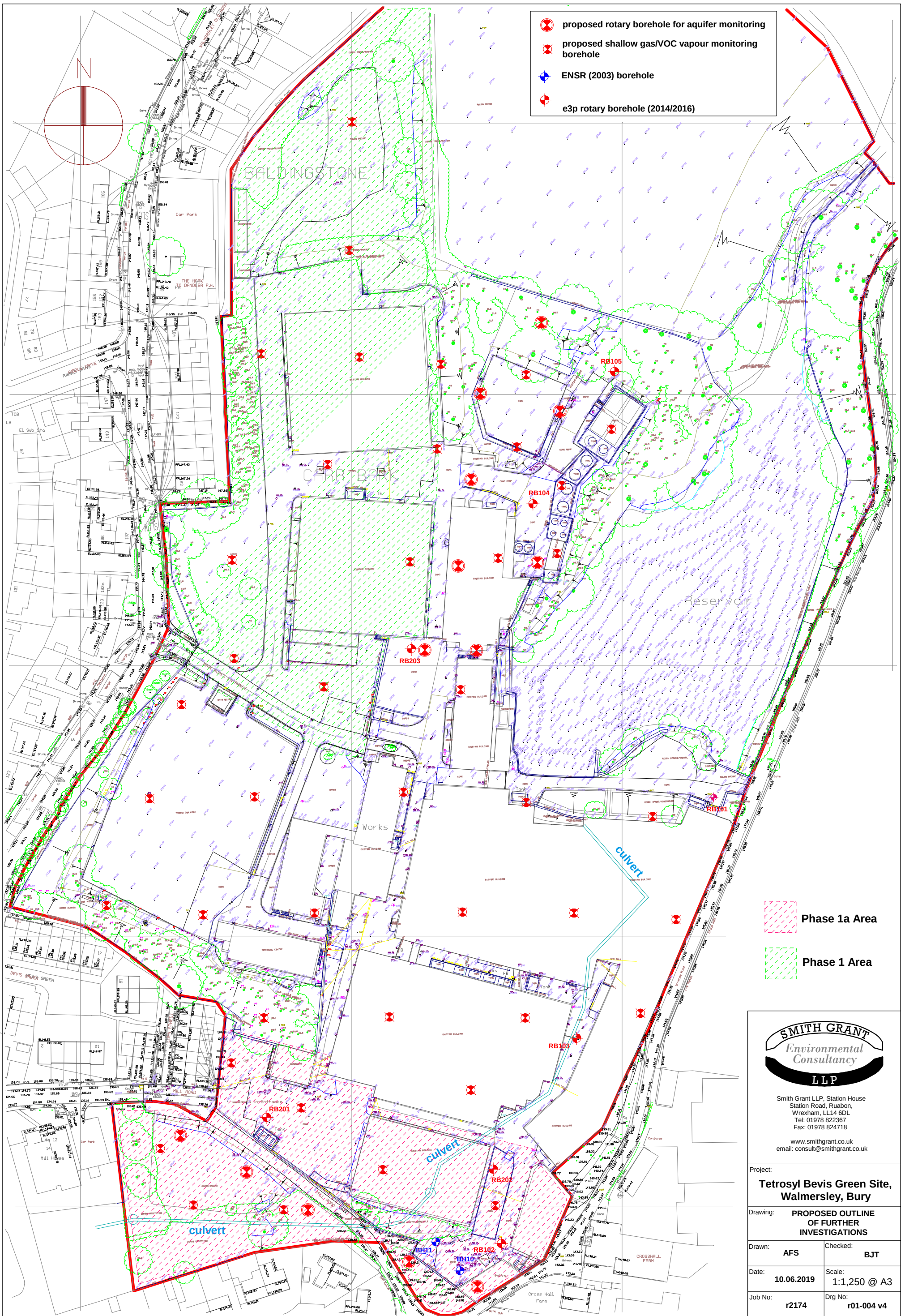
Project:
Tetrosyl Bevis Green Site

Drawing:
Conceptual Site Model

Drawn: AFS	Checked: BJT
---------------	-----------------

Date: 19/10/18	Scale: 1:1,250 @ A3
-------------------	------------------------

Job No: R2174	Drg No: R01 003
-------------------------	---------------------------



