

Lapal Canal, Selly Oak Park Outline Design Report

Lapal Canal Trust and Inland Waterways Association

22 June 2012

Lapal Canal Restoration Selly Oak Park

Outline Design Report

June 2012

Notice

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Executive Summary

This report has been prepared by Atkins in response to a commission from the Lapal Canal Trust (the Trust) to supply outline design services for the proposed restoration of the Lapal Canal in Selly Oak Park.

The abandoned canal follows the northern and north-eastern edge of Selly Oak Park from the western park boundary to the new Harborne Lane Bridge. The line of the former canal through the park currently consists of a mixture of ponds, wet sections and dry sections.

The Trust proposes to restore the canal between the Harborne Lane Bridge and Selly Park Bridge. We refer to this area as Harborne Wharf. The Trust also proposes restoration of the canal between Selly Park Bridge and the western boundary of the park. This may be undertaken separately.

It is anticipated that the former section of canal between Harborne Lane and the Worcester and Birmingham Canal will be restored as part of the Battery Park redevelopment (by others). This will form a link to the national canal network, but the project has been delayed due to economic circumstances, and connectivity should not be assumed for the design of the canal restoration within the park.

This report outlines the outcomes of a desk study into the current condition of the site and possible constraints to the restoration of the canal, and presents outline proposals for the restoration and gives a cost plan for the delivery of the scheme.

An initial ecological assessment identifies the need for further surveys to determine if bats and Great Crested Newts are present at the site. Japanese Knotweed is present at the western end of the site

Services constraints include existing electrical services that may cause difficulties in constructing the proposed winding hole at the western end of the site, along with the possibility that electrical services have been laid adjacent to Harborne lane on the site (however, this needs to be confirmed with detection equipment and trial holes).

The most significant restriction is the water supply aqueduct located below Harborne Wharf. This consists of four 1 metre (42 inch) diameter pipes situated below the bed of the canal, two of these pipes supply water to Birmingham, whilst two are blanked off at either end. The location of these pipes will have an impact on construction activities, especially refurbishment or construction of waterway walls. Methods for construction should be discussed with Severn Trent Water during detailed design.

Following consultation with Birmingham City Council's parks and planning departments, an outline design has been produced showing the main features for the restoration of the Harborne Wharf and western section of canal.

The layout proposes improvements to the wharf area to increase public access between Harborne Lane and Selly Park Bridge, whilst providing for canal boat moorings, a slipway and landing for canoes.

The wharf should be able to accommodate winding of boats that are 19m (62ft). A further winding hole is proposed in the second phase at the western end of the park to accommodate boats that are 22m (72ft), however, this may not be economically viable if existing high voltage cables in this area have to be diverted.

Considerable emphasis has been given to ensuring that the restored canal will interface properly with the existing physical and leisure infrastructure within and adjacent to the park, particularly

with reference to footpath and cycle path links and to integrating the canal with the park landscape.

The estimated construction phase costs (including detailed design and supervision fees etc.) for the Harborne Wharf scheme are £300,000, based on a very limited use of volunteer labour for primarily finishing tasks. These could be very significantly reduced if a group such as the Waterways Recovery Group were to be used as the Principal Contractor.

In order to reach this stage, a costed Forward Action Plan is also presented which identifies the various activities required to reach the point where the construction phase can be commenced. The total cost of the activities identified in the Forward Action Plan is estimated to be £15,000.

1. Introduction

This report has been prepared by Atkins in response to a commission from the Lapal Canal Trust (the Trust) to supply outline design services for the proposed restoration of the Lapal Canal in Selly Oak Park.

1.1 The Canal

The Lapal Canal (properly called the Dudley No. 2 Canal), was built in the late 18th Century in order to transport large quantities of raw materials and coal. This canal acted as a “by-pass” for the Birmingham network, linking Dudley and Selly Oak on the Worcester and Birmingham canal, without the need for any locks. The canal was completed and opened to traffic in May 1798. Use of the canal significantly declined following the official closure of the „Lapal Tunnel“ in 1926. The section closest to the Worcester and Birmingham Canal, through the Battery Park and Selly Oak Park areas was finally abandoned in 1960.¹

1.2 Restoration Proposals

Atkins undertook a feasibility study into the restoration of the canal in 2007. The study recommended that the Trust pursue a phased approach to restoration, beginning with the creation of a “Lapal Canal Walkway” and restoration of navigation to the eastern (Selly Oak) section of the canal in three phases:

Stage 0: Battery Park (from the Junction of the Worcester and Birmingham and Lapal Canals to Harborne Lane Bridge) – this is to be delivered by the developer of the Battery Park site, and at the time of the feasibility report (2007) was due to commence shortly, but economic circumstances since have meant that the project has currently on hold² and work has not progressed beyond the enabling road works which included the replacement of Harborne Lane Bridge;

Stage 1: Selly Oak Park (from Harborne Lane Bridge to the west end of Selly Oak Park);

Stage 2: Lodge Hill (from the edge of Selly Oak Park to Weoley Castle).

Given the changes in circumstances relating to the Battery Park site, the Trust has decided to pursue Stage 1 as a stand-alone project which could be undertaken independently of the Stage 0 restoration. The Trust has also requested that outline design proposals and estimates are prepared to support delivery of the Stage 1 restoration in two sub-phases:

Stage 1A: Harborne Wharf – the eastern section of the canal in Selly Oak Park, between the new Harborne Lane Bridge and Selly Park Bridge, a length of approximately 120 metres;

Stage 1B: Selly Oak Park (west) – the remaining section of the canal in Selly Oak Park, from Selly Park Bridge to the western boundary of the park.

¹ The brief summary of the history of the canal given is based on information in an article by J Ian Langford, first published in the newsletter of the Dudley Canal Trust in August 1998, and available online at <http://www.lapal.org/lap-tun-2c.html>.

² Although a revised planning application was submitted by a new development vehicle, Harvest, in early 2012. The Trust was included in the process of developing the current proposals.

The restored sections of canal should be accessible for trailable and unpowered vessels, with dimensions which would be suitable for incorporation within a fully restored canal.

To enable work on the Stage 1 restoration to progress, the Trust engaged Atkins to undertake outline design stage works.

1.3 Scope of Services

The scope of services for the outline design phase was as follows.

Desk and site study

Undertake a desk and site study which will include:

- obtaining information on the works currently being constructed to the east of the site to enable interfaces to be designed;
- geotechnical and environmental checks (Envirocheck);
- a search of statutory undertakers' plant records;
- a site walkover survey for habitat/ecology, and consultation with BCC parks and biodiversity teams;
- consideration of possible sources of water supply (to establish whether the scheme can open in advance of restoration of the canal in Battery Park) including consideration of whether water quality is likely to be adequate for recreational water sports use;
- producing a summary of the site constraints for inclusion in the design report.

Outline proposals

Produce up to three options outlining possible layouts which include consideration of:

- the shape of the water space (particularly the location and dimensions of the proposed winding hole);
- access points (both for pedestrians and cyclists and for maintenance);
- linkages to existing paths within the park and into Battery Park;
- visual interaction with the park;
- providing security for any moorings;
- user safety.

These proposals will be consulted on with Birmingham City Council and British Waterways. Design criteria for detailed design will be developed and agreed as part of this process.

Cost Plan

Provide an outline cost plan for future design stages and for the construction of the project.

This will identify works which could be undertaken by volunteers and the likely cost savings if volunteer labour is used for these elements.

Outline Design Report

Produce a report on the findings, including detail and recommendations, to support progress to detailed design and delivery in due course. This report is intended to form the basis of a brief for future design stages.

2. Desk and Site Study

2.1 Site Location

The proposals refer to a section of abandoned canal that follows the northern and north-eastern edge of Selly Oak Park from the Harborne Lane to the western park boundary, as shown in Figure 2.1. The site lies approximately 3 miles southwest of Birmingham city centre. The Ordnance Survey National Grid Reference of the approximate centre of the site is 403790E, 282900N.

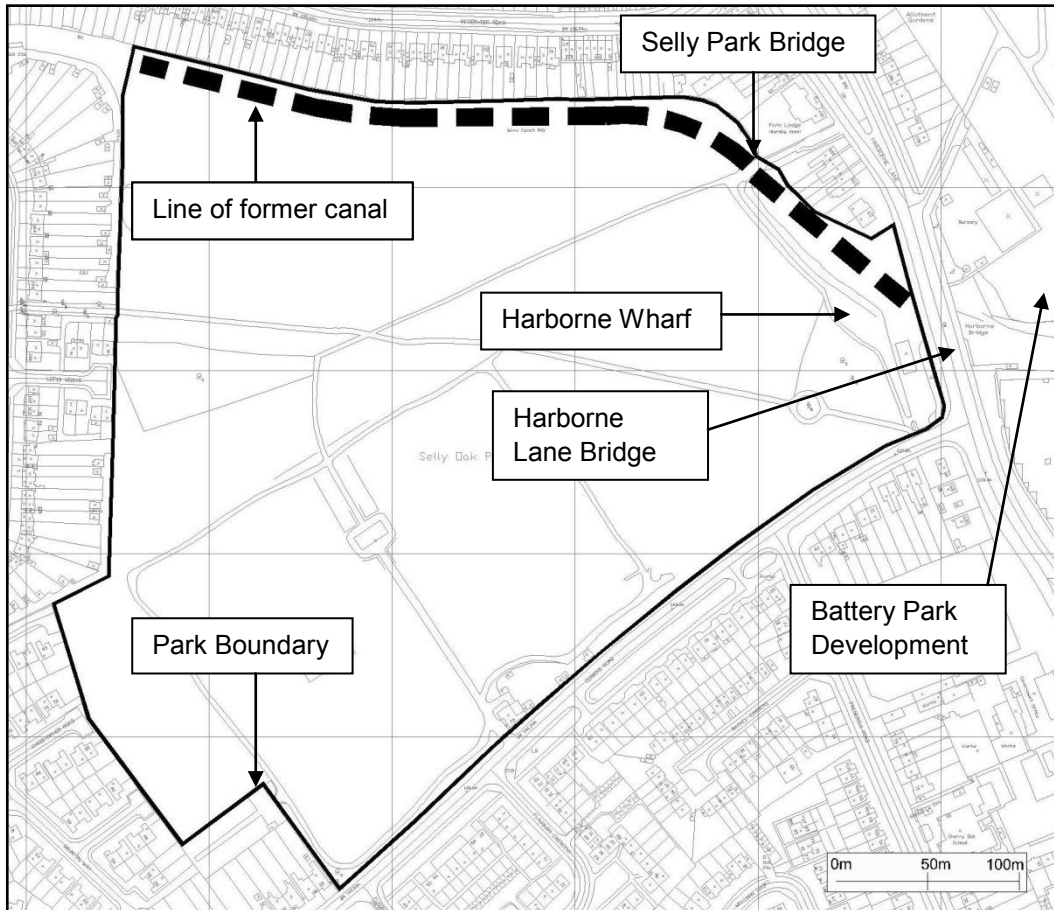


Figure 2.1 – Site Overview

2.2 Description of Site

The former route of the canal along the edge of the park can be easily made out as the majority of this section has not been infilled. The channel and sides have become overgrown with shrubs and trees, the majority of these having self seeded and grown since the canal was abandoned. In some places, most notably near Selly Park Bridge (referred to elsewhere as Park Lodge Bridge), the bed still retains a shallow depth of water.

