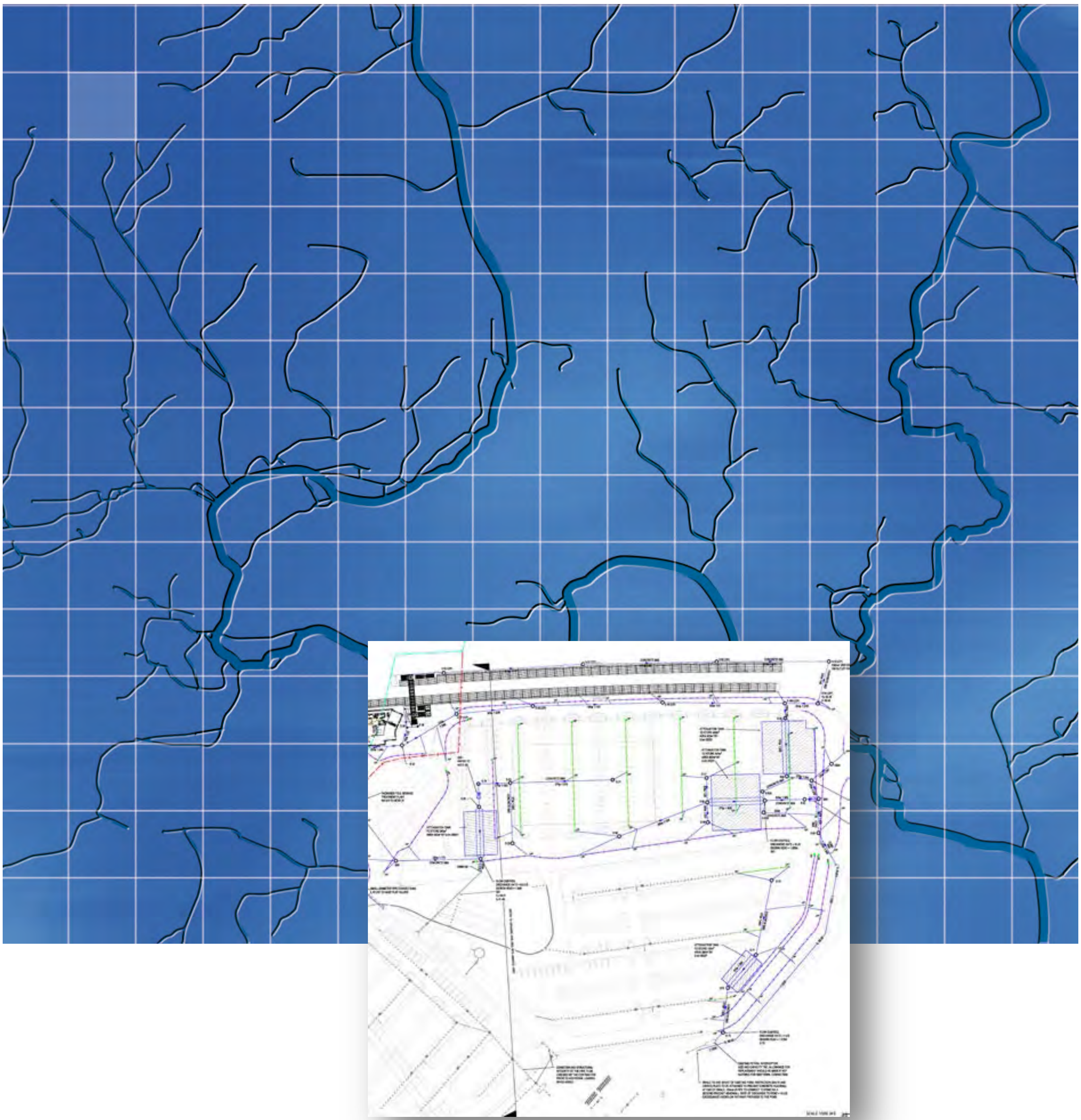
Network Rail and Chiltern Railways

September 2015

EWR P1 – SW Drainage Assessment (AP14 & AP14a)



Wallingford HydroSolutions Limited

Network Rail and Chiltern Railways

EWR P1 – SW Drainage Assessment (AP14 & AP14a)

Document issue details

WHS1160

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For and on behalf of Wallingford HydroSolutions Ltd.

Prepared by Brett Park

Approved by Paul Blackman
Position *Technical Director*

Date **11th September 2015**

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Contents

1 Purpose

This document constitutes a surface water drainage assessment (SWDA), as required by Condition 13 of the Order under the Transport and Works Act 1992 (TWA) obtained by Chiltern Railways for the construction of the East West Rail Phase 1 (EWR P1) project between Bicester and Oxford. This document also provides the information required by the National Planning Policy Framework (NPPF) in considering the surface water drainage aspects of a Flood Risk Assessment for new development.

This surface water drainage assessment considers the requirements for the development of the following elements of the railway scheme:

- AP14 – Oxford Parkway Station; and
- AP14a – Banbury Road Sidings.

Figure 1 shows the locations of these Assessment Points in relation to the overall railway development.

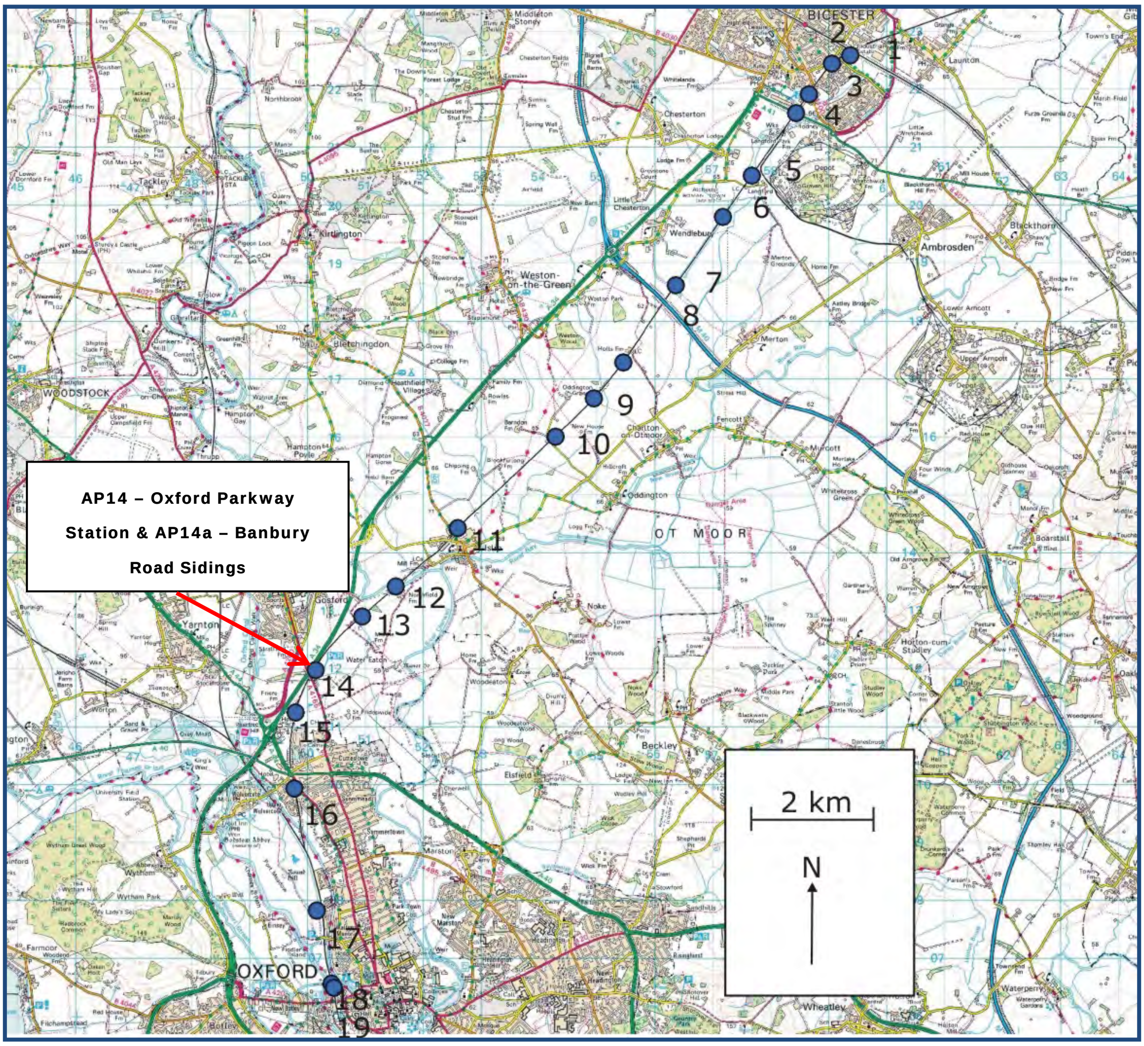

Figure 1 - Overview of the scheme with Assessment Points shown.

Condition 13 of the TWA Order requires that:

'No construction of any one of the following elements of development shall commence until a surface water drainage assessment and scheme for that element (as identified in the Level 2 Flood Risk Assessment Revised, July 2010 (Inquiry document CD/2.22), unless stated otherwise here) has been submitted to and approved in writing by the local planning authority, in consultation with the Environment Agency:

- *AP1 Bicester Chord.*
- *AP2 Tubbs Lane footbridge.*
- *AP3 Bicester Town station.*
- *AP4 A41 overbridge.*
- *AP6 Elm Tree Farm/Langford Lane Overbridge (modified to accord with the revised proposal shown on Revised Sheets 8b, 35 and 37 of the Deposited Plans and Sections (Inquiry Document CD/1.28).*
- *AP7 Merton footbridge.*
- *AP8 Holts Farm overbridge.*
- *AP9 Oddington Footbridge No 5.*
- *AP10 Oddington overbridge.*
- *AP11 Islip station in Phase 1.*
- *AP11 Islip station in Phase 2.*
- *AP13 Oxford No5 overbridge.*
- *AP14 Oxford Parkway.*
- *AP14a Banbury Road Sidings.*
- *AP15 Gosford and Oxford Footbridge No 10.*
- *AP18 Sheepwash Bridge.*
- *AP19 Oxford station.*

The surface water drainage assessments shall follow the methodology set out in the Scope of Surface Water Drainage Assessment, July 2010, agreed by the Environment Agency. Each surface water drainage assessment shall demonstrate that surface water discharge rates and volumes from that element of the development will not increase flood risk, or taken together with other relevant works in the same catchment, can be maintained at or below the agreed limits, using sustainable drainage techniques. Development shall be in accordance with the approved surface water drainage assessment and scheme'

Therefore the purpose of this document is to obtain approval of the local planning authority, in consultation with the Environment Agency (EA), for the surface water drainage assessment for AP14 Oxford Parkway Station & AP14a Banbury Road Sidings, thus discharging the requirements of Condition 13 of the TWA Order and meeting the surface water drainage requirements of NPPF.

2 Proposed Development

2.1 Overview

EWR P1 is a major package of infrastructure investments including: the doubling of the line between Bicester Town and Oxford North Junction; a new independent line being built between Oxford North Junction and Oxford station, using a disused track bed parallel to the existing railway; the existing stations at Bicester Town and Islip will be rebuilt, and a new station built at Oxford Parkway; and at Oxford the disused parcels platforms at the north end of the station will be removed and replaced for passenger use for Chiltern Railways services. The following sections describe the proposed works at AP14 & AP14a in more detail.

2.2 AP14 – Oxford Parkway Station

A new station is planned to be built at the site of redundant grain silos and stone sidings that are to be demolished and relocated respectively. This site shown on Figure 2 is adjacent to an existing Oxfordshire County Council Park and Ride facility with immediate access from the A34 trunk road.

Most of the parking already exist for the Park and Ride scheme, although a new area of hardstanding will be required on parts of the site that are currently grassed. Some existing hardstanding parking areas are to be re-laid. Additional parking is to be provided by decking at existing hardstanding areas. The existing aggregates depot is to be relocated to agricultural land to the north east of the site, connected to the railway network. The present aggregates site is to be used for the station buildings and to enhance car parking capacity. The proposals include provisions for platform extensions at the northern end of the station. Surface water runoff assessments have therefore been undertaken for the proposals with and without the platform extensions.

Figure 2 - AP14, Oxford Parkway Station. Contains Ordnance Survey Data © Crown copyright and database right 2013

2.3 AP14a – Banbury Road Sidings

The existing Banbury Road sidings are to be converted for general use for the construction of the new Oxford Parkway Station. A roadway is to be constructed linking the sidings to the proposed car park of the new station, including turning circles for large vehicles, a site office and car parking for site staff. The location of the works is shown in Figure 3.

Figure 3 - AP14a, Banbury Road Sidings. Contains Ordnance Survey Data © Crown copyright and database right 2013.

3 Management of Surface Water Runoff

3.1 Planning Requirements

It is a recognised development requirement that post-development the stormwater runoff rates discharged from any new development should not be greater than flows currently generated from the site, whether this be at greenfield or existing brownfield run-off rates. Exceptions generally only apply where it is not practical to achieve this due to the size of the hydraulic control unit. In this situation overcompensation at neighbouring sites will be provided to ensure that over the whole scheme surface water runoff is reduced. These commitments are in line with guidance set out in the NPPF and through discussions with the EA. The following sections describe the calculation procedure followed to obtain these rates.

