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10327 Technical Note 05

19/01047/OUT-2

Land North East of Oxford Road West of Oxford Canal and East of Bankside, Banbury, Oxfordshire

Technical Note: Outline Drainage Strategy

17th June 2020

1 Introduction

This technical note responds to Drainage Virtual Teams Meetings held between Brookbanks Consulting and the Oxfordshire County Council (OCC) Lead Local Flood Authority Drainage Engineer, Adam Littler during June 2020.

The Strategy relates to the submission of the Flood Risk Assessment (*10327 FRA02 Rv4*) produced by Brookbanks Consulting Ltd (BCL), in support of the outline application at Land North East of Oxford Road West of Oxford Canal and East Of Bankside, Banbury, Oxfordshire.

A drainage strategy plan has been produced and is included in within Appendix A of this note:

10327-DR-07 Drainage Strategy Plan.
10327-DR-08 Typical Drainage Sections.

The application comprises the following:

- *Up to 825 residential units,*
- *Area designated for allotments and green space.*

2 Drainage Strategy

2.1 The site is described in detail within the submitted FRA for the scheme as described above. However to summarise the site generally falls from the West to East and then North East of the site. The site itself has been tested for infiltration in accordance with BRE 365 requirements and found to have useable infiltration throughout. Best values for infiltration where mostly located in the North East.

2.2 Within the FRA a scheme was demonstrated to collect surface water from the new development areas and deposit it into a basin within the North East of the site. This basin has been designed to take advantage of the infiltration rates found in the North East of the site. This basin has been designed to accommodate flows from the new development up to and including a 1:100yr storm event with climate change, as is required for an FRA supporting any Planning Application of the nature.

2.3 Within the appendices of this note is drawing 10327-DR-07 and 08 which detail the routing and general form of the following drainage structures which treat, infiltrate and convey water to the final storage and infiltration basin as mentioned above and detailed within the FRA.

Conveyance Swales

2.4 Shallow conveyance swales will be used through the developments green space to pick up and convey water towards the infiltration basin in the North East of the development.

2.5 The Swales, as shown in plan and section within the appendices will predominantly be 5.5m wide and 0.75m deep. The sizes of the Swales may vary depending on other land use requirements such as pinch points through retained hedgerows or land boundary constraints etc. Where appropriate check dams will also be installed to let parcel surface water to be part stored to infiltrate locally as well as be conveyed to the main basin. Where a swale cannot connect through open drainage means to other above ground drainage features, then a piped network will be used to convey the surface water to the next available above ground drainage feature down stream by gravity.

Highway Swales

2.6 Where highways have single sided or no frontage and are therefore within open space then highway water should be directed to shallow swales by the side of the road where appropriate. The sizes of the swales may vary depending on other land use requirements such as LEAPS or NEAPS. If the amount of road draining to the swale would not infiltrate within the swale for a 1:30yr event then it should be returned to the piped highway drainage network for conveyance to the main infiltration basin.

New Ditches

2.7 Running approximately north to south through the centre of the development is a retained hedge line and proposed new footway within a corridor of greenspace. While the space is not wide enough for a swale a ditch can be provided between the development edge and the Root Protection Zone (RPZ) of the retained hedge.

2.8 The ditches, as shown in plan and section within the appendices will predominantly be 1.5-2m wide and 1 to 1.5m deep. The sizes of the Ditches may vary and will respect the need to protect the hedge and its RPZ as a key feature of the development. As with all drainage features on this project there will be an element of infiltration within the ditch.

Drainage Hierarchy

2.9 Drainage within the development will be collected within each parcel and conveyed to either swales or ditches within the development located within the green space. Small sections of pipe work may be required for certain sections of this conveyance depending on the location of the parcel to the open conveyance locations.

2.10 The open conveyances as described above will then by gravity connected together within a multi-tiered system. This system will have a considerable surface area that will also discharge back into the ground through infiltration. This additional infiltration potential has not been considered within the FRA at present with the basin remaining the main point of discharge and infiltration for robustness. This additional infiltration could however be looked at during any future Reserved Matter submission.

2.11 Once water reaches the basin it is held there in volume to take advantage of the good infiltration rates found in this location. While being held it is expected that suspended solids will settle out and help polish water as infiltration takes place.