Selly Park Bridge crosses the canal at the north-eastern corner of the park. This brick arch structure is the oldest remaining structure on the Lapal Canal and is generally in good condition.

The area between Selly Park Bridge and the Harborne Lane Bridge was formerly the Harborne Wharf. This area was partly infilled and landscaped as a picnic area in the 1970's but has since become substantially overgrown with trees and shrubs.

A range of views of the abandoned canal in its current condition are shown in Figures 2.2 to 2.6.



Figure 2.2 – View from Harborne Lane towards Selly Park Bridge



Figure 2.3 – View from Selly Park Bridge to Harborne Lane Bridge



Figure 2.4 – Selly Park Bridge from south side of proposed Harborne Wharf



Figure 2.5 – View eastwards, showing drainage manhole in canal



Figure 2.6 – View westwards towards park boundary in dry section

2.3 Desk and Site Study

Atkins previously prepared and issued a report entitled, „Feasibility Study for the Restoration of the Dudley No.2 Canal (The Lapal Canal)“, issued on 24/7/2007.

The study assessed a number of previous reports and available information and considered the viability of restoration of the Dudley No.2 Canal (the Lapal Canal) on the basis that this might be reopened between Combeswood Basin and Selly Oak Junction.

2.3.1 Information on Battery Park Works

Battery Park is the term used for an area of former industrial „brown field“ land situated to the east of Selly Oak Park, which historically used to be one of several industrial sites occupied by Birmingham Battery and Metal Company in the Midlands (other sites being located in Digbeth). The term battery refers to a method of metal production and forming, rather than the production of batteries.

Part of the original Battery Works site has already been redeveloped into several large „out of town“ retail units, and there is currently a detailed planning application submitted to extend the development of Battery Park to encapsulate the majority of the remaining former Battery Works industrial site. The Planning Application for the extension of the Battery Park retail development has been submitted by the Harvest Partnership, with the scheme being designed by Architects 3D Reid.

Retail development proposals submitted by the Harvest Partnership include restoration of the Selly Oak Junction on the Worcester and Birmingham canal, and a short section of the Lapal Canal from the junction to Harborne Lane Bridge, a replacement modern bridge included within an enabling works package (taking into account the future restoration of the Lapal Canal) during Harborne Lane modernisation and improvement works. The restoration of the junction and canal length by the Developer will restore the link between the Worcester and Birmingham canal and

Harborne Wharf, the latter being which this outline design report looks to address in the form of outline design proposals. The restoration proposals for the canal within the retail development are shown in an artist impression image below, demonstrating the integration of the restored canal length into the modern retail environment.



Figure 2.7 – Artist's impression of proposed Battery Park retail development

Detailed design proposals relating to the proposed Battery Park retail development are provided in Appendix B, although it should be noted that planning permission at the time of issuing this report has not been granted, therefore submitted proposals may be subject to change (most likely to change as a result of reworking of S106 agreements). It has proved possible to progress outline design without the approved Battery Park designs, however, the two design proposals should be checked for consistency once revised Battery Park proposals are available.

The original canal link design submitted by the Developers of the Battery Park scheme provided protection for the canal corridor only, with no formal restoration being undertaken. Work by the Lapal Canal Trust, Inland Waterways Association and Atkins with the Developer demonstrated that restoration could be economically accommodated within the development, following analysis of suitable standards and specifications for a navigable link and considering the impact of this on pedestrians and permeability.

2.3.2 Geotechnical and Environmental Checks

An Envirocheck report was obtained and reviewed together with historical mapping and information gathered as part of the feasibility study to undertake a desk study to identify ground conditions.

2.3.2.1 Site History

Historical mapping dating back to 1884 has been reviewed and copies of the historical maps are included in the Envirocheck Report (Appendix F). Copies of Ordnance Survey (OS) maps and aerial photographs inspected are as follows:

1:1,250 Scale Historical OS Maps - 1939, 1959 - 1964, 1969 – 1974, 1974, 1977, 1979, 1992.

1:2,500 Scale Historical OS Maps - 1884, 1885, 1890, 1904, 1916, 1937, 1961 - 1965.

1:10,000 Scale Historical OS Maps - 1955 - 1956, 1966 -1968, 1976, 1977, 1980 -1982, 1999, 2006, 2009.

1:10,560 Scale Historical OS Maps - 1884, 1888, 1905, 1921, 1938, 1948 – 1950.

Aerial Photographs (dated 1948 -1950).

2.3.2.2 Historical Mapping

Historical features of note on the site and surrounding land (based on available historic OS maps, are summarised below.

Date	Scale	Site Area	Off site
1885	1:2,500	A canal is shown to be present on site.	Two ponds are shown approximately 55 and 65m to the southwest of the site. Weoley Park Farm is shown approximately 100m to the south of the canal.
1888	1:10,560	The site is shown as the Birmingham Canal. A wharf is shown on the northern side of canal at its eastern end.	An embankment is shown approximately 25m to the north of the site, adjacent to Harborne Lane. Oak Tree Tannery is shown adjacent to the eastern end of the site on the eastern side of Harborne Lane. Selly Oak Works (metal) are shown to the east of the Tannery and Selly Oak pumping station to the northeast. A reservoir is shown 70m to the north of the canal. The Birmingham Canal is shown to connect into the Worcester and Birmingham Canal, approximately 300m to the east of the site. The Birmingham and West Suburban Branch railway is shown to roughly follow the line of the main Worcester and Birmingham Canal.
1890	1:2,500	A wharf is shown adjacent to the northern bank of the canal in the area of Harborne Lane.	Selly Oak Works is now denoted as a metal works. An old brickyard is shown between the tannery and metal works.

Date	Scale	Site Area	Off site
1904	1:2,500	Elan Aqueduct (associated with Birmingham Corporation Water Works) is shown to cross the site at the south-eastern end of the site.	A mattress works is shown in the area of the former tannery.
1905	1:10,560	Selly Oak Park is shown to the south of the canal.	
1917	1:2,500		A Battery and Metal works is shown in the area of the former Selly Oak Works. A circular structure (denoted on the 1921 OS map as a gasometer) is shown approximately 100m to the northeast of the site. Tanks and a Basin (inlet to canal) are also shown in this area.
1921	1:10,560		Blocks of terrace housing have been constructed adjacent of the northern side of the canal. Allotment gardens are shown 150m to the northeast of the site.
1937	1:2,500		The gasometer is no longer shown.
1938	1:10,560		Weoley Park Farm is no longer shown. Development is shown to the north and southwest of the site, next to the canal.
1955	1:10,560		The Battery Metal Works is now simply denoted as „Works“.
1965	1:10,560		A nursery is shown approximately 40m to the northeast of Harborne Bridge. A large „L“ shaped building and two ancillary buildings are now shown in the area of the former tannery.
1965	1:2,500		A „refuse tip“ is shown approximately 250m to the east of the site. Issues (ground water) are shown 120m to the east of the site.
1974	1:2,500		The refuse tip is also denoted to include the area to the west, approximately 150m to the northeast of the site.
1984	1:2,500		The „L“ shaped buildings in the area of the former mattress works have been demolished. A warehouse building is shown in its place

Date	Scale	Site Area	Off site
1992	1:2,500	A building is present adjacent to the southern bank of the canal near Harborne bridge.	

Table 2.1 - Summary of Site History

2.3.2.3 Geology

The 1:50,000 scale British Geological Survey (BGS) geological map Sheet 168, Birmingham, dated 1996 (Reference 1) indicates that the site is underlain by Glacial Till. The Wildmoor Sandstone Formation, which is part of the Sherwood Sandstone Group, is shown to underlie the superficial deposits.

Alluvium is shown by the BGS to be present to the north of the canal adjacent to Bourn Brook whilst Glaciolacustrine Deposits are shown further to the south and northwest of the canal. An area of backfilled excavation is shown approximately 200m to the east of the site.

The Bromsgrove Sandstone Formation is shown to lie to the south and the Kidderminster Formation is present to the west of the site.

No geological faults are indicated to cross the site, however, an un-named fault is shown approximately 350m to the southeast of the site. The fault is orientated in a northeast to southwest direction and is shown as being downthrown to the southeast. Mercia Mudstone Group is shown to the southeast of the fault, underlying Glacial Till and Glaciolacustrine Deposits.

2.3.2.4 Hydrogeology

The relevant Groundwater Vulnerability Map prepared by the Environment Agency (Reference 2) indicates that the Wildmoor Sandstone, which is shown by the BGS to underlie the site, is recorded as a Major Aquifer of high permeability. The overlying soils are classed as „Urban“. This categorisation assumes a worst case high vulnerability classification for leaching potential, relating to the downward passage of water and possible contaminants.

