M54 to M6 Link Road

TR010054

Volume 6

6.3 Environmental Statement Appendices

Appendix 13.2 Drainage Strategy

Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

January 2020

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M54 to M6 Link Road

Development Consent Order 202[ ]

6.3 Environmental Statement Appendices

Appendix 13.2 Drainage Strategy

Regulation Number	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010054
Application Document Reference	6.3
Author	M54 to M6 Link Road Project Team and Highways England

Version	Date	Status of Version
P01	January 2020	DCO Application

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1 Introduction

1.1 Purpose of this report

1.1.1 A drainage strategy and preliminary drainage design have been developed in conjunction to support the application for the Development Consent Order (DCO) for the M54 to M6 Link Road (referred to herein as 'the Scheme').

1.1.2 This report is based on the information received to date (e.g. topographical survey, as built drawings, Highways England's Drainage Data Management System (HADDMS)). The principles and main criteria used in the preliminary drainage design discharging to the Scheme's watercourses (Watercourse 1 to 6) and connections to existing drainage infrastructure (M54 and M6) are outlined separately.

1.1.3 The purpose of the drainage strategy is to outline the methodology proposed to mitigate significant impacts upon the water environment from the Scheme regarding highway runoff.

1.1.4 This report describes the various drainage concepts identified for each watercourse. The concepts include proposed indicative embedded mitigation measures which have been developed through close coordination with the geoenvironmental, flood risk and water quality disciplines to provide an integrated approach.

1.1.5 The Outline Environmental Management Plan (OEMP) [TR010054/APP/6.11] includes details of measures to protect the water environment during construction of the Scheme and thus construction issues are not considered herein.

1.2 Structure of this Drainage Strategy Report

1.2.1 The main text of this Drainage Strategy Report divides into fifteen parts:

- Chapters 1-2: Provides an introduction and description to the Scheme.
- Chapter 3: Describes the existing drainage features for each watercourse.
- Chapter 4: Describes the preliminary design overview.
- Chapter 5: Describes the drainage strategy approach for M54 outfalls.
- Chapters 6-11: Describes the drainage strategy approach for each watercourse.
- Chapter 12: Describes the drainage strategy approach for M6 outfalls.
- Chapter 13: Provides an overview regarding water quality.
- Chapter 14: Provides an overview regarding hydraulic modelling.
- Chapter 15: Describes maintenance implications associated with the preliminary design.

1.3 Stakeholders and interested parties

1.3.1 Consultation with the following parties has informed the drainage strategy and the choice of features included within the preliminary drainage design:

Highways England

1.3.2 Highways England, Area 9 is the maintaining authority for the M54 and the M6.

Staffordshire County Council

1.3.3 Staffordshire County Council (SCC) is the Lead Local Flood Authority (LLFA). SCC is the host authority and would be taking ownership and maintenance responsibility for all drainage assets within their authority. This primarily affects the A460.

Sow and Penk

1.3.4 The Internal Drainage Board (IDB) is a public authority managing water levels within the District and Ordinary Watercourses. Sow and Penk IDB is the closest drainage board to the Scheme.

Severn Trent Water

1.3.5 Severn Trent Water (STW) is responsible for the water main, combined sewer overflow and foul network within the Scheme boundary.

Environment Agency

1.3.6 The Environment Agency was created under the Environment Act 1995 to regulate and police the water environment in England and Wales and dispatches the powers bestowed on the public body under various legislation - namely the Water Resources Act 1991, the Land Drainage Act 1991, the Water Act 1989, the Control of Pollution Act 1990 and the Environmental Protection Act 1990.

2 Site Location and Description

2.1 Location

2.1.1 The Scheme comprises of north and south outfalls distinct drainage sections; M54 outfalls, Watercourses 1 to 6 and M6 outfalls (Figure 2.1 of this Appendix). It is proposed that with the Scheme, each of these drainage sections would use different SuDS features to treat and attenuate the highway runoff prior to discharge. The drainage approach for each drainage section is described in Sections 5 to 12.

2.2 Drainage Strategy Drawing

2.2.1 A Drainage Strategy Drawing has been produced for the Scheme (HE514465-ACM-HDG-M54_SW_PR_Z-DR-CD-0007) and is provided within Annex A.