3.2 Runoff Assessments

Pre-development (i.e greenfield or brownfield) and post-development peak surface water runoff rates have been calculated for the 1 in 1yr and 1 in 100yr events for the development sites at AP14 & AP14a. Appendix 1 outlines the methodology used in the estimation of the peak surface water runoff rates. It should be noted that following discussions with the EA this analysis has not considered runoff from embankments, as these are permeable hence can be assumed to generate runoff at the greenfield rate. The following sections present the data used and the results of the surface water runoff calculations.

3.2.1 Area Assessment

Table 1 details the areas of permeable and impermeable surfaces at each assessment point pre- and post-development.

Table 1 - Surface types and areas at assessment points.

Assessment Point	Type	Existing Brownfield		Post Development		Increase in Impermeable area (ha)
		Impermeable extent (ha)	Permeable extent (ha)	Impermeable extent (ha)	Permeable extent (ha)	
AP14 Oxford Parkway Station	**Brownfield**	1.05	2.86	3.91	0	2.86
AP14a Banbury Road Sidings	**Greenfield**	0	0	0.36	0	0.36

3.2.2 Surface Water Runoff Rates

Greenfield, brownfield and post-development runoff rates and volumes were calculated as described in Appendix 1. Runoff rates are presented in Table 2 below.

Table 2 – Surface Water Runoff rates.

Assessment Point	Area (ha)	1:1yr Event			1:100yr Event		
		Greenfield peak Runoff rate (ls^{-1})	Brownfield peak Runoff rate (ls^{-1})	Post development peak Runoff rate (ls^{-1})	Greenfield peak Runoff rate (ls^{-1})	Brownfield peak Runoff rate (ls^{-1})	Post development peak Runoff rate (ls^{-1})
AP14 Oxford Parkway Station	3.91	9.86	**10.94**	35.13	35.22	**40.05**	136.64
AP14a Banbury Road Sidings	0.36	**0.81**	n/a	3.26	**3.04**	n/a	12.65

4 Design Statements & Commitments

An initial desk study undertaken by Network Rail in 2013 confirmed that the underlying geology at this site consists of Oxford Clay (Borehole records are provided in Appendix 2). This data has confirmed that infiltration would not be a viable option for disposal of surface water because of the relatively impermeable nature of the underlying geology. Using the SuDS hierarchy set out in Building Regs Part H[1] and the SuDS Manual[2] if infiltration is not viable then discharge to a watercourse should be achieved. This is the preferred method of surface water disposal for this site where discharge is proposed into an existing watercourse that runs from west to east through the existing park and ride car park. Formal attenuation will be required to ensure that runoff is controlled to pre-development rates.

Jacobs has prepared the surface water drainage design for AP14 "Oxford Parkway Station" and Atkins have prepared drainage design for AP14a "Banbury Road Sidings" as part of Drainage Strategy GRIP 5[3] (please see Appendix 3 & 4 for drainage designs). These designs show the drainage arrangements at each site that will be installed to sustainably manage surface water. Jacobs has confirmed and identified on their detailed drainage design that the Post-Development runoff rate from Oxford Parkway Station can be limited to the 1 in 100 year Target Discharge Rate as provided in Table 3. This will be achieved through provision onsite attenuation and discharge into a small watercourse system that runs through the existing park and ride car park. The

[1] The Building Regulations Part H – Drainage and waste disposal. (2002)
[2] CIRIA publication 'The SuDS Manual (C697)'
[3] East West Rail Phase 1 Drainage Strategy GRIP 5 – Detailed Drainage Designs.

following sections describe the Target Discharge Rates that need to be achieved, the drainage layouts and the SuDS components used to sustainably manage runoff in more detail.

4.1 Target Discharge Rates

Atkins has confirmed that because of the low greenfield runoff rate associated with AP14a Banbury Road sidings (i.e 3.04l/s for the 1 in 100 year rainfall event) providing formal attenuation at this site would not be practicable. This is because controlling discharge down to very low rates would require small hydraulic controls that would be prone to blockage and require onerous maintenance regimes. Therefore, no formal attenuation will be provided at AP14a Banbury Road Sidings and over attenuation will be provided at AP14 Oxford Parkway Station to compensate. This is a principle that has been previously discussed and agreed with the EA for other sites where small greenfield runoff rates are difficult to achieve (eg for AP2 Tubbs Lane Footbridge & AP3 Bicester Town Station).

To account for this the combined pre-development runoff rate for both AP14 & AP14a has been reduced to reflect the post-development runoff rate for AP14a. For example, for the 1 in 100 year rainfall event the difference between post-development and greenfield flow of 9.61l/s for Banbury Road sidings has been subtracted from the brownfield flow of 40.05l/s for Oxford Parkway Station resulting in a reduced target discharge rate of 30.44l/s for Oxford Parkway Station. This results in the reduced target discharge rates presented in Table 3 below for AP14 Oxford Parkway Station.

Table 3 – AP14 Oxford Parkway Station Target Discharge Rates (l/s).

Return Period	Limiting Discharge rate (l/S)
1:1	8.49*
1:100	30.44*

**an allowance for Banbury Road Sidings has been included.*

4.2 AP 14 – Oxford Parkway Station Drainage Strategy (Designed by Jacobs)

Jacobs has designed the surface water drainage system for Oxford Parkway Station including the new platforms, station buildings and car park. Details of the proposed drainage layout can be seen in Appendix 3.

Surface water from the station buildings will be collected by gutters and downpipes with the surface water from the platforms, roadways and car parking areas collected via gullies and linear drainage channels. Surface water is then directed via below ground drainage pipework and inspection chambers directly to underground attenuation tanks located at strategic locations throughout the development. Surface water originating from car parking areas will be discharged through a hydrocarbon interceptor before being discharged into the existing watercourse or attenuation pond.

In summary the surface water drainage system serving this development consists of five attenuation storage tanks as per Figure 4. These tanks collect surface water from the hardstanding areas of the development and discharge into either the existing watercourse or existing attenuation pond at a controlled rate through hydrobrake flow controls. The attenuation volumes and discharge rates are presented in Table 4. The total discharge from this site during a 1 in 100 year (plus a

30% allowance for climate change) rainfall event is limited to 25.0l/s, which provides a betterment over the Target Discharge Rate of 30.44l/s.

Table 4 – Attenuation Provision and Discharge from Oxford Parkway Station.

Attenuation Tank	Storage Volume (m^3)	Discharge Rate (l/s)
Tank 1	165	4.0
Tank 2	240	6.5
Tank 3	540	5.0
Tank 4	540	5.5
Tank 5	81	4.0
Total	**1566**	**25.0**

4.3 AP14a – Banbury Road Sidings Drainage Strategy (Designed by Atkins)

Atkins has designed the surface water drainage system for Banbury Road Sidings. Details of the drainage layout can be seen in Appendix 4.

Surface water from this new roadway will be collected within a series of filter drains that run along the edge of the site which discharge into new drainage ditches designed to have a shallow gradient to reduce flow velocity. There are three networks that ultimately discharge into existing drainage ditches that cross the site. There is no formal attenuation provided for this site but as described in section 4.1 over attenuation will be provided at AP14 Oxford Parkway Station to compensate.

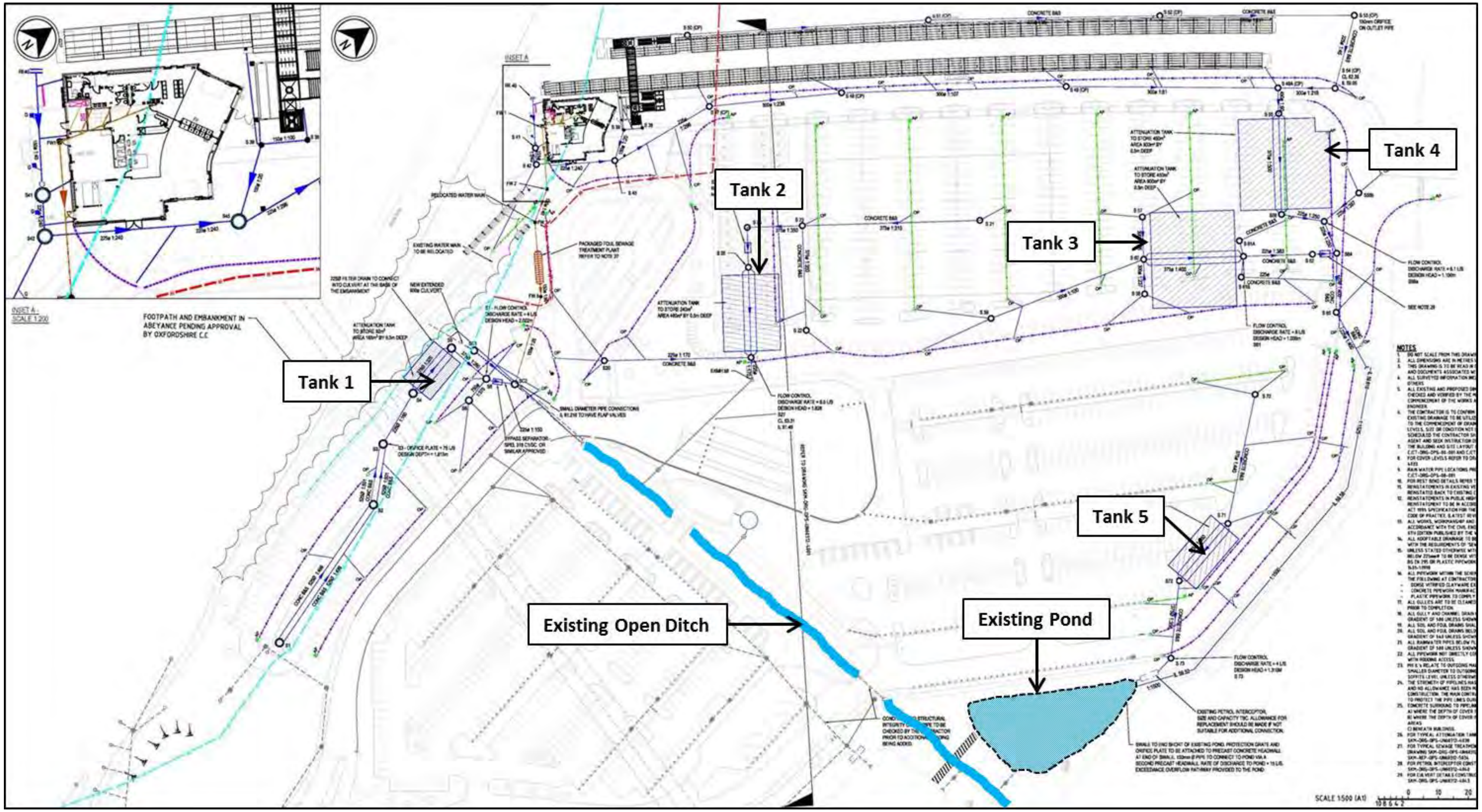

Figure 4 – Proposed Attenuation Storage Tank Locations and Discharge Points.

5 Conclusion

The proposed drainage at AP14 Oxford Parkway Station has been designed to achieve the “Target Discharge Rates” presented in Table 3. This has been achieved though the provision of 5 formal attenuation storage tanks installed under the new car park at AP14 Oxford Parkway. The storage tanks will store surface water runoff during extreme rainfall events and discharge to an existing watercourse or existing attenuation pond at controlled rates (as per Table 4) using hydrobrake flow controls. The drainage infrastructure at AP14 Oxford Parkway Station has been designed to ensure a degree of over attenuation is provided to account for the runoff generated by AP14a Banbury Road Sidings which does not have any formal attenuation. This arrangement will ensure that post-development the overall runoff rates and volumes from both AP14 & AP14a are reduced to below the pre-development equivalent. Therefore, we consider that the information provided in this surface water drainage assessment is sufficient to comply with Condition 13 of the TWA Order and the surface water drainage requirements of NPPF.

Appendix 1 – Surface Runoff Calculations Methodology

1.1 Introduction

Guidance issued by DEFRA[4] states that post development the stormwater runoff discharges from urban developments should approximate to the site greenfield response over an extended range of storm frequencies of occurrence (return periods). However, it is accepted that drainage proposals may be measured against the existing drainage performance of the site (brownfield). In addition the peak rate of runoff into a watercourse should be no greater than the undeveloped rate of runoff, although similarly exceptions apply where it is not practical to achieve this. The guidance outlines methodologies for estimating storage volumes for stormwater control for development sites and also provides methodologies for the estimation of peak rates of runoff from greenfield sites.

For clarification, the greenfield rate refers to the volumes and peak flows associated with an undeveloped site whilst brownfield relates to a site which has been previously developed hence a proportion of the site is impermeable.

As part of the Chiltern Railways development surface water runoff volumes for greenfield and brownfield conditions are required. In addition, peak runoff rates are also required for greenfield and brownfield conditions. Section 1.2 outlines the methodology for the estimation of the surface water runoff volumes whilst Section 1.3 outlines the methodology for estimating the peak runoff rates. Note that there is no guidance on estimating brownfield peak runoff rates, and the guidance states that greenfield runoff rates should be considered as indicative only due to the limitations of the methodologies.