Major aquifers are defined as highly permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes.

Information obtained from the Environment Agency, included within the Envirocheck Report (Appendix F), confirmed the following:

There is one record of a licensed surface water abstraction within 500m of the site. The abstraction is located approximately 390m to the east of the site and relates to the abstraction of surface waters for cooling purposes.

There are no records of any groundwater abstractions within 500m of the site.

There are no records of any discharges consents within 250m of the site.

The site is located with a Zone III (total catchment) Source Protection Area. Source protection zones I (outer protection Zone) and II (Inner Protection Zone) are located 700m and 350m respectively to the northeast of the site. The groundwater „source“ is located approximately 750m to the northeast.

There are three recorded pollution incident within 500m of the site, all of which are classed as category 3 (minor incidents). The incidents are located 120m to the northeast, 270m to the northeast and 340m to the northeast and relate to crude sewage or miscellaneous pollutants entering the River Cole and River Rea (tributaries of the Trent catchment).

The information indicates that the site is not at risk of flooding from rivers.

2.3.2.5 Landfill Sites and Contaminated Land

Information received as part of The Envirocheck Report (Appendix F) confirms that:

- There are no landfill sites within the site.
- There is one recorded BGS Landfill site within 500m of the site. The landfill is located approximately 150m to the east. No information on the landfill is available.
- There are two recorded historical Landfill sites within 500m of the site. The landfills are recorded as being 150m and 240m to the northeast. The closer of the two landfills was licensed to The Birmingham Battery and Metal Company Limited, and was licensed to receive deposited waste including Inert, Industrial and Household Waste. The further of the two landfills was licensed to Birmingham EPU and was authorised to receive deposited waste including inert and industrial waste.
- There are two Local Authority recorded landfill sites within 500m of the site. One site was located approximately 150m east of the site on an area of land formerly occupied by the Birmingham Battery and Metal Company. The types of waste the landfill received are listed as ash, brick, clinker, gravel and timber. The landfill was closed in 1990. The second recorded landfill was located approximately 240m to the east (also located on the former Birmingham Battery site) and received clay, ash, brick, gravel and wood wastes. The landfill is recorded as being closed in the „early 1970s“.
- There is one registered landfill site approximately 220m to the east of the site. The licence was held by the Birmingham Battery and Metal Company until 1st December 1976 after which the landfill is presumed to have closed. The landfill was only licensed to accept waste produced on site and authorised to accept construction and demolition waste, inert/non-combustible, excavated natural materials, refractory linings/bricks, slag boiler/flue cleanings.
- There is one Registered Disposal site within 500m of the site. The site is categorised as a scrapyards and is located approximately 150m to the north of the site. The site is „operational as far as is known“ and is licensed to receive Electrical cables, lead/acid batteries, scrap metal and scrap vehicles.
- There is one Licensed Waste Management Facility within 500m of the site. The facility is categorised as a Vehicle Dismantlers and is located 210m to the north of the site.

2.3.2.6 Mineshafts, Mineworkings and Mineral Extraction

The area is reported by Envirocheck to be in an area that may not be affected by Coal Mining. The BGS map indicates that the site does not lie in the vicinity of productive Coal Measures.

2.3.2.7 Previous Site Investigation Information

No previous site investigation information was available at the time of writing this report.

2.3.2.8 Contamination Issues

Soil Contamination

Guidance on the redevelopment of contaminated land is provided by Planning Policy Statement PPS23, which states that no sites should be developed (without remediation), which could be determined as Contaminated Land under Part IIA of the Environmental Protection Act 1990 at a later date. On the basis of this guidance, one of the purposes of this initial assessment is to identify any potential contamination present that may represent a potential risk to human health, controlled waters, property or ecosystems and to recommend possible appropriate mitigation measures where necessary. Any proposed future site development will need to be subject to a thorough contamination risk assessment, taking into account the site end-use.

It is proposed that the site is to be brought back into use as a canal. At present there is no information (laboratory chemical testing of soils and groundwater) taken from within the site area on which to base a contamination risk assessment.

It is anticipated that the principal source of potential contamination occurring on this site will be associated with silt deposited in the former canal, tipped materials and from former offsite historical industry (i.e. Metal and Battery works, Landfills and a Tannery) which may have leached contaminants into the canal. Potential contamination may also be present from building materials associated with the construction of Harborne Lane Bridge

Preliminary Conceptual Site Model

The following preliminary Conceptual Site Model (CSM) has been developed using the available information described above. The purpose of this is to identify potential contamination sources, receptors and pathways (as summarised in Table 2.2 below), so that this information can be used when planning a ground investigation for the site.

POTENTIAL SOURCES
<p>On-site Sources:</p> <ul style="list-style-type: none"> • Made Ground associated with the in-filled canal • Made Ground associated with the construction of Harborne Lane and Bridge at the eastern extent of the site. • Surface water / Leachate: dissolved compounds from contaminated soils. • Groundwater: dissolved compounds from contaminated soils. <p>Off-site Sources:</p> <ul style="list-style-type: none"> • Metals / Metalloids, Sulphur Compounds, acids, associated with off-site Battery and Metal works. • Metals, hydrocarbons, possible anthrax, associated with historical Tannery. • Adjacent roads: e.g. metals, sulphur compounds, pH, PAH's, TPH's. • Leachate from made ground associated with off site historical landfills.
PATHWAYS
<p>Human Health</p> <ul style="list-style-type: none"> • Direct ingestion of soil and soil-derived dust • Dermal Contact • Direct inhalation of dust • Migration in gaseous / vapour phase & inhalation of vapours. <p>Controlled Waters</p> <ul style="list-style-type: none"> • Surface Run-off • Infiltration of contaminated surface water to groundwater. • Migration in Groundwater Migration along preferential pathways, e.g. culverted watercourses, engineered structures, granular materials (groundwater, surface water).

RECEPTORS
<p>On-site Receptors:</p> <ul style="list-style-type: none"> • Site developers / workers and maintenance contractors • Future Site Users (recreational uses) • Proposed Structures • Landscape Planting • Groundwater: The underlying solid stratum is defined as major aquifer. <p>Off-site Receptors:</p> <ul style="list-style-type: none"> • Pedestrians close to site area: (note: Selly Oak Park and Harborne Lane close to site boundaries). • Residential properties adjacent to the site.

Table 2.2 - Conceptual Site Model - Summary

The preliminary CSM shows that there is the potential for contamination on site associated with Made Ground and deposited silt. At present the main receptors identified are future site users (residents, walkers and site workers). The pathways identify routes along which potential contamination could migrate to receptors. A future ground investigation with chemical analysis of the site soils and groundwater will provide the information necessary to further refine the above CSM and to undertake a contamination risk assessment.

2.3.2.9 Summary

The desk study highlights a number of issues which will need further attention prior to the detailed design and/or construction phases. Recommendations are given in section 5.1.1 and 5.1.2 of this report.

2.3.3 Statutory Undertaker's Plant

Statutory undertakers have been approached to determine what existing plant is located on the line of the proposed restoration and in the adjacent area. A list of the utility companies that have been approached is supplied in Appendix C along with the plan of the area of investigation.

It is recommended that this search be repeated at a later date, as all services plans should be considered to be out of date upon receipt.

Furthermore, whilst these plans have been provided the Contractor shall be responsible for confirming the location of those services on the site with the use of hand dug trial holes and cable avoidance tools.

The information contained in Appendix C refers to the utilities identified within the park or adjacent to the park. A full set of received information that provides further information out side of the immediate vicinity of the canal and the park is provided on a CD with this report.

2.3.3.1 Electricity

The information provided shows a number of high voltage electrical cables to the south of the canal. This feeds from the Corisande Road Substation (west of the park boundary) along the side of the canal and crosses over to the north side across the Selly Park Bridge to Harborne Lane along the footpath access to the park.

Atkins has requested that these high voltage cables be located on site by the statutory undertaker, however, the statutory undertaker has declined to provide this service. It will therefore be necessary to confirm the route of these cables before works commence. This should be achieved

using a cable avoidance tool in the first instance and then trial holes as necessary. It will be necessary to confirm that cables are at a sufficient depth to allow foot paths to be constructed as necessary. It should also be confirmed that if the cables are likely to impede the construction of the winding at the western end of the site. If these cables cross the proposed winding it is recommended that the Trust seeks a quotation for their diversion. It is possible that the cost of diversion may be prohibitively expensive.

At the eastern end of the site, further cables (including some high voltage cables) are shown offset from Harborne Lane and the bridge. The plans do not indicate the location of the new bridge or the changes to the highway, so it is possible that these services are in the highway. However, there is a risk that some services have been laid in the north east corner of the park and across the proposed route of the canal. Again, a request was made to the statutory undertaker to confirm the location and status of the cables on site, but this was declined. It will be necessary to locate the cables with a cable avoidance tool and then dig trial pits. If cables are found the statutory undertaker shall be responsible for confirming the status of the cables. If cables do cross the canal it is likely that a diversion or lowering exercise will be required, however, this will need to be assessed separately.

2.3.3.2 Gas

The drawings do not indicate any gas supply or plant in the immediate vicinity of the canal. The 300mm diameter gas main on the west side of Harborne Lane is shown to cross the bridge. This should not be affected by the proposed restoration of the canal.

2.3.3.3 Telecommunications

Plans provided by BT Openreach do not indicate any BT Openreach plant in the vicinity of the canal.

Written responses have also been received from other telecommunications companies responsible for a variety of voice and data services. These confirm that no equipment is located in the vicinity of the canal.

2.3.3.4 Water Supply

Plans provided by Severn Trent Water show two water supply mains crossing the south east corner of Selly Oak Park. These mains are of significant strategic importance to water supply in Birmingham, in addition to the two live mains two further capped pipes have been constructed below the canal (presumably for future expansion / flexibility). Each main is a cast iron pipe with a diameter of approx 1m.