Phase 1a Area

Phase 1 Area



Smith Grant LLP, Station House
Station Road, Ruabon,
Wrexham, LL14 6DL
Tel: 01978 822367
Fax: 01978 824718

www.smithgrant.co.uk
email: consult@smithgrant.co.uk

Project:
**Tetrosyl Bevis Green Site,
Walmersley, Bury**

Drawing:
**PROPOSED OUTLINE
OF FURTHER
INVESTIGATIONS**

Drawn: **AFS** Checked: **BJT**

Date: **10.06.2019** Scale: **1:1,250 @ A3**

Job No: **r2174** Drg No: **r01-004 v4**

APPENDIX A

SGP Monitoring Record and Photographs



Off-site outfall to culvert (Sample Analysis 17-65246; sample ref: SW-DS)



Off-site drain cover on Mill Road associated with elevated PID readings in chamber



Assumed covers for USTs in Area 1



Assumed vents for USTs in Area 1



Drum Store in Area 2



Drum Store in Area 2



Oil AST in Area 3



Diesel AST in Area 4



**View towards area 5 numerous unbanded drum
/ IBC stores restrict access**



**View towards area 5 numerous unbanded drum
/ IBC stores restrict access**



**View towards area 6 numerous unbanded drum
/ IBC stores restrict access**



**Various other containers in all parts of central
and western areas**



Solvent Filling room at Area 10



**Inlet to culvert (Sample Analysis 17-65246;
sample ref: SW-DU)**



Unknown AST in Area 8



**Additional 'hot' bitumen product tank near top
of dam (west of Area 8)**



Area 13 Waste sludge reclamation plant at



Large IBC/Drum store on Area E



Solvent Filling room at Area 10



Solvent Filling room at Area 10



Solvent Filling room at Area 10



Solvent Filling room at Area 10



Tank Farm at area 11



Tank Farm at area 11

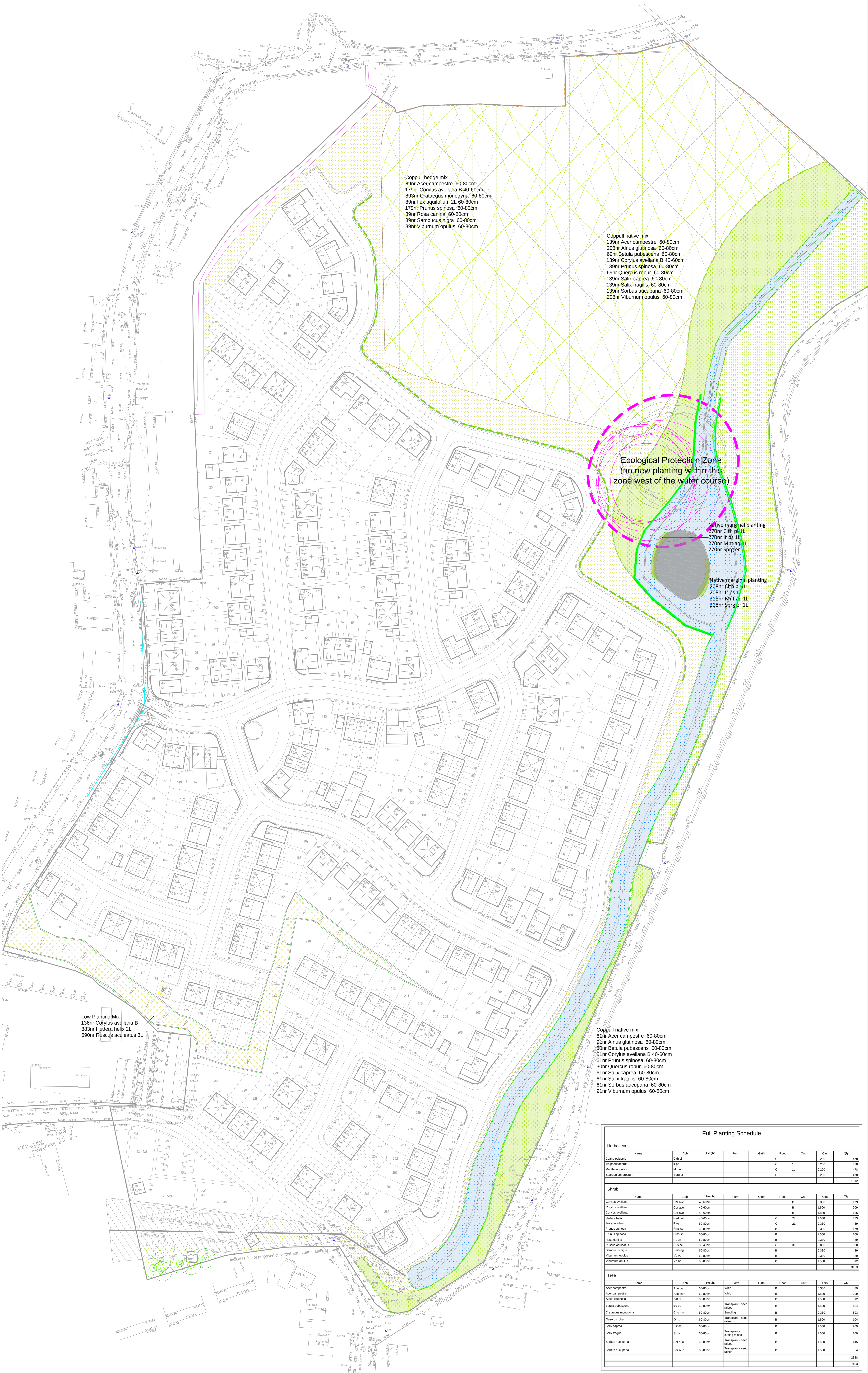


Tank Farm at area 11



Solvent recovery plant at area 11

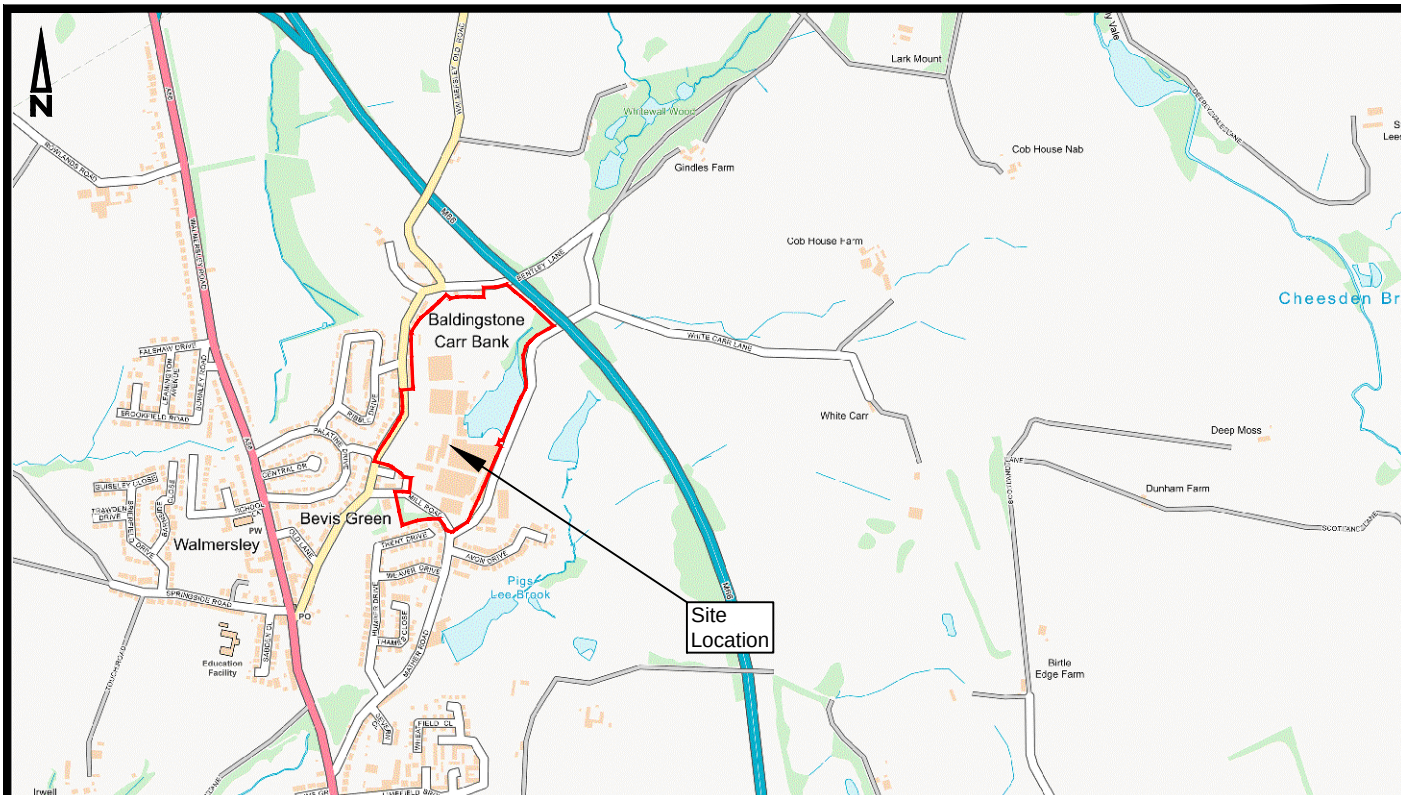
Appendix 8



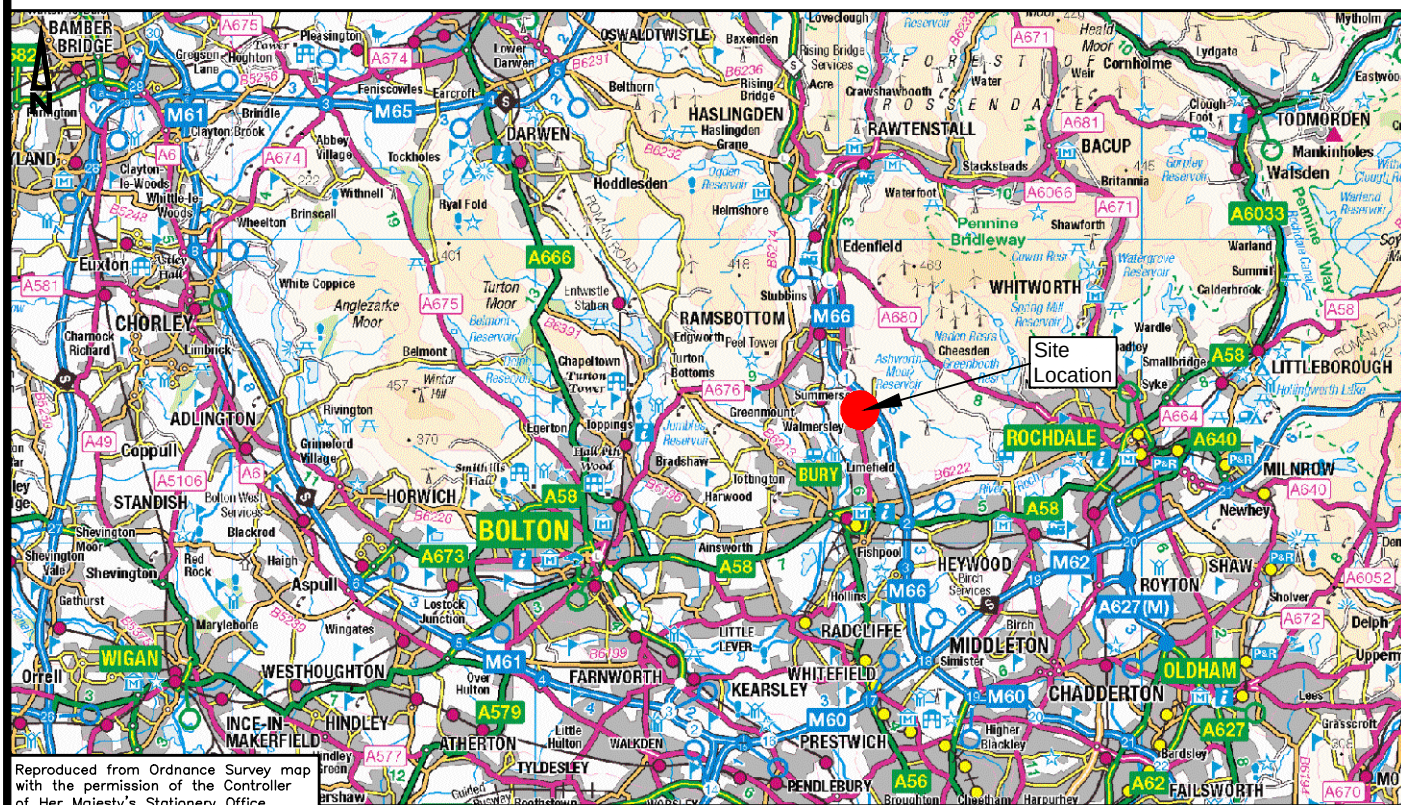
- Proposed native hedge planting in double-staggered rows, including 50mm depth no-free-bank-much, tubular guards and stakes. Finished level to be 10mm below adjacent paving/hut (250m length)
- Areas to be seeded with amenity grade seed mix, or existing grassed areas, made good (500m²)
- Areas to be seeded with species-rich grass seed mix, such as Emorsgate Mix (400m²)
- Areas to be seeded with species-rich wetland grass seed mix, such as Emorsgate Mix EGB (4900m²)
- Existing native planting, to be retained and enhanced in any gaps greater than 5m width (4425m²)
- Areas of native woodland groundcover planting 1m centres on embankment (3760m²)
- Proposed new native buffer planting at 1.5m centres, including tubular guards and stakes (4800m²)
- Areas of marginal planting around edge or permanent water (77m²)
- Areas of existing improved grassland, to be retained.