1.2 Surface Water Runoff Methodology

The DEFRA guidance recommends the use of Institute of Hydrology Report 124 (IH124)[5] for estimating surface water runoff. However, recent research into flood design for small catchments[6] suggests that the FEH statistical method[7] and the Revitalised Flood Hydrograph (ReFH)[8] event-based method both outperform the older methods. The report states that these are applicable across the range of catchment sizes used in their development and that the continued recommendation of outdated methods such as IH124 and ADAS 345 is inappropriate. The research notes that there is little evidence to suggest that the accuracy of the FEH methods when applied to ungauged catchments is particularly scale dependent and recommends the use of current versions of the FEH statistical approach or the ReFH rainfall-runoff model except on highly permeable (BFIHOST > 0.65) or urbanised catchments (URBEXT2000>0.15) where the results of the ReFH model can be less reliable. The research recommends that for catchments smaller than 0.5 km^2 and plot scale, which is relevant for the development sites within the Chiltern Railways development, runoff estimates should be derived from FEH methods applied to the nearest suitable

[4] Kellagher R, 2012, Preliminary rainfall runoff management for developments, DEFRA R&D Technical Report W5-074/A/TR/1 Revision E

[5] Marshall D, C, W. Bayliss, A, C,. Flood Estimation for small catchments. Institute of Hydrology Report 124.

[6] Environment Agency, 2012, Estimating flood peaks and hydrographs for small catchments: Phase 1, SC090031

[7] Robson, A.J. and Reed, D.W. (1999) Statistical procedures for flood frequency estimation. Volume 3 of the Flood Estimation Handbook. Centre for Ecology & Ecology.

[8] NERC (CEH). 2005. Revitalised FSR/FEH rainfall runoff method. Spreadsheet application version 1.4.http://www.ceh.ac.uk/feh2/SpreadsheetimplementationofReFH.html

catchment above 0.5 km^2 for which descriptors can be derived from the FEH CD-ROM and scaled down by the ratio of catchment areas.

Following the guidance, and taking into account this research, greenfield runoff hydrographs were calculated using 6.25 hour duration design rainfall events for the required return period event using a conjunction of the IH124 and ReFH rainfall runoff method.

IH124

Greenfield peak runoff rates have been calculated using the small catchment statistical method, IH124 methodology, in conjunction with the growth curves factors specified within the NERC Flood Studies Supplementary Reports 2[9] and 14[10]

A catchment area of 50 ha was assumed for each site with the results expressed as runoff rates per unit area to facilitate scaling to the development area. A key catchment descriptor within the method is the soil class(es) as defined by the Winter Rainfall Acceptance Potential (WRAP) map[11]. This is an extremely coarse map which is mapped at a scale of 1:625,000 and as such does not contain sufficient information for determining local soil and underlying substrate permeability. At design level the selection of appropriate soil class values would be informed by local soil maps coupled within infiltration tests. For the purposes of defining runoff rates for this assessment the soil permeability classes and substrate classes within the Hydrology of Soil Types (HOST) classification[12] were used to guide soil class selection. The HOST classification has replaced the WRAP map in all current flood estimation procedures.

ReFH

Given that there is no available flood event data on which to calibrate the ReFH model, the catchment descriptors for each site were obtained from the FEH CD ROM v3. The nearest 1km cell to each site was used to obtain the rainfall parameters required for the rainfall Depth Duration Frequency (DFF) ReFH model. Where this is not possible catchment scale parameters were obtained for the nearest small river reach.

The ReFH model was run using the 6.25 hour event for the 1 in 1 year, 1 in 30 year and 1in 100 year events. Allowances for climate change were made for the 1:100 year event by increasing the rainfall intensity by 30%. Note that current DEFRA[13] guidance advises increasing rainfall intensities by 20% for 2080 and beyond, so the adopted values are conservative. A catchment area of 50 hectares was assumed and results are then scaled to the site level.

Development of final runoff rates

The ReFH and IH124 methodologies produce independent runoff rates for the given return periods. Current research into small catchments[14] indicates that more recent methodologies are generally more reliable that the older (IH124) methodologies. The differences between the peak runoff rates

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[9] Faulkner, D.S. 1999. Rainfall Frequency Estimation. Flood Estimation Handbook Vol. 2, Institute of Hydrology, Wallingford, UK.

[10] Institute of Hydrology,1983 Review of regional growth curves. Flood Studies Supplementary Report 14. Institute of Hydrology, Wallingford, UK

[11] Natural Environment Research Council, 1975. Flood Studies Report.

[12] Boorman, D. B., Hollis, J. M. and Lilly, A., Hydrology of soil types: a hydrologically-based classification of the soils of the United Kingdom. Institute of Hydrology Report 126.

[13] Kellagher R, 2012, Preliminary rainfall runoff management for developments, DEFRA R&D Technical Report W5-074/A/TR/1 Revision E

[14] Environment Agency, 2012, Estimating flood peaks and hydrographs for small catchments: Phase 1, SC090031.

were resolved by adjusting the BFIHOST or WRAP classes. For most of the sites the peak runoff from IH124 was rescaled to be similar to ReFH. Since ReFH is not considered as reliable in high permeability catchments (taken to be where the BFIHOST is greater than 0.6) in highly permeable catchments the IH124 estimates for peak runoff were given a greater weighting.

Calculation of current brownfield and potential post development runoff volumes

The assessment of current brownfield and potential post-development runoff volumes for each return period is conducted:

- by assuming a runoff coefficient of unity for impermeable areas;
- calculating a gross direct runoff volume by taking the product of the areal extent of the impermeable area and the corresponding rainfall event profile;
- calculating the equivalent greenfield runoff profile for the impermeable area by taking the product of the greenfield runoff hydrograph (expressed in units of runoff per unit area) and the impermeable areas, and estimating the net runoff volume for the impermeable area.

This nett runoff volume represents the runoff volume that has to be captured, and preferably infiltrated to maintain runoff at the greenfield rate. For the 1:100 year event the runoff calculations have included an overall increase in event rainfall depth of 30% for the impermeable runoff estimate to allow for climate change.

Surfaces assumed to be impermeable in this outline design level assessment include roofs, car parks, pavements, roads, bridge structures and platforms. As such this represents a worst case scenario as it ignores the detailed design potential for at-source mitigation.

1.3 Brownfield Peak Runoff

The greenfield peak runoff can be obtained from the IH124 and ReFH methodologies. However, DEFRA[15] do not provide guidance on producing peak runoff for brownfield sites. Whilst ideally runoff volumes and peak runoff should be returned to the greenfield level, it is accepted that this is not always possible. In these circumstances maintaining the current runoff or peak flows is acceptable hence brownfield peak runoff values are required.

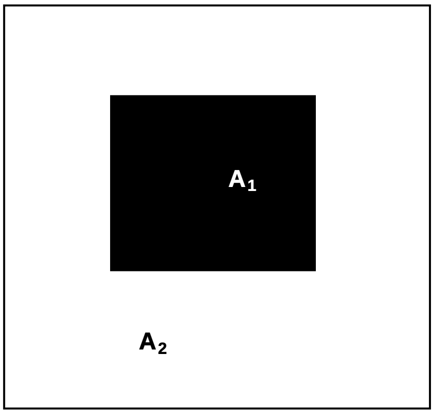
It is widely accepted that increasing the impermeable extents within a catchment, or development site in this case, increases runoff volume and decrease the response time within the catchment[16].

The following methodology has been developed to calculate the Brownfield peak flow:

1) Consider a site to contain an impermeable surface of area A_1 (m^2) and permeable surface of area A_2 (m^2), as per diagram below

[15] Kellagher R, 2012, Preliminary rainfall runoff management for developments, DEFRA R&D Technical Report W5-074/A/TR/1 Revision E

[16] Chow V. T., Maidment D. R. and Mays L. W., 1988, Applied Hydrology, McGraw-Hill, New York, USA.



2) Calculations within ReFH assume that A_1 and A_2 are both greenfield hence we already have the design rainfall *P* (mm) and the greenfield runoff *Q* (mm) for the design hydrograph.

3) For a completely impermeable surface, A_1 and A_2 are impermeable, the following is proposed:

$$Q = 0.7 \times P + 0.3 \times Q$$

It is assumed that 70% of the rainfall becomes direct runoff. The value of 70% is used as this is generally recommended for use within the UK[17,18]. A proportion of the rainfall is also delayed through the system and this is reflected by adding 30% of the greenfield runoff.

The result is a hydrograph which has a faster time to peak, higher peak and greater total runoff than the greenfield hydrograph.

4) For a mixed impermeable/greenfield site these two components are combined according to the proportion of each within the development site.

$$Q = \left[\frac{A_2}{A_1 + A_2} \times Q\right] + \left[\frac{A_1}{A_1 + A_2} \times 0.7 \times P\right] + \left[\frac{A_1}{A_1 + A_2} \times 0.3 \times Q\right]$$

5) The peak flows can then be extracted from the hydrographs and rescaled to cumecs.

[17] Institute of Hydrology, 1999, Flood Estimation Handbook, Vols 1 – 5.
[18] Department of Environment/National Water Council, 1981, Design and analysis of Urban Storm Drainage:the Wallingford Procedure, National Water Council, UK.

An example is presented within Figure 5.

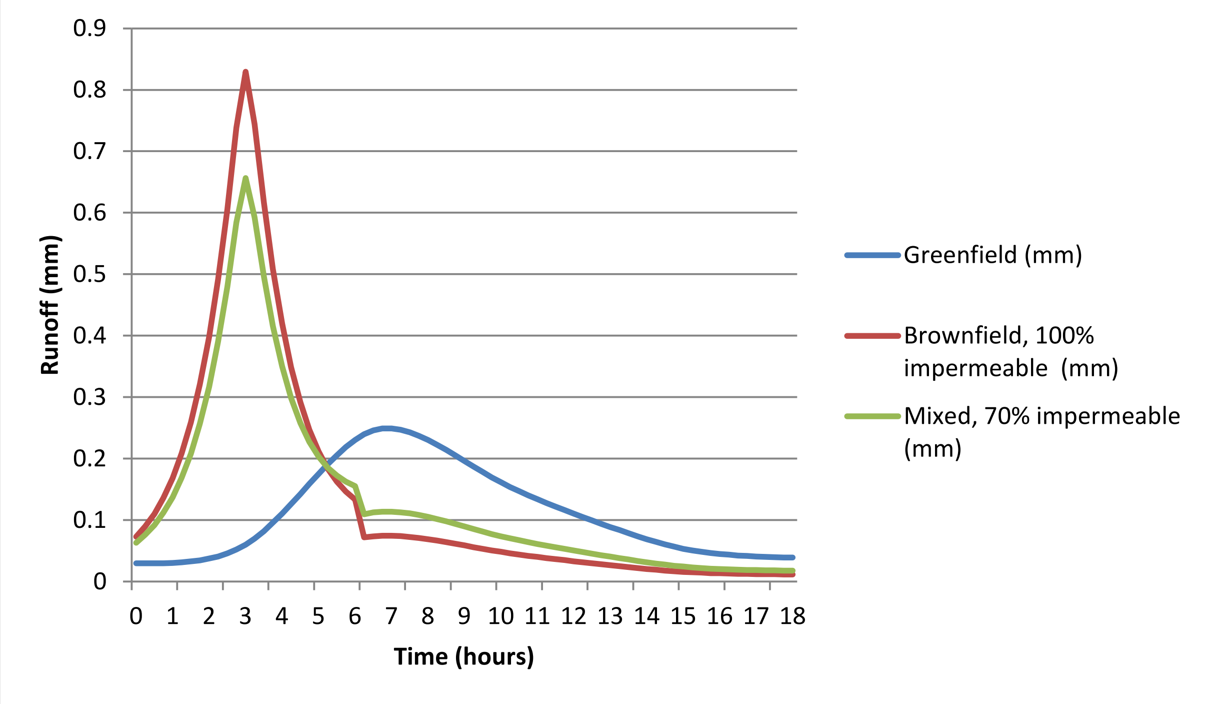


Figure 5 Example Hydrograph for a Greenfield, 100% impermeable and 70% impermeable site.

1.4 Determining the development site area

For most sites the development site considered is the same as the footprint of the development thus the post development will be 100% impermeable. i.e. if a footbridge is being built then the footprint of the footbridge is considered to be the development site and the site is initially 100% greenfield and post development 100% impermeable.

Some sites are more complex, for example the development of Islip and Oxford Parkway Stations. The proposal indicates that the aim will be to retain the runoff associated with the existing site (or greenfield where possible) which means that agreement of the development site extent may affect the amount of flood storage which must be allowed for. In these cases the development site is considered to be the addition of the existing and proposed development site. Post development all sites will be 100% impermeable unless land at any of the sites is returned to greenfield which is unlikely. This is illustrated for Islip Station, Figure 2, where the development site is the combined area of existing and proposed developments.