The mains form part of the Elan Valley Aqueduct constructed circa 1900 after the construction of the canal. It is therefore logical that these mains are situated below the formation of the canal.

Atkins has provided an approximate location on the outline plan to show where these mains are likely to be. This is based on the water supply plans and construction drawings of the aqueduct. It is recommended that hand dug trial holes are used to locate the extent of the section that crosses the canal to inform detailed design.

It is recommended that the Trust and Contractor Liaise with Severn Trent Water prior to construction to ensure that both parties communicate information to each other.

The location of these water supply mains may impact upon the proposed design of the walls to the Wharf as it will be necessary to avoid piling operations within an agreed radius of the mains.

Plans indicate that water supply mains are located on the west side of Harborne Lane. It is assumed that these pass through ducts on the Harborne Lane Bridge.

2.3.3.5 Storm Water and Foul Water Management

Sewer records obtained from Severn Trent Water indicate that drainage has been installed along the route of the former canal. This starts at the eastern end close to the new Harborne Lane Bridge and flows north-west and then west, continuing along the canal west of the park boundary. It seems that this later section (outside of the scope of this study) is private drainage.

It is likely that this drainage was designed to act as a filter drain to drain the former canal bed to reduce the volume of water standing in the canal. However, it is assumed that this system no longer fulfils this function as parts of the canal are filled with water. No other connection to this pipe off line of the canal is indicated.

Records indicate that this drain bifurcates along the northern edge of the park. One pipe runs northwards between 71 and 75 Reservoir Road acting as a connection to the sewers that eventually discharge to the Bourn Brook. The second pipe continues to flow westwards along the former line of the canal.

Records indicate that the chamber invert level of the bifurcation chamber (on the proposed line of the canal) is 136.09m aOD, and the invert of the connecting manhole in Reservoir Road is 132.21m aOD. The difference between these two exceeds four metres so it is not feasible that the system was installed to take flow from Reservoir Road and store this in the canal. It is however likely that the drainage has been placed to drain the canal and utilise the former canal as storage for the runoff from the park, before discharging this via Reservoir Road to the Brook.

It is recommended that the pipe in the canal is abandoned. A new outfall structure should be built on the pipe between 71 and 75 Reservoir Road. This would act as an overflow structure whilst allowing the canal to be drained in the future. Once connected to the Worcester and Birmingham canal the network as a whole would accept exceedance flows.

2.3.4 Habitat and Ecology

Atkins has undertaken an assessment of potential ecological constraints to the restoration of this section of the Lapal Canal. This assessment comprises information obtained from a desk study and a walkover survey undertaken on 6 November 2009. This includes a review of an initial constraints assessment for the whole 10 km route of the proposed restoration undertaken by Atkins in 2007 (Feasibility Study for the Restoration of the Dudley No.2 Canal (The Lapal Canal)).

2.3.4.1 Desk Study

The MAGIC (Multi Agency Geographical Information for the Countryside) website (www.magic.gov.uk) was reviewed for information on statutory designated sites of nature conservation importance within 1 km of the site.

Ordnance Survey maps were used to identify the presence of water bodies within 500 m of the site, in order to establish if the site could be used as terrestrial habitat for great crested newts. Great crested newts can use suitable terrestrial habitat up to 500 m from a breeding pond (English Nature, Great Crested Newt Mitigation Guidelines, August 2001).

2.3.4.2 Walkover Survey

A walk-over ecological survey of the site and the immediate surrounds (the survey area) was undertaken on 6 November 2009 broadly following the „Extended Phase 1“ methodology as set out in Guidelines for Baseline Ecological Assessment (Institute of Environmental Assessment 1995). The extended Phase 1 habitat survey provides information on the habitats in the survey area and assesses the potential for protected/notable fauna to occur in or adjacent to the site. Plant names in this report follow New Flora of the British Isles (2nd edition, Stace 1997).

Preliminary investigations were undertaken in respect of the presence of legally protected species within the survey area:

- A visual inspection of trees from the ground to assess their suitability for bat roosts;
- Assessment of suitable habitats for nesting birds;
- Search for signs of badger activity within 50m of the site boundary (including setts, tracks, snuffle holes and latrines);
- Assessment of habitat potential for reptiles and amphibians, in particular great crested newts;
- Assessment of potential of waterbodies to support great crested newts (using the habitat suitability index incorporated into the Natural England great crested newt licence application form WML-A14-2 version 28 January 2008).
- Evidence of the presence of invasive plants (Japanese knotweed and giant hogweed) listed on Schedule 9 of the Wildlife & Countryside Act 1981 and subject to strict legal control.

2.3.4.3 Limitations to Survey

Ecological surveys are limited by factors which affect the presence of plants and animals such as the time of year, migration patterns and behaviour. The ecological survey has not therefore produced a complete list of plants and animals and the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. Nevertheless, the results of this constraints report permit an initial assessment of the ecological value of the site and the potential for negative impacts from the proposed works.

2.3.4.4 Ecological Constraints and Relevant Legislation

The ecological constraints identified and recommendations for mitigation and further survey are set out in Table 2.3.

Features	Potential Ecological Constraints	Mitigation and Further Ecological Surveys
Designated sites for nature conservation	No statutory or non-statutory designated sites for nature conservation were identified within 1 km of the site from MAGIC or during the initial constraints assessments in 2007.	No mitigation required. Information on locally designated sites will need to be updated via a data record request to EcoRecord as part of further ecological assessment
Waterbodies (great crested newts)	There are five pools of standing water within the disused canal. These all support emergent vegetation and have potential to support great crested newts. The site is isolated from any waterbodies outside the site by roads which present a significant barrier to the great crested newts. Therefore works could affect great crested newts, potentially causing an offence under wildlife law (see Error! Reference source not found.)	Great crested newt surveys will need to be undertaken prior to works commencing. This will entail four initial surveys using a number of techniques including bottle trapping, egg searches and torching surveys. If great crested newts are found to be present a further two surveys would be required to determine the size of the population. Appropriate mitigation measures would need to be implemented under a licence from Natural England.

Features	Potential Ecological Constraints	Mitigation and Further Ecological Surveys
		Great crested newt surveys are to be undertaken between March and June (inclusive).
Mature trees (bats, breeding birds)	<p>There is a row of mature trees, along the top of the southern bank of the disused canal. In addition there are some mature and semi mature trees on the embankments and within the route of the canal and on the northern bank.</p> <p>The majority of these trees have low or moderate potential to support roosting bats and are likely to support nesting birds.</p> <p>Any tree work required (i.e. felling or tree surgery) could affect bats or nesting birds, potentially causing an offence under wildlife law (see Error! Reference source not found.)</p>	<p>Where possible, works to mature trees should be avoided. Any mature trees subject to works should be inspected further by an ecologist prior to works for evidence of bats and if necessary soft-felling techniques will be used.</p> <p>Tree works should be undertaken outside the bird breeding season (generally February to August inclusive). If this is not possible, an ecologist must check suitable areas for nesting birds not more than 24 hours prior to commencements of works. Active nests and their associated vegetation must remain undisturbed until young birds have left the nest. Vegetation must be kept short after clearance to reduce nesting potential.</p>
Bridges	<p>Selly Park Road bridge has very low potential to support roosting bats. There are two broken bricks which could allow access to small cavities, but the dimensions of these apertures do not appear to be suitable for roosting bats.</p> <p>Harborne Lane bridge: the vertical joint to the south west abutment is not sealed, leaving access to the cavity behind the brick facing. There is potential that this cavity could be suitable for roosting bats.</p>	<p>An internal inspection of cavities in these bridges should be undertaken by an ecologist prior to works using appropriate equipment such as a torch and endoscope.</p> <p>If the cavities are found to be suitable for roosting bats, or evidence of bats is found, further emergence/ re-entry surveys may need to be undertaken and appropriate mitigation measures may need to be implemented under a licence from Natural England</p>
Scrub and small trees	These habitats are likely to support nesting birds. Therefore clearance of these habitats for access or as part of works could affect nesting birds, potentially causing an offence under wildlife law (see Error! Reference source not found.).	Tree works should be undertaken outside the bird breeding season (generally February to August inclusive). If this is not possible, an ecologist must check suitable areas for nesting birds not more than 24 hours prior to commencements of works. Active nests and their associated vegetation must remain undisturbed until young birds have left

Features	Potential Ecological Constraints	Mitigation and Further Ecological Surveys
		the nest. Vegetation must be kept short after clearance to ensure that the potential to nest in the area is removed.
Japanese knotweed	There are two stands of Japanese knotweed at the western end of the site. Works in the vicinity of Japanese knotweed could cause it to spread, potentially causing an offence.	No works should be undertaken within 7 m of Japanese knotweed without a Japanese knotweed management plan having been prepared and implemented, which should include either eradication of knotweed using herbicide treatments or removal and disposal of all potentially contaminated material as controlled waste.
Reptiles	The scrub and open areas within the site are suitable for reptiles, particularly grass snake and slow worm. Detritus such as fallen timber, leaf litter and garden rubbish could provide suitable refuges for reptiles. Therefore works within the site could affect reptiles, causing an offence under wildlife law (see Error! Reference source not found.).	Precautionary measures should be implemented during site clearance to avoid killing or injuring reptiles. Suitable habitats within the working area should be destructively searched under the supervision of an ecologist to ensure no reptiles are present. This should be undertaken between March and October to avoid disturbing reptiles when they are torpid in cold weather and unable to move away from harm

Table 2.3 – Ecological Constraints

Legislation relevant to the project is set out in Table 2.4, below.