3 Water Quality

3.1 Impermeable surfaces collect pollutants from a wide variety of sources including cleaning activities, wear from car tyres, vehicle oil and exhaust leaks and general atmospheric deposition (source: CIRIA C609). The implementation of SUDS in development drainage provides a significant benefit in removal of pollutant from development run-off.

3.2 The SuDS Manual C753 describes a 'Simple Index Approach' for assessing the pollution risk of surface run-off to the receiving environment using indices for likely pollution levels for different land uses and SUDS performance capabilities.

3.3 CIRIA document C753 Table 26.2, as shown in Table 3a below, indicates the minimum treatment indices appropriate for contributing pollution hazards for different land use classifications. To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index.

2

Land Use	Pollution Hazard Level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul-de-sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. < 300 traffic movements/day	Low	0.5	0.4	0.4
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g. hospitals, retail) all roads except low traffic roads and trunk roads/motorways.	Medium	0.7	0.6	0.7
Sites with heavy pollution (haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites) sites where chemicals and fuels (other than domestic fuel oils) are to be delivered, handled, stored, used or manufactured, industrial sites, trunk roads and motorways.	High	0.8	0.8	0.9

Table 3a: CIRIA 753 Table 26.2 Pollution Hazard Indices

3.4 For a residential type development, roof water requires a very low treatment of 0.2 for total suspended solids, 0.2 for heavy metals and 0.05 for hydrocarbons, and run-off from low traffic roads such as cul-de-sacs and individual property driveways requires low treatment of 0.5 for total suspended solids, 0.4 for heavy metals and 0.4 for hydrocarbons.

3.5 To provide the correct level of treatment, an assessment needs to be made of the mitigation provided by each SuDS feature. Table 26.3 of The SuDS Manual CIRIA document C753 shown as Table 3b for discharges to surface waters indicate the treatment mitigation indices provided by each SuDS feature.

Type of SUDS component	Total suspended solids (TSS)	Metals	Hydro-carbons
Filter Strip	0.4	0.4	0.5
Filter Drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bio-retention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8
Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Table 3b: CIRIA 753 Table 26.3 SuDS Mitigation Indices for discharges to surface waters.

3.6 Where more than one mitigation feature is to be used, CIRIA guidance states that the total mitigation index shall be calculated as follows:

Total SUDS mitigation index = Mitigation Index 1 + 0.5 x Mitigation Index 2

The SuDS management train being promoted for the development has been tailored to encourage passive treatment and will result in high levels of pollutant load removal in accordance with the 'Simple Index Approach' procedure. 'Simple Index Approach' assessments will be included as part of the reserved matters applications.

4 Summary

4.1 This Technical Note has identified no prohibitive engineering constraints in developing the proposed site for the proposed residential usage.

4.2 Strategies for surface water drainage at the site has been developed to meet both national and local policy. The strategy demonstrates the viability of the site to employ means of drainage to comply with NPPF guidance, together with local guidance and requirements of the approved Flood Risk Assessment and the LLFA.

4.3 Storm water discharged from development will be directed to the strategic detention/infiltration pond, to the North East of the site, through where appropriate surface infrastructure as described in section 2.

4.4 The system will provide passive treatment to improve the quality of water discharged from the development and also provide biodiversity and amenity opportunities.

Objectives

4.5 The key objectives for the site drainage will be:

- Implementation of a sustainable drainage scheme in accordance with current national and local policy together with principles of good practice design.
- Control of peak discharges from the site to a rate below the baseline conditions.
- Development of surface water management proposals that improve water quality and biodiversity of the site.

5 Limitations

7.1 The conclusions and recommendations contained herein are limited to those given the general availability of background information and the planned usage of the site.