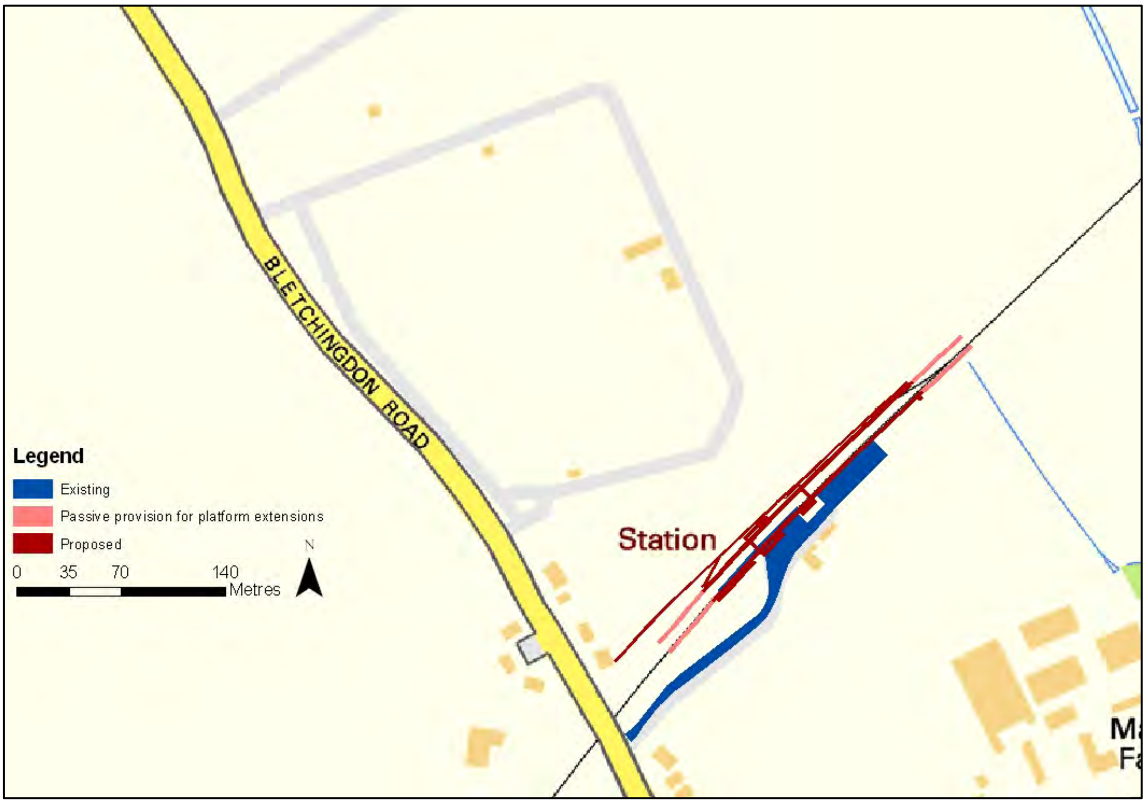
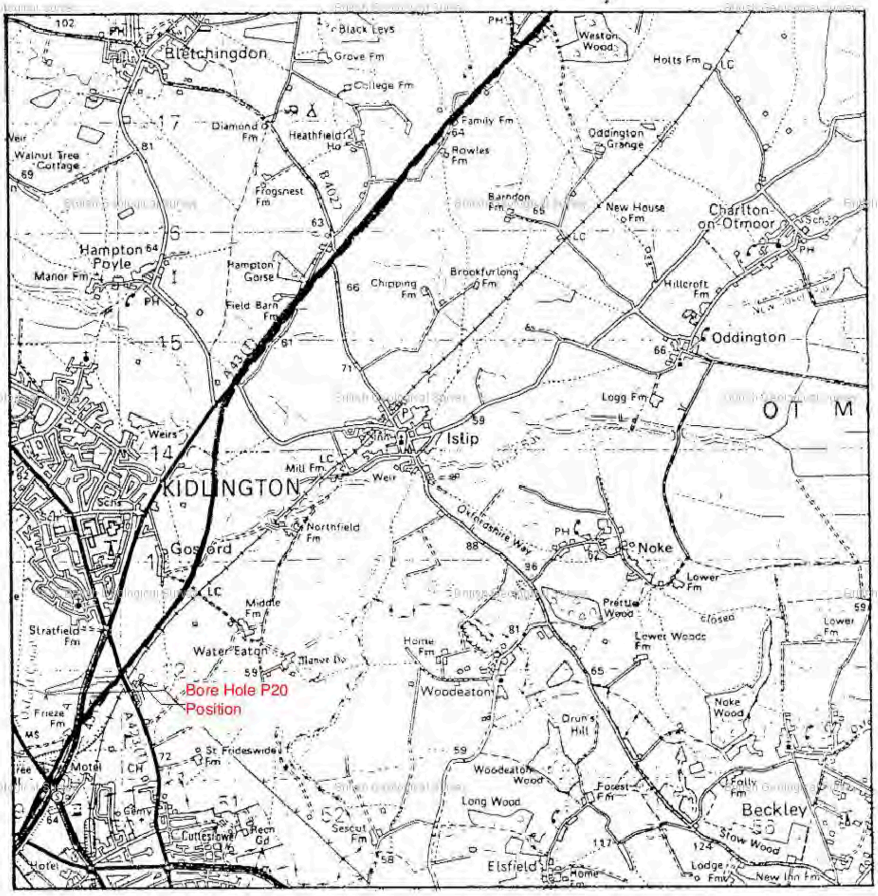


Figure 6 Existing and post development site at Islip Station.

Appendix 2 – Borehole Log Data (BGS)

Page 1 | Borehole SP51SW54 | Borehole Logs

SP 51SW / 16 → 73



Pear Tree Hill
SP 4910
(SP 41 SE)

Wendlebury
SP 5619
(SP 51 NE)

Scale 1:50,000

Site Location Plan	**Project** Department of Transport	Contract F5588

http://scans.bgs.ac.uk/sobi_scans/boreholes/336336/images/10636620.html (1 of 2) [06/06/2013 10:31:35]

Page 1 | Borehole SP51SW75 | Borehole Logs

SP51SW 75

Record of Borehole No.P20

Sheet 1 of 2

Location OXFORD A40

Client DEPARTMENT OF TRANSPORT
N : 211 753
E : 450 173

Type of boring LIGHT CABLE PERCUSSION (PILCON 150)

Job No. 11311028 Ground level 62.63m O.D. Diameter / 150mm to 20.00m Casing / 150mm to 1.50m

Daily Progress	Ground water levels	Depth of casing	Samples Depth	No.	Type
4.8.86			0.20	1	D
			0.30	2	D
			1.00 - 1.45	3	U(21)
			1.45	4	D
		1.50			
			1.80	5	D
			2.00 - 2.45	6	U(30)
			2.45	7	D
			2.75	8	D
			3.00 - 3.45	9	U(33)
			3.45	10	D
			3.75	11	D
			4.00 - 4.45	12	U (60)
			4.45	13	D
			4.75	14	D
			5.00 - 5.45	15	U(90)*
			5.45	16	D
			5.50 - 5.95	17	U(90)
			5.95	18	D
			6.50	19	D
			7.00 - 7.45	20	U(100)
			7.45	21	D
			7.70	22	D
			8.50 - 8.95	23	U(90)
			8.95	24	D
			9.50	25	D

Strata Depth (thickness)	Reduced level	Description of strata	Geology
0.25	62.38	TOPSOIL.	WEATHERED OXFORD CLAY
(0.85) 1.10	61.53	Stiff to very stiff friable orange brown mottled light grey and brown sandy silty CLAY with a little sub-angular fine flint gravel and occasional fine rootlets.	WEATHERED OXFORD CLAY
(0.65) 1.75	60.88	Firm horizontally poorly thinly laminated closely fissured brown with light grey staining on discontinuities silty CLAY with white calcareous silt on laminations traces of shell fragments and fine rootlets.	WEATHERED OXFORD CLAY
(1.50) 3.25	59.38	Firm to stiff horizontally poorly thinly laminated closely fissured variegated olive green and brown slightly to moderately calcareous silty CLAY(CV) with small inclusions and laminations of white calcareous silt, small pockets of fine to medium sand size gypsum crystals and traces of shell fragments.	WEATHERED OXFORD CLAY
(1.45) 4.70	57.93	Stiff becoming very stiff horizontally thinly laminated closely fissured dark brownish olive grey with bands of brown calcareous silty CLAY with traces of shell fragments, inc. bivalves and ammonites.	UNWEATHERED OXFORD CLAY
(5.30) 10.00	52.63	Very stiff horizontally thinly laminated closely fissured brownish olive grey slightly calcareous silty CLAY with occasional shells and shell fragments, inc. bivalves. (borehole continues...)	UNWEATHERED OXFORD CLAY

Key
U.... undisturbed 102mm diameter sample
D.... disturbed jar sample
B.... disturbed bulk sample
W.... water sample
S( ). standard penetration test
C( ). cone penetration test
(33).. number of blows ('N' value)
▼.. groundwater encountered

Remarks
Service pit excavated to 1.00m.
U4 No. 17 : 290mm Recovery.
Remainder > 380mm Recovery.
U4 No. 15 : stripped thread in borehole. Tube damaged in recovery.
U4 No. 3 : 320mm Recovery.
U4 No. 23 : 240mm Recovery.

http://scans.bgs.ac.uk/sobi_scans/boreholes/336357/images/10636699.html (1 of 2) [06/06/2013 10:35:44]

Page 2 | Borehole SP51SW54 | Borehole Logs

British Geological Survey

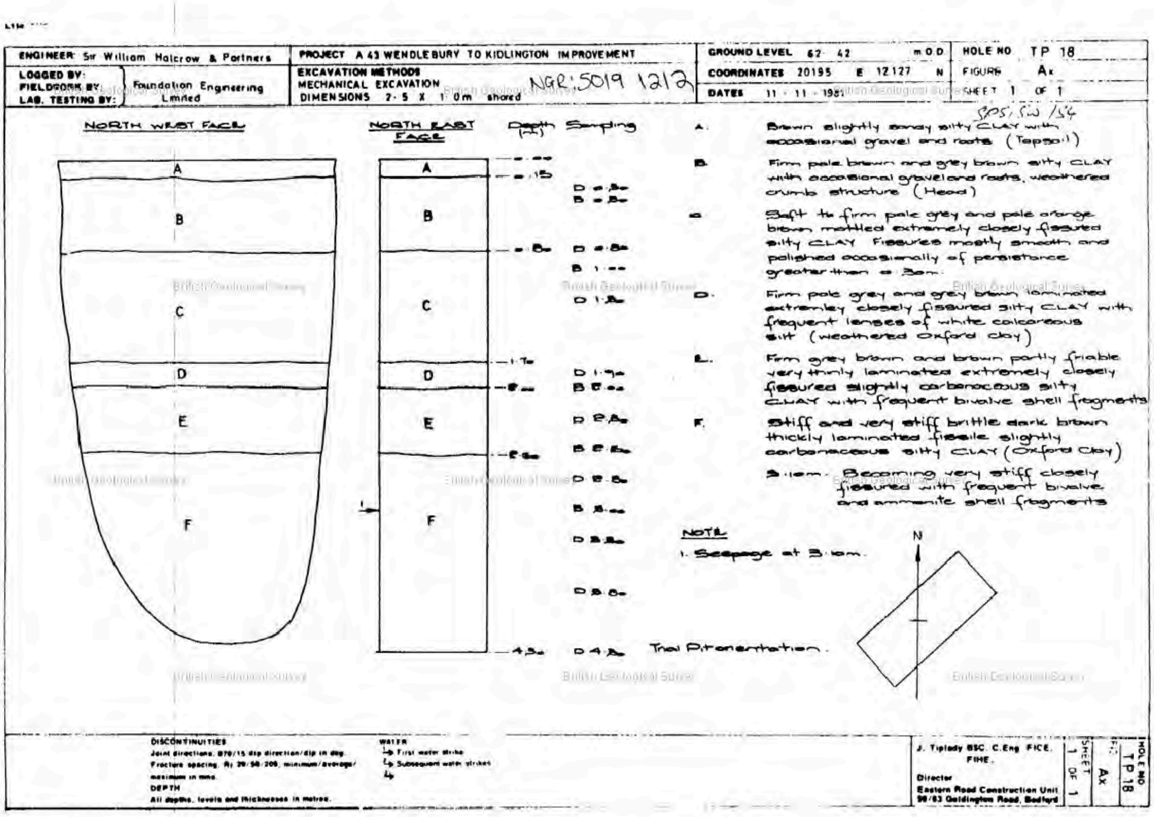
NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 336336 : BGS Reference: SP51SW54