Species	Legislation (England & Wales)	Offences	Licensing procedures (England & Wales)
Bats European protected species	Conservation (Natural Habitats &c.) Regulations 1994 (as amended) Reg.39	Deliberately ¹ capture, injure or kill a bat; deliberate disturbance ² of bats; or damage or destroy a breeding site or resting place used by a bat. [The protection of bat roosts is considered to apply regardless of whether bats are present.]	A Natural England (NE) licence in respect of development is required in England or a licence from the Welsh Assembly Government in consultation with Countryside Council of Wales (CCW) in Wales. European Protected Species Guidance Note (NE 2009) Bat Mitigation Guidelines (English Nature 2004) Bat Workers Manual (JNCC)

Species	Legislation (England & Wales)	Offences	Licensing procedures (England & Wales)
	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb a bat in such a place.	2004) Licence from NE or CCW is required for surveys (scientific purposes) that would involve disturbance of bats or entering a known or suspected roost site.
Breeding birds	Wildlife and Countryside Act 1981 (as amended) S.1	Intentionally kill, injure or take any wild bird; intentionally take, damage or destroy the nest of any wild bird while that nest is in use or being built; intentionally take or destroy the nest or eggs of any wild bird. [Special penalties are liable for these offences involving birds on Schedule 1 (e.g. most birds of prey, kingfisher, barn owl, black redstart, little ringed plover).] Intentionally or recklessly disturb a Schedule 1 species while it is building a nest or is in, on or near a nest containing eggs or young; intentionally or recklessly disturb dependent young of such a species.	No licences are available to disturb any breeding birds in regard to development. Licences are available in certain circumstances to damage or destroy nests, but these only apply to the list of licensable activities in the Act and do not cover development. General licences are available in respect of „pest species“ but only for certain very specific purposes e.g. public health, public safety, air safety.
Great crested newt European protected species	Conservation (Natural Habitats &c.) Regulations 1994 (as amended) Reg.39	Deliberately ¹ capture, injure or kill a great crested newt; deliberate disturbance ² of a great crested newt; deliberately take or destroy its eggs; or damage or destroy a breeding site or resting place used by a great crested newt.	Licences issued for development by Natural England or from the Welsh Assembly Government in consultation with the Countryside Council for Wales. European Protected Species Guidance Note (NE 2009) Great Crested Newt Mitigation Guidelines (English Nature 2001)
	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb a great crested newt in such a place.	Licences issued for science (survey), education and conservation by Natural England or the Countryside Council for Wales.

Species	Legislation (England & Wales)	Offences	Licensing procedures (England & Wales)
Adder Common lizard Grass snake Slow worm	Wildlife and Countryside Act 1981 S.9(1) (part); S.9(5)	Intentionally kill or injure any common reptile species.	No licence is required in England or Wales. However, an assessment for the potential of a site to support reptiles should be undertaken prior to any development works which have potential to affect these animals.
Japanese Knotweed	Wildlife and Countryside Act 1981 S.14	Plant or otherwise cause to grow in the wild.	Any Japanese knotweed/giant hogweed contaminated soil or plant material is classified as controlled waste and should be disposed of in a suitably licensed landfill site, accompanied by appropriate Waste Transfer documentation, and must comply with section 34 of the Environmental Protection Act 1990. <i>The Knotweed Code of Practice</i> (Environment Agency 2006) http://www.ea-transactions.co.uk/static/documents/Leisure/japnkot_1_a_1463028.pdf

Notes to Summary of Relevant Legislation

¹Deliberate capture or killing is taken to include “accepting the possibility” of such capture or killing

²Deliberate disturbance of animals includes in particular any disturbance which is likely to impair their ability- to survive, to breed or reproduce, or to rear or nurture their young; or in the case of animals of hibernating or migratory species, to hibernate or migrate; or to affect significantly the local distribution or abundance of the species to which they belong. Lower levels of disturbance, not covered by the Conservation Regulations, remain an offence under the Wildlife and Countryside Act, however a defence is available where such actions are the incidental result of a lawful activity.

Table 2.4 – Summary of Relevant Legislation

You should note that this section of the report has been prepared by an environmental specialist and does not purport to provide legal advice. You may wish to take separate legal advice.

2.3.4.5 Summary

The desk study and walkover survey highlight a number of issues which will need further attention prior to the detailed design and/or construction phases. Recommendations are given in section 5.1.3 of this report.

2.3.5 Water Supplies for Canal

At this stage it is possible that Harborne Wharf may be restored before there is a connection through Battery Park to the Worcester and Birmingham Canal. It is therefore necessary to consider possible sources of water for the restored section of canal.

There are several options for filling the canal if the Wharf is restored as a separate section (approximate volume 1500m³), these are:

- Supply by standpipe – current charges are understood to be £1.36/ m³ suggesting a cost of £2,050 for 1500m³ (plus the cost of supply of a metered standpipe £155). Severn Trent Water advise that only 28mm diameter metered standpipes are available, so another metering option and delivery option needs to be considered, as this size would be insufficient as it would take several months to fill the wharf. Furthermore, the option uses potable water to fill the canal which is not the most sustainable option.
- Pump water from the Worcester and Birmingham Canal – this would require access to the canal, the hire of a pump and access across the Battery Park development site, and under the new bridge. This option would avoid using potable water, however the access would need to be agreed. A larger pump could be used to increase the rate of fill. The length of the delivery pipe would be approximately 300m. There is a further option which is to hire a tanker to extract water from the Worcester and Birmingham Canal and place it in the Harborne Wharf. This would require in excess of 50 repeat trips from one canal to the other – which is impractical.
- Extraction from the surface water system during rainfall events has been considered. To undertake such an operation (post Severn Trent Water permission acquisition), extraction via accessible and suitable surface water sewers via pumps during peak sewer flows would need to be actioned, This option is not reliable and filling may take considerable time dependent upon rainfall events, and permissions may prove problematic to obtain.
- Natural fill from the surrounding catchment has also been considered. Again, this option would rely on rainfall, so it could take some considerable time to fill.
- A further, perhaps novel, approach might be to liaise with the local fire service to see if they would be prepared to undertake a training exercise to assist in filling the canal. This could be an exercise to pump from the canal or an exercise to connect to a fire hydrant. The Trust would still be required to pay for the water, if taken from a potable source, however, the use of larger bore fire hoses would achieve a quicker fill of the canal.

Having looked at the options only two are feasible. The preferred option would be to pump water from the Worcester and Birmingham Canal across the Battery Park development. If this option is not viable water could be pumped from the Worcester and Birmingham Canal or a standpipe by the fire brigade, however this would need to be discussed with the fire brigade. Such options become obsolete should the proposed retail development (which includes the new canal connection) at Battery Park be completed before restoration Harborne Wharf.

2.4 Site Constraints Summary

The table below identifies the key site constraints identified:

Site Constraint	Potential Scheme Impact
Services – Water Main	Restoration detailed design and construction constraints in the vicinity of Harborne Wharf. Information required from service supplier to determine extent of constraint prior to progressing with detailed design proposals.
Services - Sewers	Detailed design and cost constraint – provision to re-design/replace sewers within the abandoned canal bed adds to cost of any proposed restoration programme. Further information and consultation required with service supplier prior to detailed design progressing.
Ecological – Great Crested Newts	Significant impact on construction works programme and restoration costs should Great Crested Newts be found within waterbodies associated with the former canal. Great Crested Newts will require translocation prior to any construction activities commencing. If present, legal requirements could include licensed ecological input, seasonal trapping (including appropriate GCN fencing installation) and additional suitable land acquisition on which to translocate Great Crested Newts to (mitigation requirements).
Ecological - Birds	Requirement to engage with specialist ecological representatives. Potential species survey and mitigation costs. Seasonal construction programme impact.
Ecological - Bats	Requirement to engage with specialist ecological representatives. Potential species survey and mitigation costs. Seasonal construction programme impact.
Ecological – Japanese Knotweed	Eradication costs – Such costs can be reduced if a long term (upto and over 3 years) herbicidal treatment programme is initiated. Direct removal of rhizome infected soils to licensed landfill expensive and requires bespoke management plan.
Site – Soil Contamination	Should contaminated soils be present and be classified as hazardous waste, significant impact on restoration construction costs for disposal of such arisings could be incurred.
Site – Water Supply	Delays in filling and maintaining water levels in the restored canal should the Battery Park link not be completed before Harborne Wharf restoration.

Table 2.5 – Site Constraint Summary

3. Outline Design Proposals

The aim of the project is to consider the restoration of the former wharf and canal so the orientation and shape of the proposed wharf and canal reflects the original arrangement as far as possible whilst being suitable for its proposed uses:

Recreational boat use – initially by unpowered or trailable craft, but design to be suitable for all craft able to use the Worcester and Birmingham Canal.

Towpath use – including fully accessible paths if practicable to comply with the Disability Discrimination Act

There are however various elements that have been considered in the optioneering exercise. Reference should be made to the Outline Design Drawing provided in Appendix A.

The following design issues were considered in preparing the Outline Design Drawing.

3.1.1 Boundaries

The proposals for boundary treatment to the rear of the properties on Reservoir Road and Harborne Lane will need to be agreed with property owners and the LPA as part of the detailed design process.

Details of vegetation removal have not been shown. However, it is generally assumed that all vegetation north of the existing path along the south side of the Phase 1B restoration would be removed, along with most of the self set vegetation on the north side of the Phase 1B restoration (whilst maintaining a zone of buffer planting adjacent to boundaries where practicable). In addition at least one of the mature trees adjacent to the bridge will have to be removed to ensure the ongoing stability of the bridge structure.

3.1.2 North side of Harborne Wharf

Access is proposed in the area between the Harborne Lane Bridge and the Selly Park Bridge to open up the area and encourage pedestrian use. Vegetation and trees to the north of the wharf should be removed or coppiced to improve the line of sight from Harborne Lane to the wharf for general visibility and security. The ground level in this area will also be re-profiled to give suitable slopes for the access ramps.

It is proposed that the edge of the wharf will be formed by re-using the existing wall, although the condition of this wall needs to be confirmed before detailed design to ensure its structural integrity. The degree of any repair / reconstruction required will not be apparent until the canal is excavated and the wall exposed.