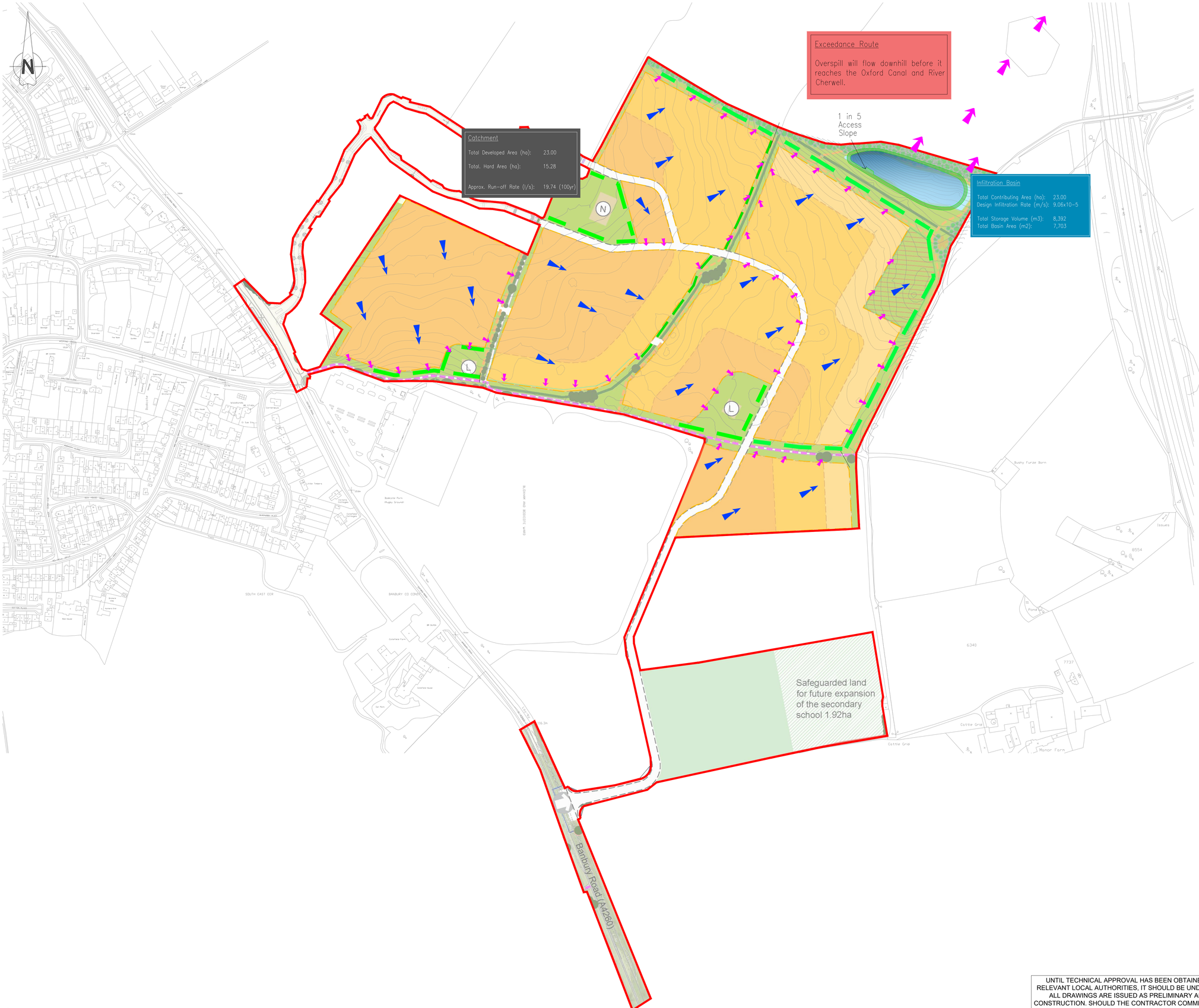
7.2 Third party information has been used in the preparation of this report, which Brookbanks Consulting Ltd, by necessity assumes is correct at the time of writing. While all reasonable checks have been made on data sources and the accuracy of data, Brookbanks Consulting Ltd accepts no liability for same.

7.3 The benefits of this report are provided solely to Hallam for the proposed development land at Banbury only.

7.4 Brookbanks Consulting Ltd excludes third party rights for the information contained in the report.

Appendix A

Original Drawing Size A1



Construction Design and Management (CDM) Key Residual Risks

Contractors entering the site should gain permission from the relevant land owners and/or principle contractor working on site at the time of entry. Contractors shall be responsible for carrying out their own risk assessments and for liaising with the relevant services companies and authorities. Listed below are Site Specific key risks associated with the project.