British National Grid (27700) : 450190,212120

Report an issue with this borehole

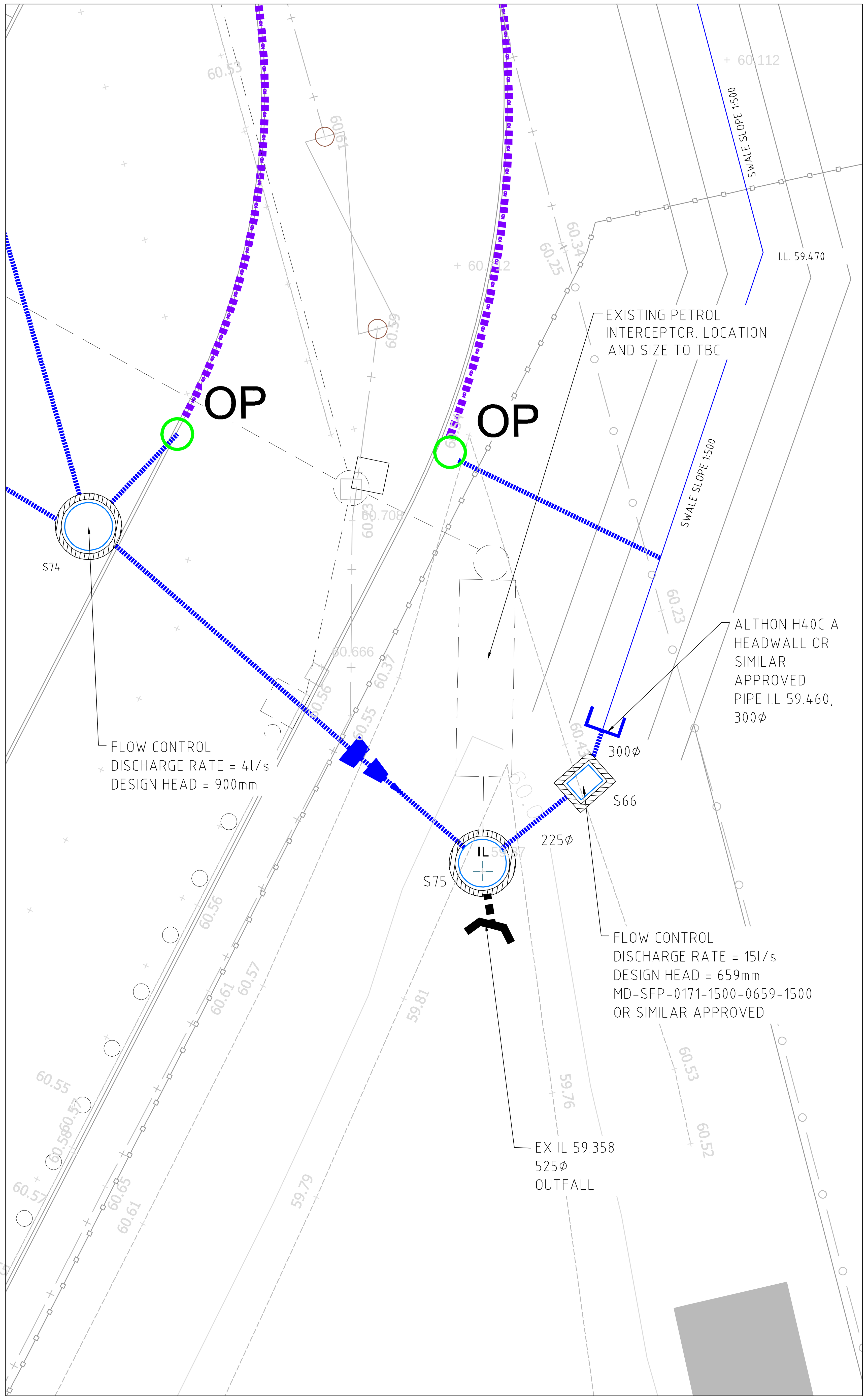
- <<
- < Prev
- Page 2 of 2
- **Next >**
- > >



http://scans.bgs.ac.uk/sobi_scans/boreholes/336336/images/10636677.html [06/06/2013 10:32:26]

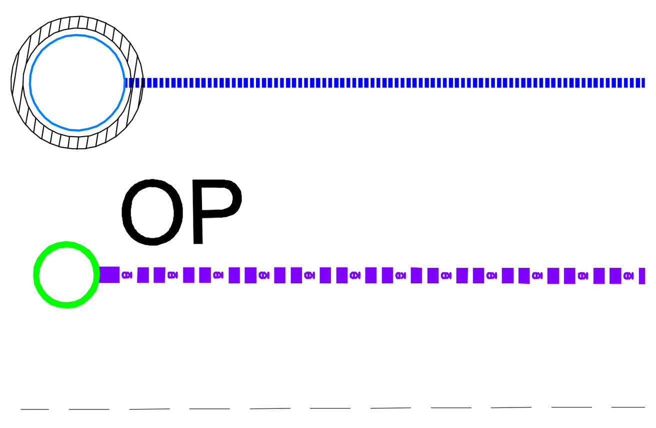
Appendix 3 – AP14 Oxford Parkway Station Drainage Layout. Designed by Jacobs

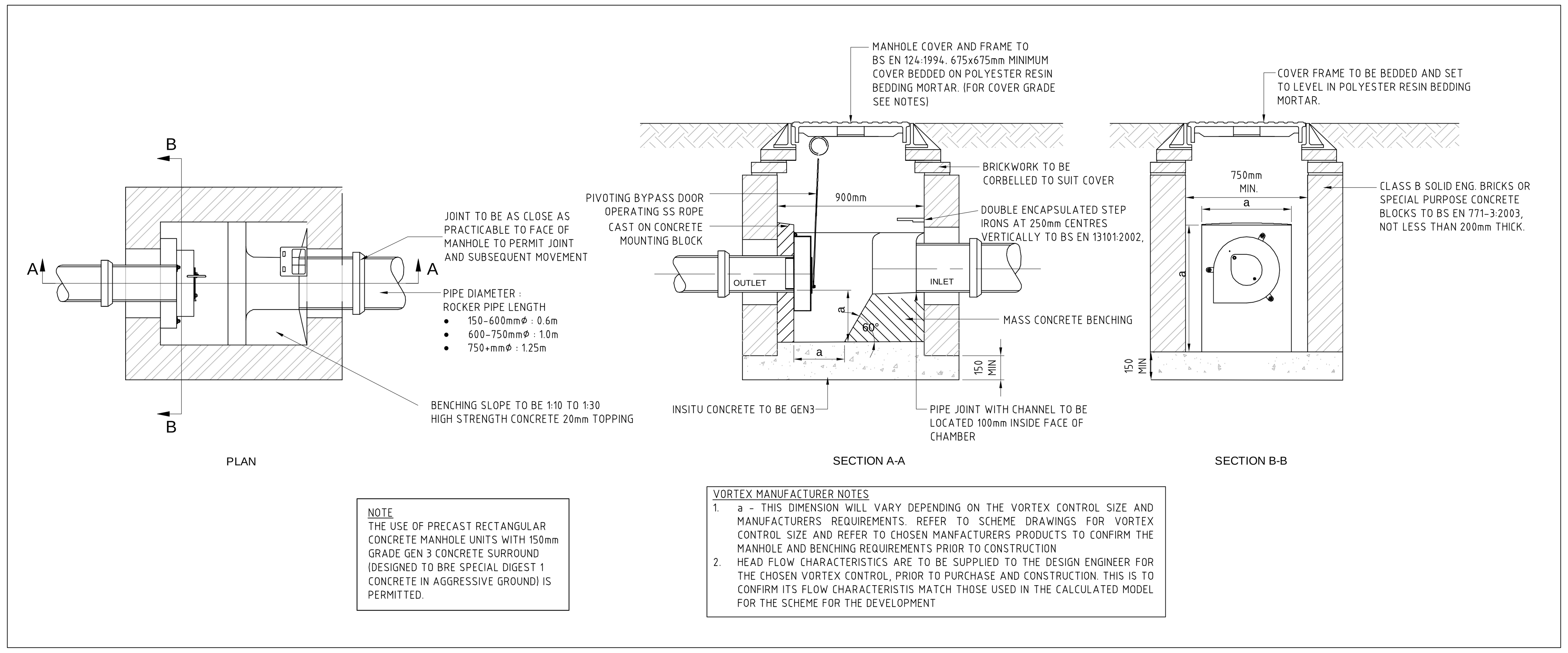
DATE: 10/09/2015 09:54:02 LOGIN NAME: CURRY, NICK J
LOCATION: K:\Emea\United Kingdom\Salford\UNIF\Projects\UN60312\Deliverables\Drawings\Oxford\Civils\Drawings\SKM-DRG-OPS-UN60312-4068.dwg