The works for the Harborne Lane Bridge provide for footpath access on both sides of the canal, it is uncertain if both will be used for pedestrian access as part of the Battery Park development. At this time it is assumed that both will be used, and a connection has accordingly been indicated on the north side of the canal.

3.1.3 South side of Harborne Wharf

The key feature of this area is a slipway which is proposed to provide for the small (trailable) craft and canoes that are expected to use the wharf. The slipway cannot be designed for full length boats because of the limited space available around the Scout Hut. In addition a short flat area is proposed adjacent to the slipway for the purpose of launching canoes without the aid of the slipway.

A viewing and seating area is been proposed adjacent to the proposed slipway, perhaps with an interpretation board to explain the history of the wharf.

Vehicular access to the slipway and wharf side on the south side will be restricted with the use of demountable vehicle barriers to prevent unauthorised use.

3.1.4 Drainage

The drainage system in the base of the canal will have to be formally abandoned. This could be achieved either by removal or by grouting the pipe with cementitious grout. It is proposed that a new chamber and weir is placed close to the existing manhole between 71 and 75 Reservoir Road to act as a draw down or high level overflow providing further flooding protection especially if the canal is restored prior to the connection being made via Battery Park to the Worcester and Birmingham Canal.

3.1.5 Canal Construction

3.1.5.1 Design Parameters

The alignment was drawn using design criteria which were derived from those agreed with British Waterways for the previous studies into restoration of the Lichfield and Hatherton Canals. The following criteria have been specifically approved by British Waterways for the Lapal Canal:

- General width of canal not less than 9 metres (except in special circumstances over short sections and through structures, or where original canal was narrower);
- Generally a 3 metre wide towpath (including any verges – towpath surface to be generally 2 metres wide);
- The headroom above normal water level will be 2.5 metres where practicable, with an absolute minimum of 2.0 metres - it may be felt necessary to install warning signs or gauge boards / chains either side of bridges with lowered headroom to reduce the risk of injury to people on boat roofs;
- Draft (the depth of water from normal water level to canal bed level) to be 1.5 metres over a main navigation channel width of at least 5 metres, and adjacent to any vertical waterway walls.

Other parameters used for the design are:

- Minimum curve radius 60 metres (BW agreed for the Hatherton Canal this could be 40m with channel widening, but the Lichfield Canal is for the most part more rural without the physical constraints which dictated such sharp curve radii, and the points where the 60 metre radius could not be met are identified in the detailed description of the proposed route below)
- The minimum construction depth of road bridges has conservatively been taken to be 1.0m from soffit to carriageway level, although it should be possible to reduce this in many cases in the detailed design process;
- The maximum slope used for new embankment and cutting batters is generally 1 in 2, and where steeper slopes have been used this is identified in the detailed description of the proposed route below.

3.1.5.2 Other design considerations

The proposals aim to maximise the water space to ensure there is sufficient width to accommodate moorings and turning of canal boats and also to give the best possible area for use for canoeing instruction and practise sessions. The actual width available will only be determined exactly when a detailed topographical survey is available.

Where it is proposed that the edge of the canal will not be retained by walls the edges shall have a slope of 1 vertical to 2 horizontal.

It is anticipated that it will not be possible to prove adequately low permeability of the existing canal liner. It is therefore assumed for the purposes of the estimates that a new liner will be required throughout.

3.1.6 Selly Park Bridge

Some remedial works may be required to Selly Park Bridge; these should be undertaken before the canal is filled with water. A detailed inspection should be undertaken once the canal is excavated. The bridge was assessed in March 1999 and has an axle load restriction of 5.7 tonnes. Bollards on the park side of the bridge limit access, however, additional bollards should be placed on the Harborne Lane side of the bridge.

Previous versions of the proposed layout included a footpath turnover at Selly Park Bridge, but the land required has since changed hands and the turnover has been omitted from the current proposal.

3.1.7 Paths and Parkland

The tow path should not be resurfaced with tarmac materials because of the proximity of the trees to the edge of the canal. For this reason a 2.5m wide shared tarmac path is proposed along the southern side of the Phase 1B restoration. This shared use path would be situated at the edge of the existing tree canopies to avoid tree damage.

Historically the tow path was located on the north side of the canal, however, it is considered desirable not to allow free public access to this side of the canal. The tow path and shared access path are better suited to the south side of the canal.

The tow path will be restored with loose stones over an average width of 800mm.

3.1.8 Boat Winding (Phase 1B Restoration)

A winding is proposed for boats up to 19m long in the wharf itself, however, the exact extent of excavation, retaining walls, and bank protection will need to be confirmed at detailed design.

A winding is also proposed for boats up to 22m, at the western end of the Phase 1B restoration. The Trust proposes to make this into a feature area with the option for seating, planting, and perhaps fishing. A retaining wall will be required to protect the bank. However, the viability of the winding depends on the location and cost of diversion of the existing high voltage cables. Cable locations to be confirmed with cable avoidance tools and trial holes where necessary prior to commencing detailed design. If this winding is omitted signage is required at the junction with the Worcester and Birmingham Canal to indicate, "No winding for boats exceeding 60ft in length".

3.1.9 Western Park Boundary (Phase 1B Restoration)

An earth bund and post and rail fence is proposed at the western boundary of the park to be prevent overland flow from the canal, and act as a physical barrier at the end of the existing footpath.

3.1.10 Proposed Moorings

Mooring has been considered on the north and south side of the Harborne Wharf, as well as the north side of the Phase 1B restoration.

Mooring on the southern side of the wharf would be reached by 1.2m wide 17m long pontoons situated at the bottom of the existing bank. To secure this area additional planting would be provided along with additional fencing at the top of slope.

There may be opportunities for end of garden and/or long term moorings at the rear of 1A to 97 Reservoir Road. This area would be secured by gated access at either end of the bank, and a 600mm wide path would be provided

4. Cost Plan

An outline cost estimate has been estimated for the restoration of the Harborne Wharf (Phase 1A) as well as the Western Park Boundary (Phase 1B). The costs have been estimated in two ways, the first cost assumes that a contractor undertakes all the works, the second cost assumes that elements of the works can be completed by volunteers. A summary of the cost of both phases is provided in Table 4.1. A breakdown of the pricing elements is included in Appendix E.

Estimated Costs	Phase 1A		Phase 1B		Combined	
	Phase 1A	Phase 1A with volunteers	Phase 1B	Phase 1B with volunteers	Combined	Combined with volunteers
Construction costs	£181,955	£173,905	£174,072	£165,129	£356,026	£339,033
Preliminaries at 20% of structures	£36,391	£34,781	£34,814	£33,026	£71,205	£67,807
Construction Total	£218,346	£208,686	£208,886	£198,154	£427,232	£406,840
Fees and disbursements (15%)	£32,752	£31,303	£31,333	£29,723	£64,085	£61,026
Total (without contingency)	£251,097	£239,988	£240,219	£227,877	£491,316	£467,866
Overall Contingency (25%)	£62,774	£59,997	£60,055	£56,969	£122,829	£116,966
<u>Grand Total</u>	<u>£314,000</u>	<u>£300,000</u>	<u>£300,000</u>	<u>£285,000</u>	<u>£614,000</u>	<u>£585,000</u>

Table 4.1 – Summary of Construction Costs

In the restoration of both sections the most significant item in construction is the cost of disposal of excavated materials, whether they be „clean“ or „hazardous“ materials. It is estimated that off-site disposal may cost £61,500 for the restoration of Phase 1A, and £71,000 for Phase 1B.

In Phase 1B the cost of construction of the shared use path is £18,500, whilst the works to the new turnover on the Selly Park Bridge is expected to be £28,200. Both of these estimates ignore the option of volunteer labour.

It is estimated that the treatment and removal of the Japanese Knotweed at the western end of Phase 1B will cost £14,000. This assumes that the earth containing the Japanese Knotweed and the earth surrounding the plant can be treated on site and buried on site. If it is not possible to do this it will be necessary to take this material off site and dispose of it at a licensed tip. The cost of disposing of this waste needs to be confirmed with the tip. If it can be certified and accepted as „clean“ waste the cost of treatment and disposal could be £150,000. If the waste were treated as hazardous waste this cost could increase to £300,000.

5. Recommendations

5.1.1 Ground Contamination Issues

As described above, it is recommended that a ground investigation is undertaken prior to any development to confirm the levels of potential contaminants and thus enable a detailed contamination risk assessment to be prepared. Any ground investigation should be based upon the preliminary Conceptual Site Model, which can be updated with the benefit of soil and groundwater chemical analysis. The risk assessment should address the risks to human health, controlled waters (surface water and groundwater), building materials and the local ecosystem.

If contamination is identified following further ground investigation and risk assessment, an appraisal of remedial options should be carried out to confirm the best practicable technique for remediation of the significant pollutant linkages. If significant contamination risks are confirmed, a reclamation strategy should be produced that identifies the remedial actions, remediation standards and the requirements for verification/validation.

Based on the information currently available regarding the site history and the proposed end use, it is considered likely that there will be some contamination issues that could affect the canal restoration works. However, until a Ground Investigation and subsequent contamination risk assessment is undertaken the actual contamination can only be assumed. If contamination is found to be present, suitable mitigation measures such as isolation of the contaminated soil with „clean cover“ in landscape areas could be considered. However the risk to controlled waters, including the underlying major aquifer will need to be fully assessed.

5.1.2 Ground Investigation

Whilst this desk study report comments upon the information available and aims to provide preliminary advice where possible, there are several issues for which no data exists. To provide a more complete level of information to site developers, we recommend that a ground investigation be undertaken to characterise the site.

It is recommended that such a ground investigation, and subsequent interpretation of findings, be designed to examine the following:

- Physical properties of the soils encountered on site, including depth and extent of the Made Ground and Glacial Soils across the site and the depth to bedrock.
- Chemical properties of the underlying soils (and groundwater where encountered) with which to enable a contamination risk assessment for the site to be carried out and the classification of the ground with respect to the durability of buried concrete.
- Installation of standpipes to enable an assessment of groundwater conditions.