2.3 Hydrology and geology

2.3.1 The ground conditions within the Scheme boundary are comprised of topsoil and Made Ground underlain by rocks of the Sherwood Sandstone Group.

2.3.2 Ground investigation surveys were undertaken during July and August 2019 (Annex B). As part of this survey, ground water strikes were logged, and ground water level monitoring was undertaken. The results are summarised in Table 2.1.

2.3.3 Water level monitoring showed that water levels vary within the Scheme boundary. Groundwater depths below ground level (bgl) vary between 1.19 m and 12.96 m bgl. Most boreholes show water levels far below ground, and therefore would indicate a low risk of flooding from ground water.

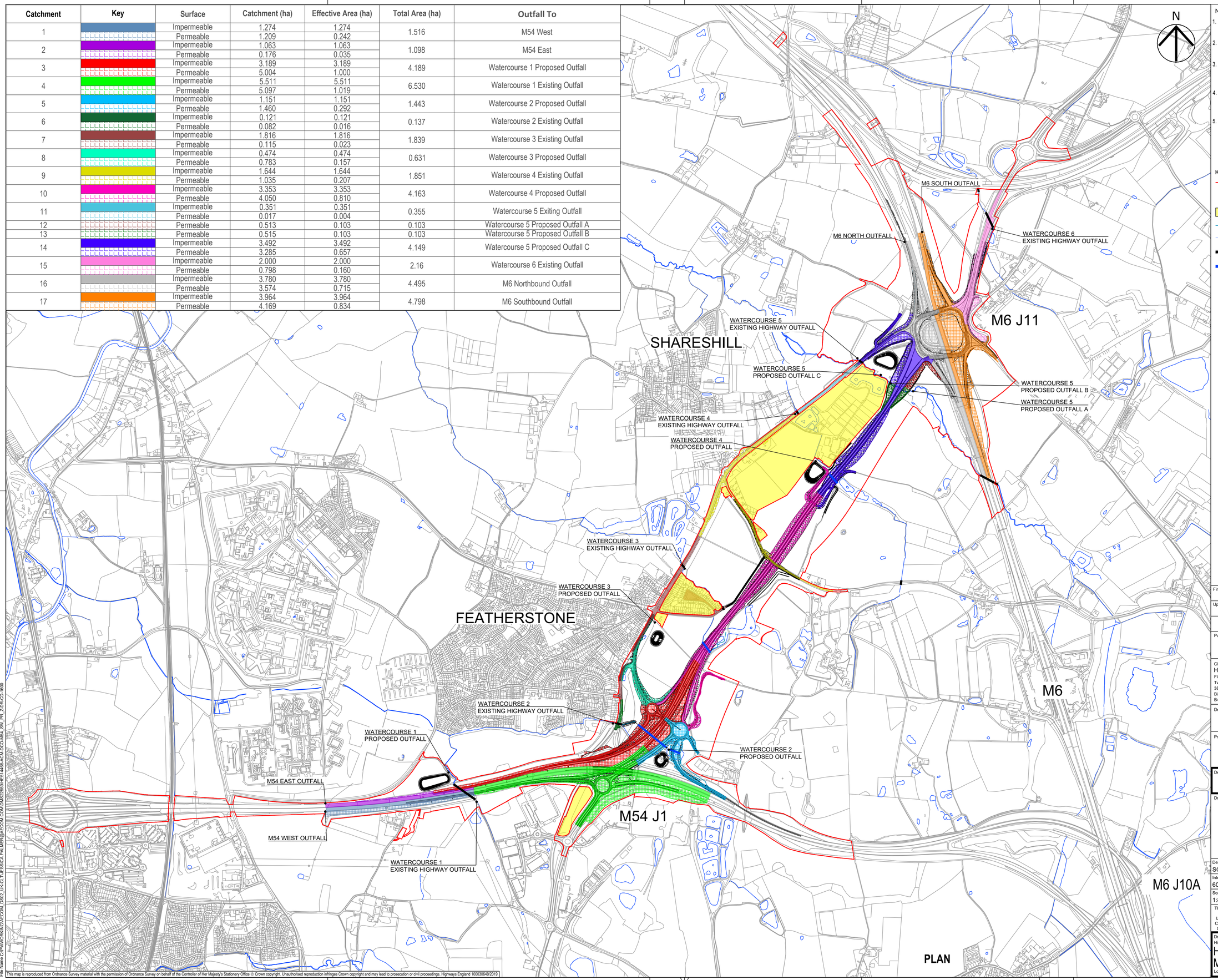
2.3.4 Groundwater was found nearest to the surface at BH12, located to the south of Lower Pool Site of Biological Importance. This area of the Scheme boundary would indicate a medium risk of flooding from groundwater.