Full Planting Schedule										
Herbaceous										
Name	Abb	Height	Form	Girth	Root	Crtr	Cts	Qty		
Calluna palustris	Call p				C	1L	0.200	478		
Deschampsia flexuosa	Des fl				C	1L	0.200	478		
Mercurialis perennis	Mer p				C	1L	0.200	478		
Spergularia erecta	Sper er				C	1L	0.200	478		
								3992		
Shrub										
Name	Abb	Height	Form	Girth	Root	Crtr	Cts	Qty		
Corylus avellana	Cor av	40-60cm				B	0.330	179		
Corylus avellana	Cor av	40-60cm				B	1.500	209		
Corylus avellana	Cor av	40-60cm				B	1.500	209		
Hedera helix	Hed h	40-60cm			C	2L	1.000	383		
Ilex aquifolium	Ilex aq	60-80cm			C	2L	0.330	89		
Prunus spinosa	Prun sp	60-80cm			B	0.330	179			
Prunus spinosa	Prun sp	60-80cm			B	1.500	209			
Rosa canina	Ros ca	60-80cm			B	0.330	89			
Ruscus aculeatus	Rusc ac	30-40cm			C	3L	0.800	690		
Sambucus nigra	Samb n	60-80cm			B	0.330	89			
Viburnum opulus	Vib op	60-80cm			B	0.330	89			
Viburnum opulus	Vib op	60-80cm			B	1.500	312			
								3992		
Tree										
Name	Abb	Height	Form	Girth	Root	Crtr	Cts	Qty		
Acer campestre	Ace cam	60-80cm	Wide		B	0.330	89			
Acer campestre	Ace cam	60-80cm	Wide		B	1.500	209			
Alnus glutinosa	Aln gl	60-80cm			B	1.500	312			
Betula pubescens	Bet p	60-80cm	Transparent - seed raised		B	1.500	104			
Crataegus monogyna	Crat m	60-80cm	Seedling		B	0.330	89			
Quercus robur	Qr ro	60-80cm	Transparent - seed raised		B	1.500	104			
Salix caprea	Sal cap	60-80cm	Transparent - seed raised		B	1.500	209			
Salix fragilis	Sal fr	60-80cm	Transparent - seed raised		B	1.500	209			
Sorbus aucuparia	Sor auc	60-80cm	Transparent - seed raised		B	1.500	145			
Sorbus aucuparia	Sor auc	60-80cm	Transparent - seed raised		B	1.500	64			
								238		
								7403		

Appendix 9



Scale 1:16,000



Scale 1:250,000

Reproduced from Ordnance Survey map with the permission of the Controller of Her Majesty's Stationery Office. Crown copyright reserved. Licence No. AL 85025X. Cole Easdon Consultants

© Copyright



COLE EASDON
CONSULTANTS

160 AZTEC
AZTEC WEST
ALMONDSBURY
BRISTOL
BS32 4TU
Tel : 01454 800474

Web Site: www.ColeEasdon.com
E-mail: br@ColeEasdon.com

Job Title:

Proposed Residential Development
Former Tetrosyl Site
Walmersley Old Road
Bury

Drawing Title:

Site Location Plan

Client:

Barratt Homes (Manchester)

Drawn By

NJ

Checked By

DF

Date Drawn

April 2018

Drawing No.