5.1.3 Further Ecological Assessment

This ecological constraints assessment is intended for advice only in respect of project designs and site layout and is not for use as part of a supporting statement to a planning application nor within an Environmental Impact Assessment. Therefore further ecological assessment will be required to support any planning application. This will include full Phase1 habitat surveying and specialist protected species surveys as described in table 1.

Up to date information on locally designated sites for nature conservation and records of protected and notable species within 1 km of the site should be sought from EcoRecord as part of further ecological assessment.

Further ecological advice will be required prior to intrusive site investigations.

Further ecological surveys will be required if works are due to commence on-site after November 2010 (12 months after date of this survey) because of the mobility of animals and the potential for colonisation of the site.

5.1.4 Costed Forward Action Plan – Next Steps

The table below gives a possible timeline and budget estimate costings for progressing the restoration project based on tasks that need undertaking prior to detailed design and tendering the scheme.

Task	Indicative Timescale	Indicative Cost
Undertake a Phase 1 Habitat Survey (Ecology) to support future planning applications (contact planning department to determine extent of survey required)	August – October 2012	£5,000
Obtain planning consent for both Phase 1A and 1B (Outline planning permission application)	October – December 2012	£5,000
Undertake programme of Japanese Knotweed treatment/eradication	Commence as soon as possible – Herbicide treatment if selected can take a number of years	Dependant on eradication methodology selected. Herbicide treatment allowance £1,500 p.a.
Confirm location of electrical services on and adjacent to Harborne Lane Bridge	June – August 2012	£500 (worst case time cost) – utilise free dial before you dig services where possible
Contact Severn Trent Water to discuss works in the vicinity of the water supply aqueduct below Harborne Wharf	June – August 2012	£500 (worst case time cost)
Contact Severn Trent Water to discuss the works to remove the existing canal drainage and place a new high level overflow in the Phase 1B restoration	June – September 2012	£500 (worst case time cost)
Investigate the option of acquiring land to construct a new turnover on Selly Park Bridge	Initiate July 2012	£500 (worst case time cost and allowance for any Land Registry and associated enquiries)
Undertake a topographical survey of proposed restoration areas to allow accurate calculation of expected excavation volumes	October 2012 – easiest when scrub has died back	£1,000 (Surveyor fee dependant on detail required and area size)

Task	Indicative Timescale	Indicative Cost
<i>(carried forward from previous page)</i>		£14,500
Investigate options available to fill the canal with water, be that via the Battery Park development or other means as discussed in section 2.3.5	Initiate August 2012	£500 (worst case time cost)
TOTAL		£15,000

Table 5.1 – Cost Forward Action Plan

6. References

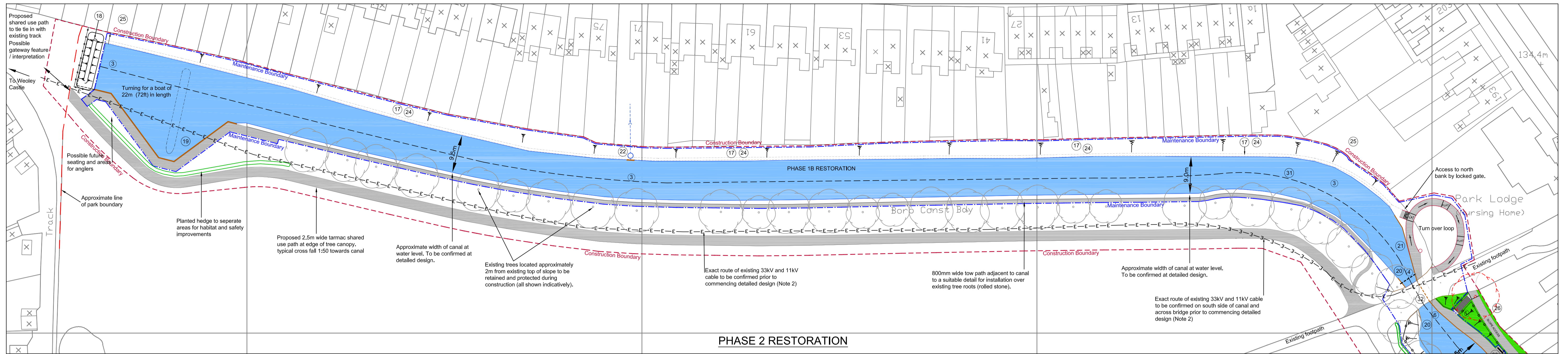
Reference 1: British Geology Survey, 1:50,000 Sheet 168 Birmingham, dated 1996.

Reference 2: Environment Agency, Policy and Practice for the Protection of Groundwater, Groundwater Vulnerability Map for South Staffordshire and East Shropshire, Sheet 22, (1997).

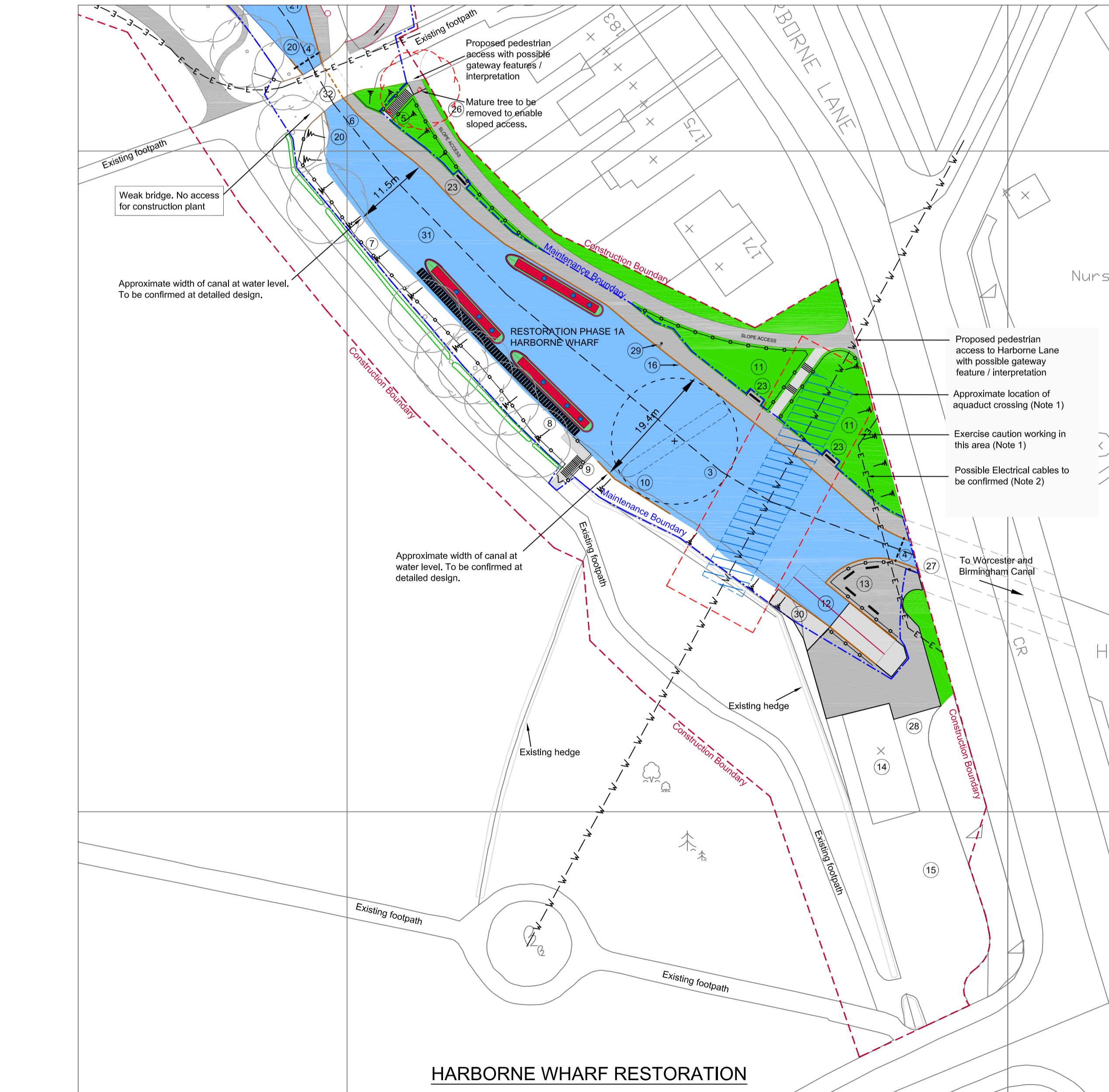
Reference 3: Atkins, Feasibility Study for the Restoration of the Dudley No.2 Canal (The Lapal Canal), 2007

Appendix A

A.1 Lapal Canal Restoration Selly Oak Park – Outline Design 5088079/DRG/01



PHASE 2 RESTORATION



HARBORNE WHARF RESTORATION

NOTES

Constraints (discussed in detail in report)

- The approximate route (centre line) of the water supply aqueduct is marked crossing the wharf. This structure has been drawn to scale based on as built drawings. However, the exact location shall be confirmed prior to detailed design. The four 1.1m diameter cast iron pipes are surrounded by concrete. Works must be designed and carried out with caution in this area and the concrete surround must not be affected by the works. Severn Trent Water shall be consulted on works in this area. The as-built information for the aqueduct will be included in an appendix to the Outline Design Report.
- Prior to detailed design a cable avoidance tool and trial holes shall be used on the west side of the bridge to confirm if any electrical cables have been laid in this area. Atkins requested that Central Networks confirm the presence of these on site but this has not been done. A cable avoidance tool and trial pits shall also be used on the southern side of the canal (phase 2), as drawings indicate that an 11kV and 33kV cable are present in this area. These cables have been jointed in many locations along their length suggesting that both cables are in a poor condition.
- Information provided by Severn Trent Water indicates that a surface water sewer has been laid in the bed of the former canal. It is understood that this drain was constructed on abandonment of the canal to fulfill the drainage function formerly provided by the canal. This is omitted from the drawings for clarity, however, this starts close to the proposed wharf winding and continues to the western park boundary. It is assumed that the surface water sewer east of 71 Reservoir Road was designed to drain to the pipe between 71 and 75 Reservoir Road. It is assumed that the sewer to the west of this drains off site below the existing footpath at the north west corner of the park. It is likely that this surface water sewer will have to be removed or infilled with cementitious grout.