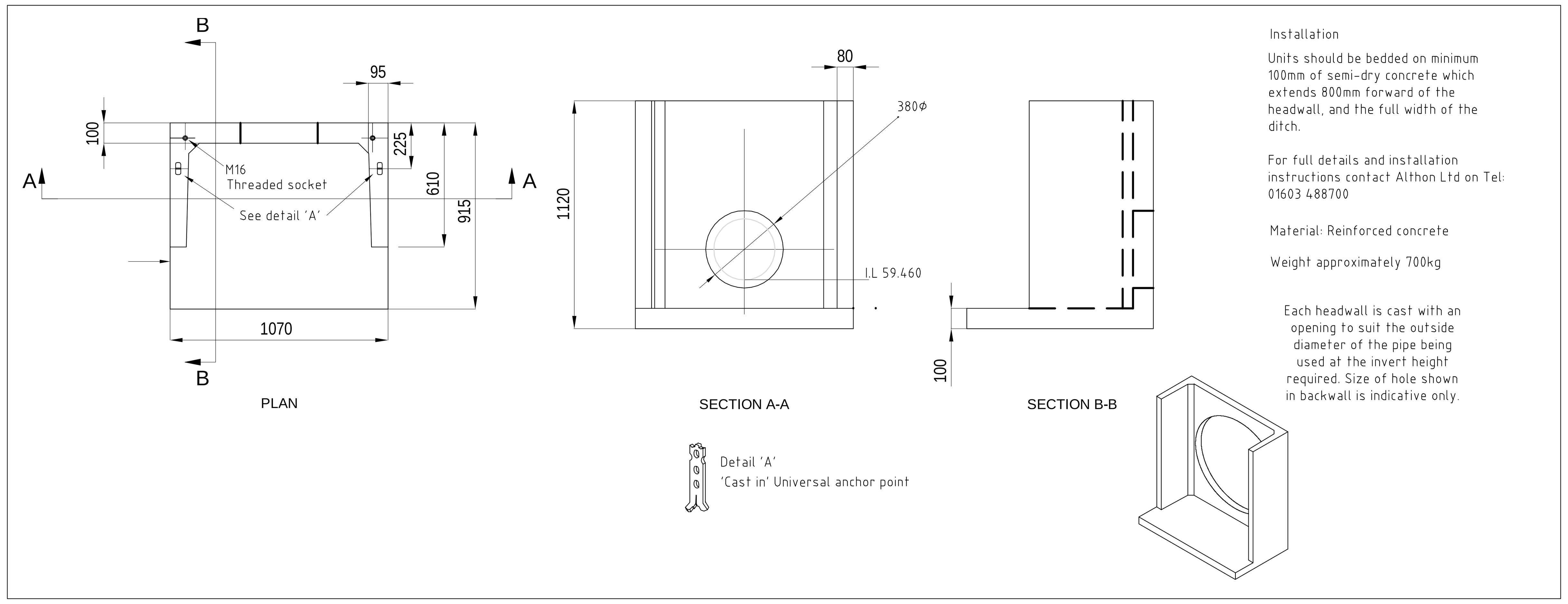
LOCATION PLAN
SCALE 1:100

KEY

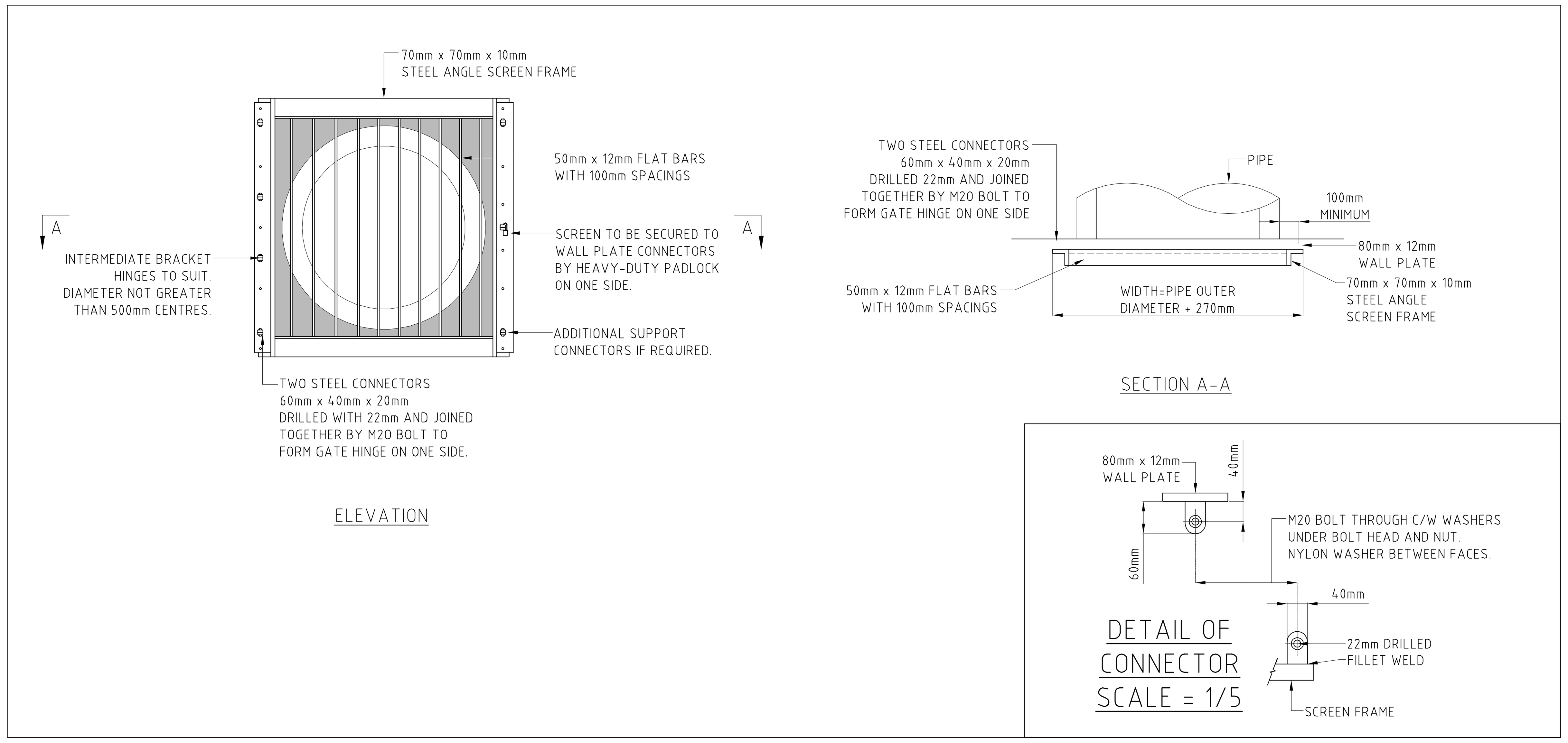




HYDROBRAKE MANHOLE S66
SCALE 1:25



ALTHON H40C A HEADWALL
SCALE 1:20



SAFETY GRILL
SCALE 1:20

FOR RISKS AND HAZARDS SEE DESIGNER'S HAZARD CHECKLIST AND HAZARD ELIMINATION SCHEDULE

NOTES
1. DO NOT SCALE FROM THIS DRAWING
2. ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS AND DOCUMENTS ASSOCIATED WITH THIS PROJECT.
4. ALL SURVEYED INFORMATION INCLUDING LEVELS AND LAYOUT IS PROVIDED BY OTHERS
5. ALL EXISTING AND PROPOSED DIMENSIONS, LEVELS AND LOCATIONS TO BE CHECKED AND VERIFIED BY THE MAIN CONTRACTOR ON SITE PRIOR TO THE COMMENCEMENT OF THE WORKS AND ANY ANOMALIES REPORTED TO THE ENGINEER.

REV	DATE	DRAWN	REV'D	APP'D	REVISION
A	09.09.15	NC	GC	EG	APPROVED FOR CONSTRUCTION

KEY PLAN

CONSULTANT

CLIENT

carillion BUCKINGHAM Group Contracting

JACOBS
4th Floor
Metro
33 Trafford Road
SALFORD M5 3NN
UNITED KINGDOM
Tel: +44 161 873 8500
Fax: +44 161 873 7115
Web: www.jacobs.com

PROJECT
OXFORD PARKWAY STATION

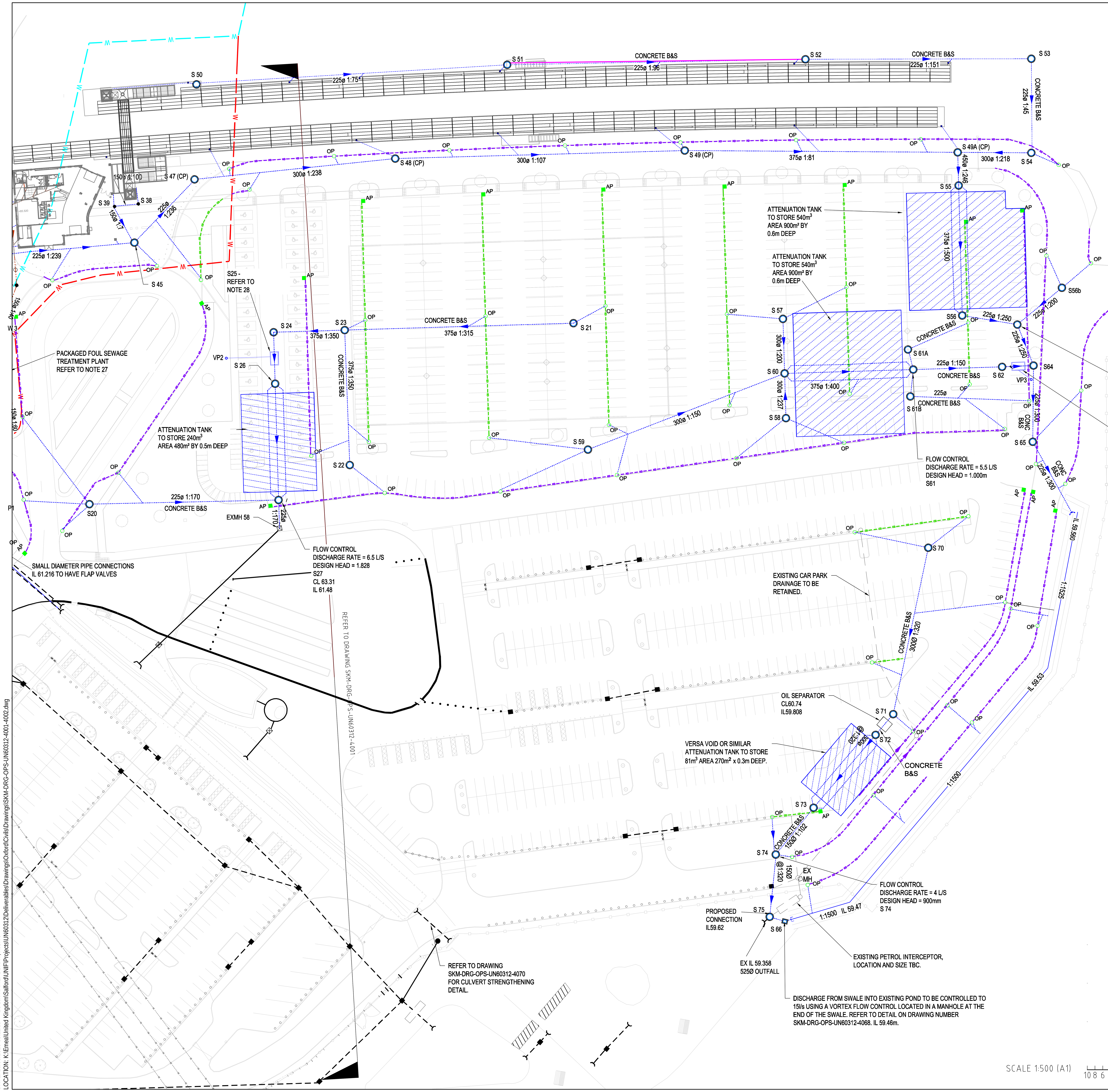
TITLE
SWALE HEADWALL AND S66 DETAIL

DRAWING STATUS
APPROVED FOR CONSTRUCTION

DRAWN: N.CURRY	DRAWING CHECK: G. COLEMAN
DESIGNED: N. CURRY	DESIGN REVIEW: G. COLEMAN
REVIEWED: K. MEALEY	DATE: 09.09.15
APPROVED: G. COLEMAN	DATE: 09.09.15

SCALE (A1): AS SHOWN
DRAWING No: SKM-DRG-OPS-UN60312-4068
REV: A
A1

DATE: 10/09/2015 08:12:59 LOGIN NAME: CURRY, NICK J
LOCATION: K:\Emea\United Kingdom\Salford\UNIF\Projects\UN60312\Deliverables\Drawings\Oxford\Civils\Drawings\SKM-DRG-OPS-UN60312-4001-4002.dwg



KEY

- PROPOSED SURFACE WATER MANHOLE
- LINEAR DRAINAGE CHANNEL WITH OUTFALL POINT
- LINEAR DRAINAGE CHANNEL WITH ACCESS POINT
- KERB DRAIN WITH OUTFALL POINT
- KERB DRAIN WITH ACCESS POINT
- PROPOSED SURFACE WATER PPIC
- PROPOSED FOUL WATER PPIC
- PROPOSED SURFACE WATER ATTENUATION TANK
- VP1 VENT POINT
- EXISTING THAMES WATER MAIN
- PROPOSED THAMES WATER MAIN DIVERSION
- PROPOSED FILTER DRAIN
- FOR RISKS AND HAZARDS SEE DESIGNER'S HAZARD CHECKLIST AND HAZARD ELIMINATION SCHEDULE

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6. THE CONTRACTOR IS TO CONFIRM POSITION, LEVELS, SIZE AND CONDITION OF EXISTING DRAINAGE TO BE UTILIZED FOR THE PURPOSES OF THE PROJECT PRIOR TO THE COMMENCEMENT OF DRAINAGE WORKS. SHOULD THE EXISTING POSITIONS, LEVELS, SIZE OR CONDITION NOT BE FIT FOR PURPOSE OR VARY FROM THAT SCHEDULED THE CONTRACTOR SHALL IMMEDIATELY ADVISE THE EMPLOYER'S AGENT AND SEEK INSTRUCTION OF HOW TO PROCEED.
7. THE BUILDING AND SITE LAYOUT IS PROVIDED BY CJCT: SEE DRAWINGS, CJCT-DRG-OPS-00-001 AND CJCT-DRG-OPS-08-001
8. FOR COVER LEVELS REFER TO DRAWINGS; SKM-DRG-OPS-UN60312-4032 AND 4033.
9. RAIN WATER PIPE LOCATIONS PROVIDED BY CJCT. SEE DRAWING CJCT-DRG-OPS-08-001
10. FOR REST BEND DETAILS REFER TO DRAWING SKM-DRG-OPS-UN60312-4013.
11. REINSTATEMENTS IN EXISTING VERGE AND OPEN FIELD AREAS ARE TO BE REINSTATED BACK TO EXISTING CONDITION, TOPSOILED AND SEEDED.
12. REINSTATEMENTS IN PUBLIC HIGHWAY AND ALL PERMANENT AND TEMPORARY REINSTATEMENT TO BE IN ACCORDANCE WITH NEW ROADS AND STREET WORKS ACT 1991: SPECIFICATION FOR THE REINSTATEMENT OF OPENINGS IN HIGHWAYS CODE OF PRACTICE. (LATEST REVISION 2012)
13. ALL WORKS, WORKMANSHIP AND MATERIALS ON PRIVATE DRAINAGE TO BE IN ACCORDANCE WITH THE CIVIL ENGINEERING SPECIFICATION FOR WATER INDUSTRY 6TH EDITION PUBLISHED BY THE WATER RESEARCH COUNCIL.
14. ALL ADOPTABLE DRAINAGE TO BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF 'SEWERS FOR ADOPTION' (7TH EDITION).
15. UNLESS STATED OTHERWISE WITHIN THE SCHEME DRAWINGS ALL PIPEWORK BELOW 225mmØ TO BE DENSE VITRIFIED CLAYWARE PIPES EXTRA STRENGTH TO BS EN 295 OR PLASTIC PIPEWORK TO COMPLY WITH BS4660:2000 AND BS EN 1401-1:1998
16. ALL PIPEWORK WITHIN THE SCHEME DRAWINGS ABOVE 225mmØ IS TO BE ONE OF THE FOLLOWING AT CONTRACTORS DISCRETION:
   - DENSE VITRIFIED CLAYWARE EXTRA STRENGTH TO BS EN 295,
   - CONCRETE PIPEWORK MANUFACTURED TO BS5911.
   - PLASTIC PIPEWORK TO COMPLY WITH BS4660:2000 AND BS EN 1401-1:1998
17. ALL GULLIES ARE TO BE CLEANED OUT AND FILLED WITH WATER TO TOP OF TRAP PRIOR TO COMPLETION.
18. ALL GULLY AND CHANNEL DRAIN CONNECTIONS TO BE 150Ø WITH A MINIMUM GRADIENT OF 1:80 UNLESS SHOWN OTHERWISE.
19. ALL SOIL AND FOUL DRAINS SHALL BE 100Ø UNLESS SHOWN OTHERWISE
20. ALL SOIL AND FOUL DRAINS BELOW FLOOR SLABS SHALL BE 100Ø AND LAID TO A GRADIENT OF 1:40 UNLESS SHOWN OTHERWISE.
21. ALL RAINWATER PIPES BELOW FLOOR SLABS SHALL BE 100Ø LAID TO A MINIMUM GRADIENT OF 1:80 UNLESS SHOWN OTHERWISE.
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23. MH IL's RELATE TO OUTGOING MAIN PIPE. WHERE INCOMING PIPES ARE OF A SMALLER DIAMETER TO OUTGOING PIPE THEY ARE TO BE POSITIONED WITH PIPE SOFFITS LEVEL UNLESS OTHERWISE SPECIFIED .
24. THE STRENGTH OF PIPELINES HAS BEEN DESIGNED ON FINISHED SITE CONDITIONS AND NO ALLOWANCE HAS BEEN MADE FOR LOADINGS IMPOSED DURING CONSTRUCTION. THE MAIN CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO PROTECT THE PIPE LINES DURING THE CONSTRUCTION OF THE WORKS.
25. CONCRETE SURROUND TO PIPELINES SHALL BE PROVIDED:
   A) WHERE THE DEPTH OF COVER IS LESS THAN 1.2m BELOW VEHICULAR AREAS.
   B) WHERE THE DEPTH OF COVER IS LESS THAN 0.9m BELOW NON VEHICULAR AREAS
   C) BENEATH BUILDINGS.
26. FOR TYPICAL ATTENUATION TANK CONSTRUCTION DETAILS REFER TO DRAWING SKM-DRG-OPS-UN60312-4038
27. FOR TYPICAL SEWAGE TREATMENT PLANT CONSTRUCTION DETAILS REFER TO DRAWING SKM-DRG-OPS-UN60312-4039 AND FOR SPEC SEE SKM-REP-OPS-UN60312-5034
28. FOR PETROL INTERCEPTOR CONSTRUCTION DETAILS REFER TO DRAWING SKM-DRG-OPS-UN60312-4040
29. FOR CULVERT DETAILS CONSTRUCTION DETAILS REFER TO DRAWING SKM-DRG-OPS-UN60312-4043