6155/500 Figure 1

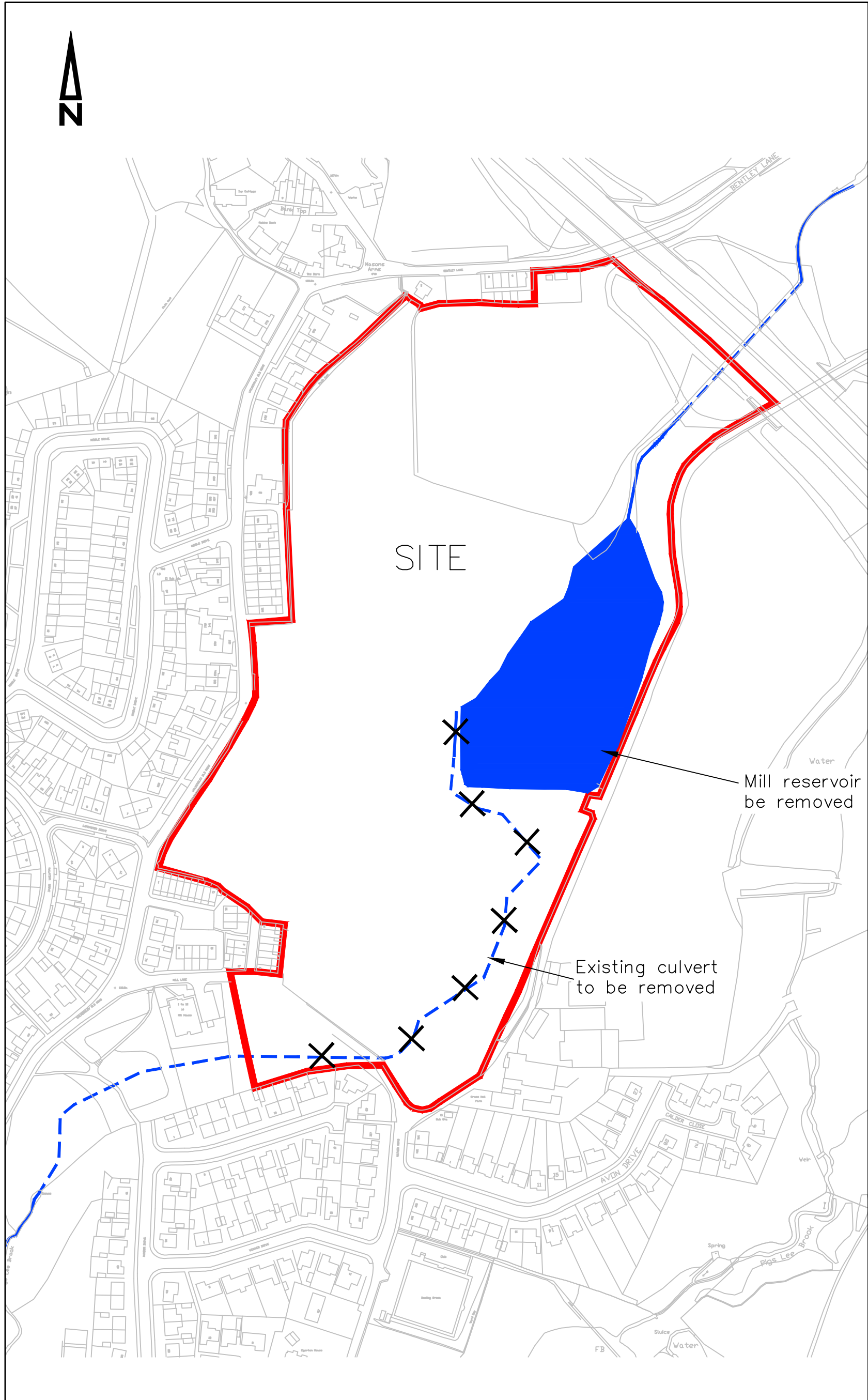
Drawing Status:

FOR COMMENT	
FOR PLANNING	
FOR TENDER	
FOR APPROVAL	
FOR CONSTRUCTION	
AS BUILT	

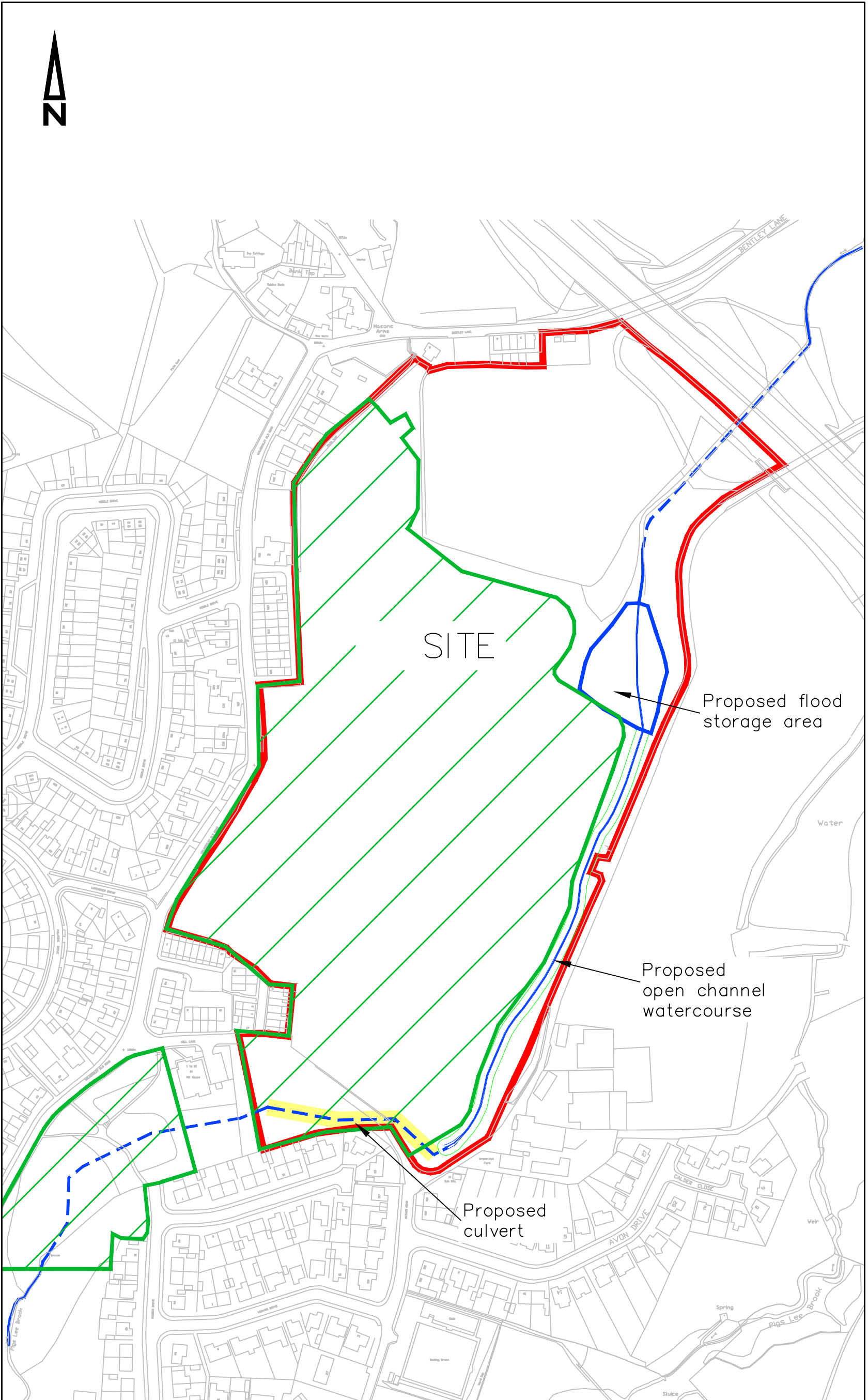
Scale

As shown (A4)