1) Overhead and underground services
2) Street Lighting Cables
3) Working adjacent to water courses and flood plain
4) Soft ground conditions
5) Working adjacent to live highways and railway line
6) Unchartered services
7) Existing buildings with potential asbestos hazards

NOTES:

1. Do not scale from this drawing
2. All dimensions are in metres unless otherwise stated.
3. Brookbanks Consulting Ltd has prepared this drawing for the sole use of the client. The drawing may not be relied upon by any other party without the express agreement of the client and Brookbanks Consulting Ltd. Where any data supplied by the client or from other sources has been used, it has been assumed that the information is correct. No responsibility can be accepted by Brookbanks Consulting Ltd for inaccuracies in the data supplied by any other party. The drawing has been produced based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.
4. No part of this drawing may be copied or duplicated without the express permission of Brookbanks Consulting.

KEY:

- Red Line
- Catchment Boundary
- Flow Direction
- Infiltration Basin and Maintance Strip
- Potential Conveyance Channel Locations
- Potential Drainage Ditches
- Exceedance Route Flow Path

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Brookbanks
6150 Knights Court Solihull Parkway Birmingham B37 7WY
Tel (0121) 329 4330 Fax (0121) 329 4331
www.brookbanks.com

Hallam Land Management

Land South of Bankside, Banbury

Illustrative Surface Water Drainage Strategy

Status		Status Date
Final		June 2020
Drawn	Checked	Date
KM	DS	18.06.20
Scale	Number	Rev
1:2500	10327-DR-07	-

0 50 100 150 200 250
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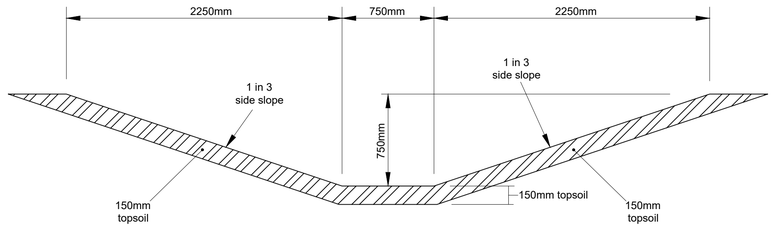
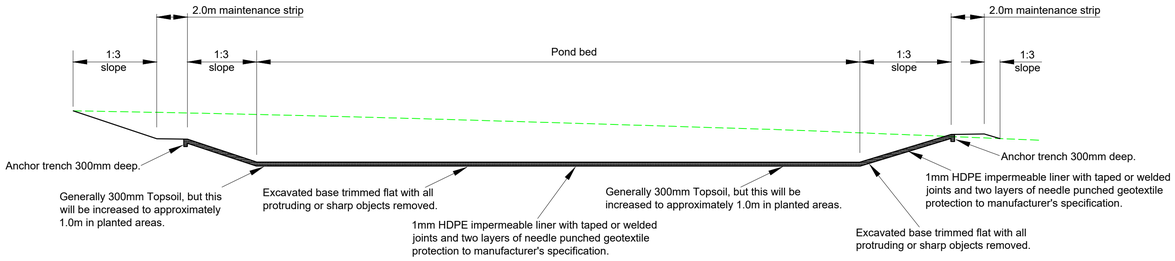
Original Drawing Size A1



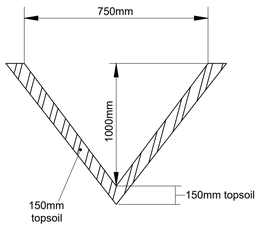
Typical Swale Section
1:25

Note: Swale dimensions may vary in line with other green corridor requirements



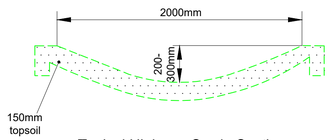
B - B
Typical Basin Section
1:200

Note: Slopes typically 1:3, Basin depth typically 1.5m



Typical Ditch Section
1:25

Note: Ditch dimensions may vary in line with other green corridor requirements



Typical Highway Swale Section
1:25

Note: Swale dimensions may vary in line with other green corridor requirements

Construction Design and Management (CDM)
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Brookbanks
6150 Knights Court Solihull Parkway Birmingham B37 7WY
Tel (0121) 329 4330 Fax (0121) 329 4331
www.brookbanks.com

Hallam Land Management

Land South of Bankside,
Banbury

Swale and Basin
Typical Sections

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