Other Notes

- Proposed stop log grooves (a location for stop log storage is to be confirmed).
- Proposed step access adjacent to existing bridge.
- Proposed gated access to north side of canal for maintenance and possible future long term mooring.
- Proposed planting of hedge and fencing at top of slope to prevent access to slope and moorings.
- 2Nr 1.2m wide 17m long pontoons for access to long term moorings.
- Steps down to proposed moorings.
- Proposed winding space for boats up to 19m long. Extent of dredging, retaining walls, and bank protection to be confirmed at detailed design.
- Vegetation and trees to be removed / coppiced to improve line of sight from Harborne Lane to wharf for general visibility and security. Ground level to be re-profiled as necessary.
- The slipway shall be designed considering the Inland Waterways Association slipway guidance as well as the specific requirements of the small craft and canoes expected to use the slipway.
- Scout hut and canoeing centre.
- Potential for car park improvements. It may be possible to utilise the existing car park for the construction site compound.
- Edge of wharf to be formed using existing wall (condition of wall and exact location to be confirmed at detailed design).
- Possible future 600mm wide access path
- Earth bund to be located to prevent overland flow from the canal. The post and rail fence will also act as a physical barrier at the end of the existing footpath.
- Possible location for a winding for 22m long boats. Retaining wall to protect bank. However, this is likely to be dependant on location and depth of existing HV electrical services. This to be confirmed with cable avoidance tools and trial holes prior to commencing detailed design. If this is not constructed signage to be placed at junction with Worcester and Birmingham Canal to indicate, "No winding for boats exceeding 60ft in length".
- Proposed section of wall to retain and protect slope adjacent to existing bridge.
- Treatment of this area to be confirmed.
- Possible draw down chamber re-using the existing 600mm diameter surface water drainage pipe for outfall, subject to investigation and consent.
- Seating area.
- There may be opportunities for end of garden and long term mooring at the rear of 1A to 97 Reservoir Road.
- Boundary treatment to the rear of the properties on Reservoir Road and Harborne Lane to be agreed with property owners and Birmingham City Council as part of detailed design.
- Details of vegetation removal have not been shown. However, it is generally assumed that all vegetation north of the existing path along the south side of the Phase 2 Restoration shall be removed, along with most of the self set vegetation on the north side of the Phase 2 Restoration. In addition at least one of the mature trees adjacent to the bridge will have to be removed.
- Provision has been made to allow access under the Harborne Lane bridge from both sides of the canal as the designation of the paths through Battery Park has not been determined.
- Demountable lockable vehicle bollards.
- Water supply tap and gully draining to wharf.
- Flat area for lowering canoes into wharf.
- It is anticipated that it will not be possible to prove adequate impermeability of the existing canal liner. It is therefore assumed that new liner is required throughout.
- Some remedial works may be required to Selly Park Bridge; these should be undertaken before the canal is filled. A detailed inspection should be undertaken once the canal is excavated. The bridge was assessed in March 1999 and has an axle load restriction of 5.7 tonnes. Bollards on the park side of the bridge limit access, however, additional bollards should be placed on the Harborne Lane side of the bridge.

Services drawings were supplied to Atkins in December 2009. These have been used to mark some of the relevant services onto this layout. THESE ARE ALL DRAWN INDICATIVELY FOR GUIDANCE ONLY. The location of all services shall be confirmed by trained staff with the use of cable avoidance tools and trial pits in liaison with the utilities providers.

KEY

- Areas requiring significant upgrading of soft landscaping
- New footpaths and access areas. See labels for details of materials.
- Approximate proposed water surface area.
- Canal centreline. Minimum 5.5m wide, 1.5m deep channel to be provided around centreline.
- W-W- Existing major water supply aqueduct.
- E-E-E- Existing electrical services
- S-S-S- Existing surface water sewer
- Maintenance Boundary - shows the proposed boundary of the land to be maintained as part of the navigation.
- Construction Boundary - approximate extent of land required during construction work.
- Proposed safety railing.

STATUS

This drawing is an outline design drawing, prepared to facilitate the consultation and planning process.

Detailed design is likely to require further investigations of services and ground conditions, and a full topographical survey.

REVISIONS	Drawn By	Checked By	Date
B	Minor amendments following receipt of WA comments.	PP	JAT 17.05.10
A	Addition of turn over loop and other minor amendments	PP	JAT 17.02.10

PURPOSE OF ISSUE	Rev.	Authorised for issue	Date
Client - For Consultation	B	JAT	17.05.10
Client - For Consultation	A	JAT	17.02.10
Client - For comment	-	JAT	11.01.10

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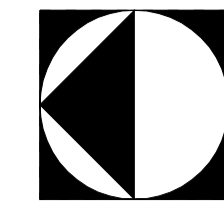
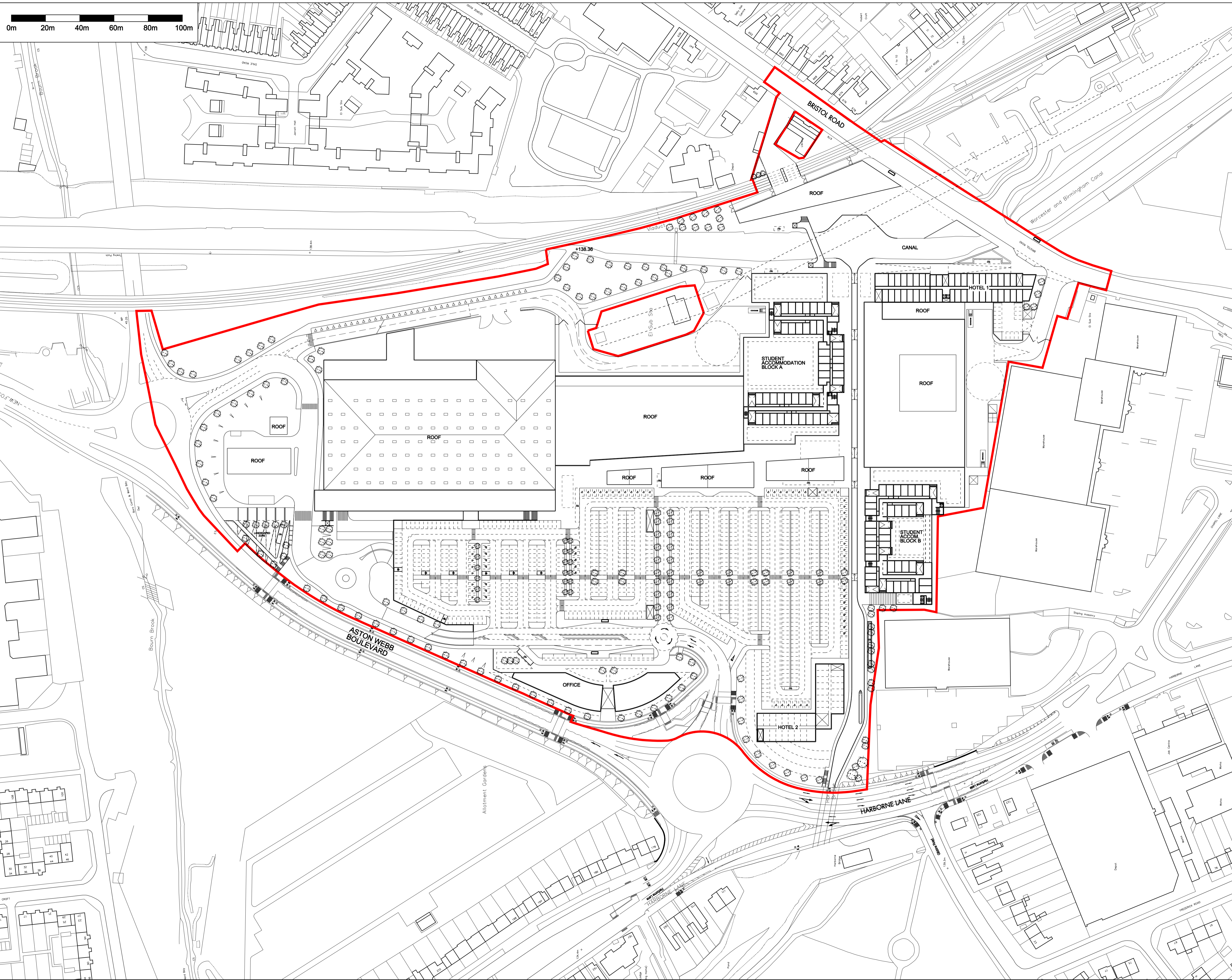
THIS DRAWING IS NOT TO BE SCALED

CLIENT	LAPAL CANAL TRUST
PROJECT	LAPAL CANAL RESTORATION SELLY OAK PARK - OUTLINE DESIGN
DRAWING TITLE	INDICATIVE SCHEME LAYOUT

Scale	1:500	DRAWN	PP	CHECKED	JAT	CO-ORD	CHECK
DATE	6.01.10	DATE	11.01.10	DATE			
DRAWING NO	5088079/DRG/01	SHEET	A1	PLOT DATE	17.05.10	REV	B

Appendix B

B.1 Harvest Partnership – Battery Park Retail Development Proposals



KEY
 — APPLICATION SITE BOUNDARY

FOR ILLUSTRATIVE PURPOSES ONLY

REVISIONS

CLIENT
HARVEST PARTNERSHIP

PROJECT
SELLY OAK - BIRMINGHAM

TITLE
PROPOSED THIRD FLOOR PLAN

SCALE DATE
 1:1000 @ A1 FEB. 12

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