Revision



EXISTING SITE



PROPOSED SITE

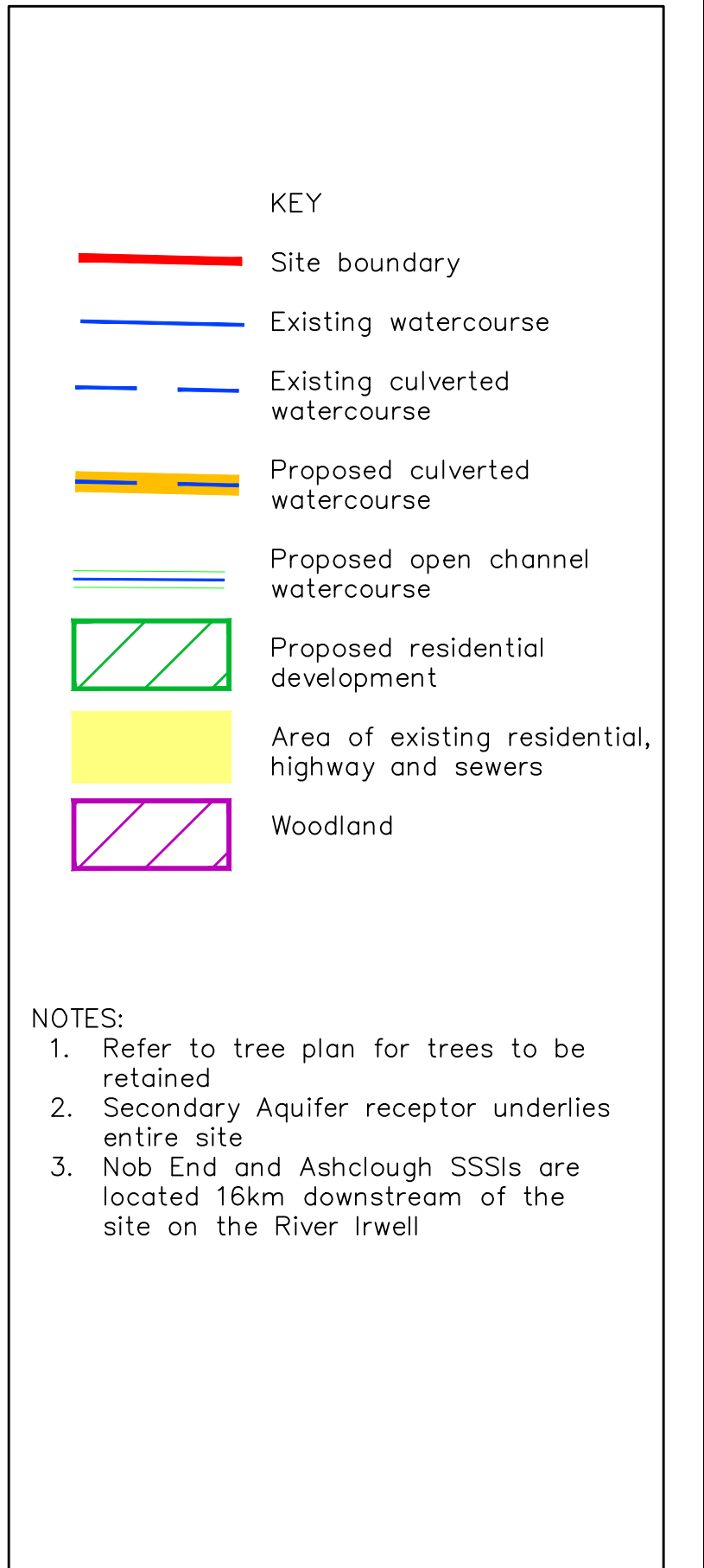
KEY

- Site boundary
- Existing watercourse
- Existing culverted watercourse
- Existing culverted watercourse to be removed
- Proposed culverted watercourse
- Proposed open channel watercourse
- Proposed residential development

NOTES:

- Refer to tree removal plans for tree removal locations
- Earthworks and soil remediation activities to take place across the site

No.	By	Date	Revision	Details
© Copyright				
		UNIT 2 YORK HOUSE EDISON PARK DORCAN WAY SWINDON WILTSHIRE SN3 3RB T: 01793 619965 E: cec@ColeEasdon www.ColeEasdon.com		
Client Barratt Homes (Manchester)				
Job Title Proposed Development Former Tetrosyl Site Walmsley Old Road Bury				
Drawing Title Location of Principal Construction Activities				
Drawing Status:				
FOR COMMENT	FOR TENDER	FOR APPROVAL	FOR CONSTRUCTION	AS BUILT
CONSTRUCTION AT CLIENT / CONTRACTOR RISK				
Designed by: DF		Drawn by: SS		Checked by: DF
Date: Feb 2021		Scale: 1:2500@A2		
Orig. No. 6155/520				Rev.



- NOTES:
1. Refer to tree plan for trees to be retained
 2. Secondary Aquifer receptor underlies entire site
 3. Nob End and Ashclough SSSIs are located 16km downstream of the site on the River Irwell

No.

By

Date

Revision Details

C

Copyright



160 AZTEC

AZTEC WEST

ALMONDSBURY

BRISTOL

BS32 4TU

Tel : 01454 800474

COLE EASON

CONSULTANTS

Web Site

www.ColeEasdon.com

E-mail

br@ColeEasdon.com

Client

Barratt Homes (Manchester)

Job Title

Proposed Development
Former Tetrosyl Site
Walmersley Old Road
Bury

Drawing Title

Location of Receptors

Drawing Status:

FOR COMMENT	FOR PLANNING	FOR TENDER	FOR APPROVAL	FOR CONSTRUCTION	AS BUILT
☐	☐	☐	☐	☐	☐
CONSTRUCTION AT CLIENT / CONTRACTOR RISK					

Designed by:

DF

Drawn by:

SS

Checked by:

DF

Date:

Feb 2021

Scale:

1:1250 @ A1

Drg. No.

6155 - 521

Rev.