0 10 20 30 40 50m
10 8 6 4 2

REV	DATE	DRAWN	REV'D	APP'D	REVISION
A	09.09.15	NC	GC	EG	APPROVED FOR CONSTRUCTION

KEY PLAN

CONSULTANT

CLIENT

carillion BUCKINGHAM Group Contracting

JACOBS

4th Floor
Metro
33 Trafford Road
SALFORD M5 3NN
UNITED KINGDOM
Tel: +44 161 873 8500
Fax: +44 161 873 7115
Web: www.jacobs.com

PROJECT
EAST WEST RAIL

TITLE
OXFORD PARKWAY
DRAINAGE LAYOUT
SHEET 2

DRAWING STATUS
APPROVED FOR CONSTRUCTION

DRAWN: AS	DRAWING CHECK: AWD	
DESIGNED: AS	DESIGN REVIEW: AWD	
REVIEWED: A. W. DAY		DATE: 04.04.14
APPROVED: A.W.DAY		DATE: 04.04.14
SCALE (A1): AS SHOWN		
DRAWING No: SKM-DRG-OPS-UN60312-4002		REV: A

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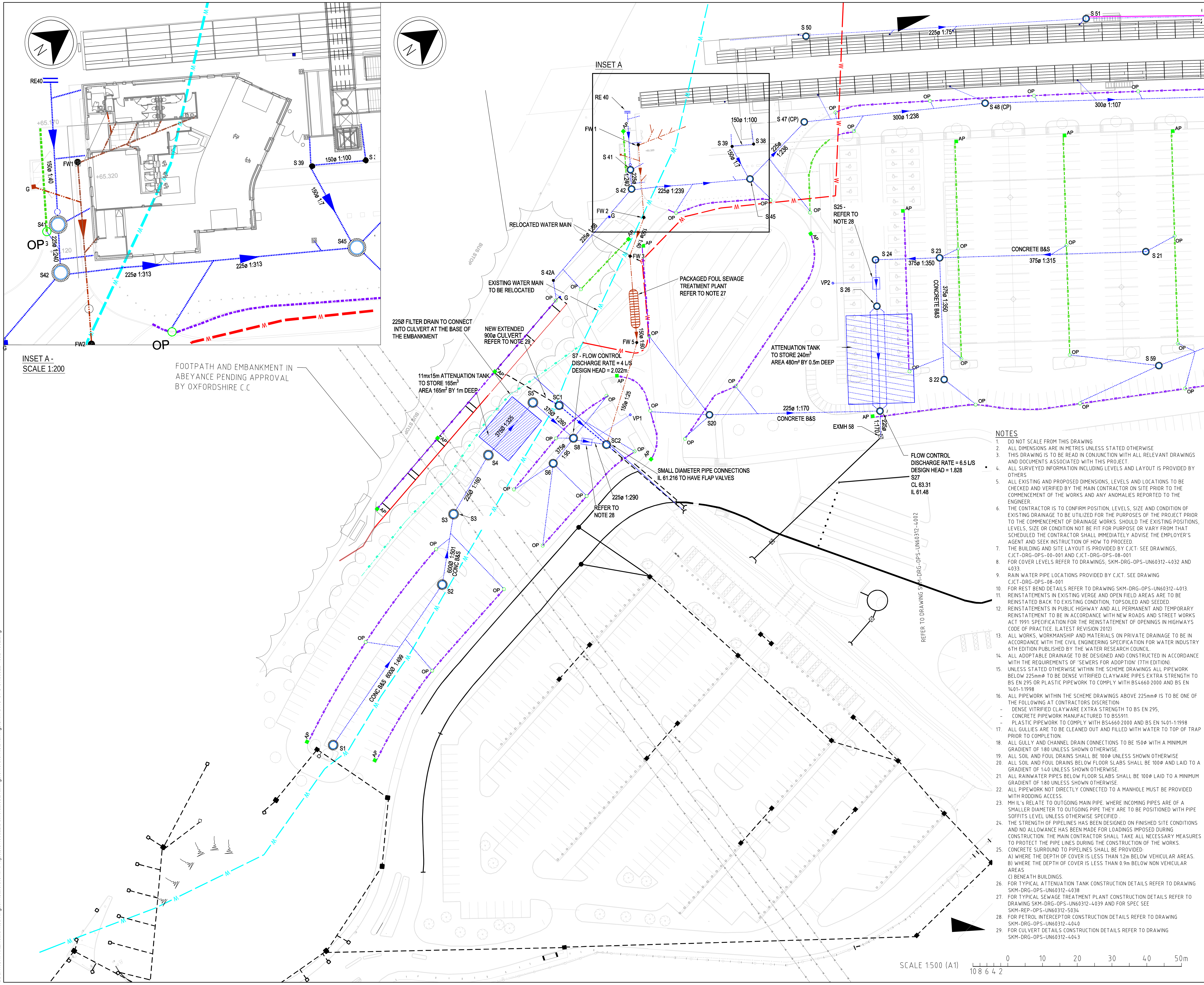
LOCATION: K:\Emea\United Kingdom\Salford\UNIF\Projects\UN60312\Deliverables\Drawings\Oxford\Civils\Drawings\SKM-DRG-OPS-UN60312-4001-4002.dwg



KEY

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- FOR RISKS AND HAZARDS SEE DESIGNER'S HAZARD CHECKLIST AND HAZARD ELIMINATION SCHEDULE

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28. FOR PETROL INTERCEPTOR CONSTRUCTION DETAILS REFER TO DRAWING SKM-DRG-OPS-UN60312-4040
29. FOR CULVERT DETAILS CONSTRUCTION DETAILS REFER TO DRAWING SKM-DRG-OPS-UN60312-4043

10 8 6 4 2 0 10 20 30 40 50m

REV	DATE	DRAWN	REV'D	APP'D	REVISION
A	09.09.15	NC	GC	EG	APPROVED FOR CONSTRUCTION

KEY PLAN

CONSULTANT

CLIENT

carillion | BUCKINGHAM Group Contracting

JACOBS

4th Floor
Metro
33 Trafford Road
SALFORD M5 3NN
UNITED KINGDOM
Tel: +44 161 873 8500
Fax: +44 161 873 7115
Web: www.jacobs.com

PROJECT
EAST WEST RAIL

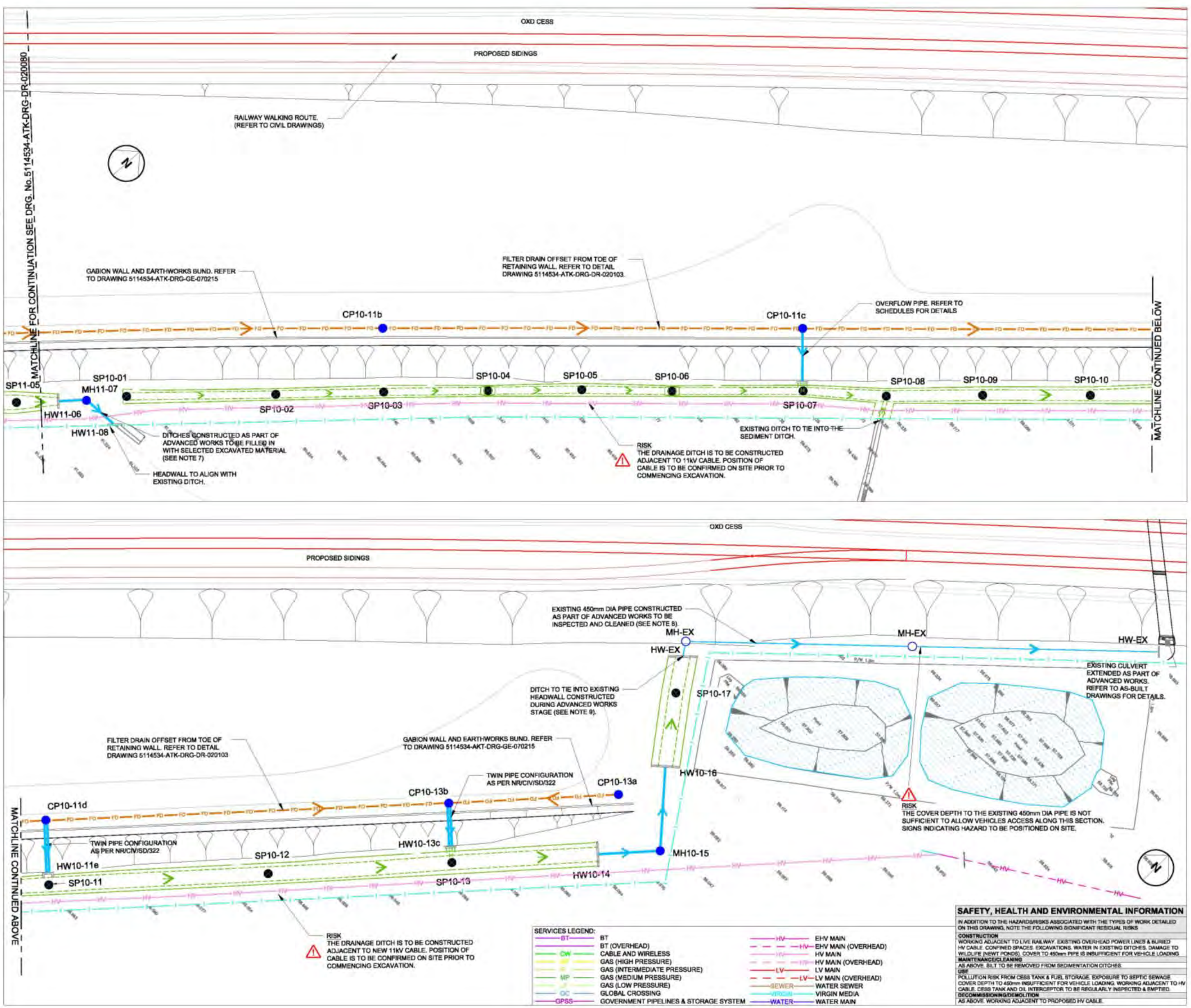
TITLE
OXFORD PARKWAY
DRAINAGE LAYOUT
SHEET 1

DRAWING STATUS
APPROVED FOR CONSTRUCTION

DRAWN	AS	DRAWING CHECK	AWD
DESIGNED	AS	DESIGN REVIEW	AWD
REVIEWED	A. W. DAY	DATE	04.04.14
APPROVED	A.W.DAY	DATE	04.04.14
SCALE (A1)	AS SHOWN		
DRAWING No	SKM-DRG-OPS-UN60312-4001	REV	A

A1

Appendix 4 – AP14a Banbury Road Sidings Drainage Layout. Designed by Atkins



SERVICES LEGEND:

BT	BT	HV	EHV MAIN
	BT (OVERHEAD)	HV	EHV MAIN (OVERHEAD)
CW	CABLE AND WIRELESS	HV	HV MAIN
HP	GAS (HIGH PRESSURE)	HV	HV MAIN (OVERHEAD)
IP	GAS (INTERMEDIATE PRESSURE)	LV	LV MAIN
MP	GAS (MEDIUM PRESSURE)	LV	LV MAIN (OVERHEAD)
LP	GAS (LOW PRESSURE)	SEWER	WATER SEWER
GC	GLOBAL CROSSING	VIRGIN	VIRGIN MEDIA
GPSS	GOVERNMENT PIPELINES & STORAGE SYSTEM	WATER	WATER MAIN

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS

CONSTRUCTION
WORKING ADJACENT TO LIVE RAILWAY. EXISTING OVERHEAD POWER LINES & BURIED HV CABLE. CONFINED SPACES. EXCAVATIONS. WATER IN EXISTING DITCHES. DAMAGE TO WILDLIFE (NEWT PONDS). COVER TO 450mm PIPE IS INSUFFICIENT FOR VEHICLE LOADING

MAINTENANCE/CLEANING
AS ABOVE. SILT TO BE REMOVED FROM SEDIMENTATION DITCHES.

USE
POLLUTION RISK FROM CESS TANK & FUEL STORAGE. EXPOSURE TO SEPTIC SEWAGE. COVER DEPTH TO 450mm INSUFFICIENT FOR VEHICLE LOADING. WORKING ADJACENT TO HV CABLE. CESS TANK AND OIL INTERCEPTOR TO BE REGULARLY INSPECTED & EMPTIED.

DECOMMISSIONING/DEMOLITION
AS ABOVE. WORKING ADJACENT TO PROPOSED HV CABLE.

Legend/Notes

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED. ALL LEVELS ARE IN METRES ABOVE PROJECT DATUM.
2. THIS DRAWING IS NOT TO BE SCALED.
3. THIS DRAWING PRESENTS THE FINAL WORKS DRAINAGE FOR BANBURY ROAD SIDINGS. DRAWING IS TO BE READ IN CONJUNCTION WITH GENERAL ARRANGEMENT DRAWING 5114534-ATK-DRG-HW-410102.
4. ALL DRAINAGE ELEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATION 5114534-ATK-DRE-SPC-020001. UNLESS STATED OTHERWISE.
5. REFER TO DRAWING SERIES 5114534-ATK-DRG-DR-023339 TO 023342 FOR SETTING OUT POINTS AND LEVEL OF CATCHPITS, MANHOLES, PIPES AND DITCHES.
6. EXISTING SERVICES INFORMATION AFFECTING THE INSTALLATION OF THE DRAINAGE SYSTEM IS SHOWN. SERVICES ARE BASED ON STATUTORY UNDERTAKERS' INFORMATION, CONSTRUCTION INFORMATION (ADVANCED WORKS) AND SITE SURVEY. THE CONTRACTOR IS SHALL CONFIRM THE LOCATION OF ALL KNOWN SERVICES PRIOR COMMENCING CONSTRUCTION WORK.
7. THE CONTRACTOR IS TO WIDEN AND RE-PROFILED EXISTING DITCHES TO THE DESIGN SHOWN ON THESE DRAWINGS. WHERE EXISTING DITCHES NEED TO BE FILLED THE CONTRACTOR SHALL USE SELECTED EXCAVATED FILL MATERIAL IN ACCORDANCE WITH THE SPECIFICATION.
8. EXISTING CARRIER DRAINS AND CATCHPITS ARE TO BE CLEAN AND JETTED IN ACCORDANCE WITH THE SPECIFICATION. LEVELS AND POSITIONS SHOWN ON AS-BUILT DRAWINGS ARE TO BE CONFIRMED ON SITE.
9. CONTRACTOR IS TO REFER TO AS-BUILT DRAWINGS AND SURVEY INFORMATION OF DRAINAGE INFRASTRUCTURE CONSTRUCTED DURING ADVANCED WORKS STAGE.
10. SITE OFFICE TOILET TO BE CONNECTED TO MH14-01 VIA 100mm STACK & VENT. SINKS ARE TO BE CONNECTED TO THE STACK VIA BRANCH CONNECTIONS. REFER TO DETAILS DRAWING NOTES ON 5114534-ATK-DRG-DR-020103.

KEY

- PROPOSED TRACK ALIGNMENT
- EXISTING FENCE LINE
- SP — PROPOSED SURFACE WATER DITCH WITH SETTING OUT POINT
- HW01 — PROPOSED CATCHPIT AND HEADWALL AT START/END OF DITCH
- PROPOSED EARTH WEIR STRUCTURE
- CP01-02 — PROPOSED SURFACE WATER CARRIER DRAIN WITH CATCHPIT
- CP01-03 — PROPOSED SURFACE WATER FILTER DRAIN WITH CATCHPIT
- MH01-01 — PROPOSED FOUL WATER DRAIN
- MH-EX / HW-EX — EXISTING SURFACE WATER CARRIER DRAIN WITH CATCHPIT AND HEADWALL (NOTE 9)

Rev	Date	Description of Revisions	Drawn	Chkd	Appr
B01	28/03/14	FOR APPROVAL	M.A.	C.F.G.	A.R.
P01	17/03/14	FOR I.D.C.	M.A.	P.L.	A.R.

Status: **FOR APPROVAL**

Chiltern Railways
Marylebone Station, Great Central House, Melcombe Place, London, NW1 6JJ

NetworkRail

Contractor(s)

ATKINS
The Axis
10 Holliday Street
Birmingham
West Midlands
B1 1TF
Tel: +44 (0)121 483 5000
Fax: +44 (0)121 483 6333

Project: **EAST WEST RAIL PHASE 1**

Drawing Title

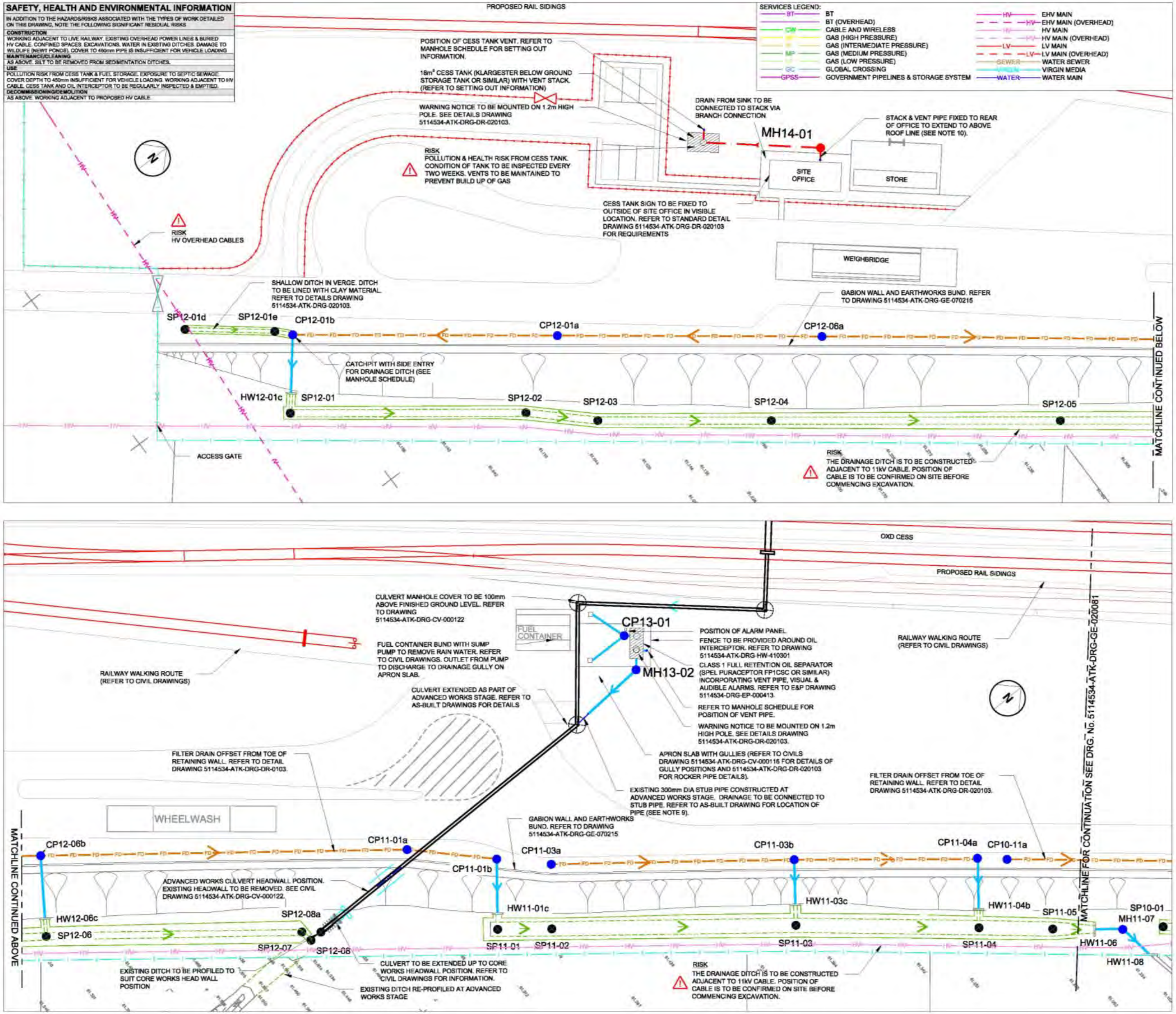
GENERAL ARRANGEMENT OXD LINE DRAINAGE BANBURY ROAD SIDINGS FINAL WORKS PACKAGE

		Signed	Date
Designed	P. LAWRENCE	02/04/2014 17:44:1	04/03/2014
Drawn	M. AKHTAR	MA	04/03/2014
Checked	C. F. NGO		04/03/2014
Approved	A.ROSE		04/03/2014

Scale(s): 1:250 — ELR & Mileage: OXD

Alternative Reference: Ch. 123191 TO 123495 — Sheet: 2 of 2

Drawing Number: 5114534-ATK-DRG-DR-020081 — Revision: B01



Legend/Notes

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED. ALL LEVELS ARE IN METRES ABOVE PROJECT DATUM.
2. THIS DRAWING IS NOT TO BE SCALED.
3. THIS DRAWING PRESENTS THE FINAL WORKS DRAINAGE FOR BANBURY ROAD SIDINGS. DRAWING IS TO BE READ IN CONJUNCTION WITH GENERAL ARRANGEMENT DRAWING 5114534-ATK-DRG-HW-410102.
4. ALL DRAINAGE ELEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATION 5114534-ATK-DRE-SPC-020001. UNLESS STATED OTHERWISE.
5. REFER TO DRAWING SERIES 5114534-ATK-DRG-DR-023339 TO 023342 FOR SETTING OUT POINTS AND LEVEL OF CATCHPITS, MANHOLES, PIPES AND DITCHES.
6. EXISTING SERVICES INFORMATION AFFECTING THE INSTALLATION OF THE DRAINAGE SYSTEM IS SHOWN. SERVICES ARE BASED ON STATUTORY UNDERTAKERS' INFORMATION, CONSTRUCTION INFORMATION (ADVANCED WORKS) AND SITE SURVEY. THE CONTRACTOR IS SHALL CONFIRM THE LOCATION OF ALL KNOWN SERVICES PRIOR COMMENCING CONSTRUCTION WORK.
7. THE CONTRACTOR IS TO WIDEN AND RE-PROFILED EXISTING DITCHES TO THE DESIGN SHOWN ON THESE DRAWINGS. WHERE EXISTING DITCHES NEED TO BE FILLED THE CONTRACTOR SHALL USE SELECTED EXCAVATED FILL MATERIAL IN ACCORDANCE WITH THE SPECIFICATION.
8. EXISTING CARRIER DRAINS AND CATCHPITS ARE TO BE CLEAN AND JETTED IN ACCORDANCE WITH THE SPECIFICATION. LEVELS AND POSITIONS SHOWN ON AS-BUILT DRAWINGS ARE TO BE CONFIRMED ON SITE.
9. CONTRACTOR IS TO REFER TO AS-BUILT DRAWINGS AND SURVEY INFORMATION OF DRAINAGE INFRASTRUCTURE CONSTRUCTED DURING ADVANCED WORKS STAGE.
10. SITE OFFICE TOILET TO BE CONNECTED TO MH14-01 VIA 100mm STACK & VENT. SINKS ARE TO BE CONNECTED TO THE STACK VIA BRANCH CONNECTIONS. REFER TO DETAILS DRAWING NOTES ON 5114534-ATK-DRG-DR-020103.

KEY

- PROPOSED TRACK ALIGNMENT
- EXISTING FENCE LINE
- SP — PROPOSED SURFACE WATER DITCH WITH SETTING OUT POINT
- HW01 — PROPOSED CATCHPIT AND HEADWALL AT START/END OF DITCH
- PROPOSED EARTH WEIR STRUCTURE
- CP01-02 — PROPOSED SURFACE WATER CARRIER DRAIN WITH CATCHPIT
- CP01-03 — PROPOSED SURFACE WATER FILTER DRAIN WITH CATCHPIT
- MH01-01 — PROPOSED FOUL WATER DRAIN
- MH-EX, HW-EX — EXISTING SURFACE WATER CARRIER DRAIN WITH CATCHPIT AND HEADWALL (NOTE 9)

Rev	Date	Description of Revisions	Drawn	Chkd	Appr
B01	28/03/14	FOR APPROVAL	M.A.	C.F.N.	A.R.
P01	17/03/14	FOR I.D.C.	M.A.	P.L.	A.R.

Status
FOR APPROVAL

Chiltern Railways
Marylebone Station, Great Central House, Melcombe Place, London, NW1 6JJ

NetworkRail

Contractor(s)

ATKINS
The Axis
10 Holliday Street
Birmingham
West Midlands
B1 1TF
Tel: +44 (0)121 483 5000
Fax: +44 (0)121 483 6333

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Scale(s): 1:250
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Alternative Reference: Ch. 123495 TO 123795
Sheet: 1 of 2
Drawing Number: 5114534-ATK-DRG-DR-020080
Revision: B01