2.3.5 Additional information on these survey results can be found in Appendix 9.1 within Volume 3 of the Environmental Statement [TR010054/APP/6.3].

2.3.6 The overall risk from groundwater flooding would be considered as low. However appropriate mitigation measures should be undertaken as part of detailed design and during construction of the Scheme.

2.3.7 Overall, the preliminary design invert levels are designed to be above the anticipated groundwater level.

Catchment	Key	Surface	Catchment (ha)	Effective Area (ha)	Total Area (ha)	Outfall To
1		Impermeable	1.274	1.274	1.516	M54 West
		Permeable	1.209	0.242		
2		Impermeable	1.063	1.063	1.098	M54 East
		Permeable	0.176	0.035		
3		Impermeable	3.189	3.189	4.189	Watercourse 1 Proposed Outfall
		Permeable	5.004	1.000		
4		Impermeable	5.511	5.511	6.530	Watercourse 1 Existing Outfall
		Permeable	5.097	1.019		
5		Impermeable	1.151	1.151	1.443	Watercourse 2 Proposed Outfall
		Permeable	1.460	0.292		
6		Impermeable	0.121	0.121	0.137	Watercourse 2 Existing Outfall
		Permeable	0.082	0.016		
7		Impermeable	1.816	1.816	1.839	Watercourse 3 Existing Outfall
		Permeable	0.115	0.023		
8		Impermeable	0.474	0.474	0.631	Watercourse 3 Proposed Outfall
		Permeable	0.783	0.157		
9		Impermeable	1.644	1.644	1.851	Watercourse 4 Existing Outfall
		Permeable	1.035	0.207		
10		Impermeable	3.353	3.353	4.163	Watercourse 4 Proposed Outfall
		Permeable	4.050	0.810		
11		Impermeable	0.351	0.351	0.355	Watercourse 5 Exiting Outfall
		Permeable	0.017	0.004		
12		Permeable	0.513	0.103	0.103	Watercourse 5 Proposed Outfall A
13		Permeable	0.515	0.103	0.103	Watercourse 5 Proposed Outfall B
14		Impermeable	3.492	3.492	4.149	Watercourse 5 Proposed Outfall C
		Permeable	3.285	0.657		
15		Impermeable	2.000	2.000	2.16	Watercourse 6 Existing Outfall
		Permeable	0.798	0.160		
16		Impermeable	3.780	3.780	4.495	M6 Northbound Outfall
		Permeable	3.574	0.715		
17		Impermeable	3.964	3.964	4.798	M6 Southbound Outfall
		Permeable	4.169	0.834		



NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. THE PROPOSED WORKS SHOWN ARE ILLUSTRATIVE ONLY AND WILL BE SUBJECT TO CHANGE AS PART OF DETAILED DESIGN. ANY CHANGES WILL BE LIMITED TO BEING WITHIN THE ORDER LIMITS AND ANY OTHER CONSTRAINTS INCLUDED IN THE DEVELOPMENT CONSENT ORDER.

KEY

- LIMITS OF LAND TO BE ACQUIRED OR USED PERMANENTLY OR TEMPORARILY (THE ORDER LIMITS)
- LAND NOT INCLUDED WITHIN THE ORDER LIMITS
- PROPOSED WATERCOURSE
- EXISTING WATERCOURSE
- EXISTING CULVERT
- PROPOSED CULVERT

Revision Details	By / Check	Date	Suffix
First Issue	JP / RR	14/01/20	P01
Update to boarder	JP / RR	24/01/20	P02

Purpose of issue: DCO APPLICATION

Client: Highways England, Floor 5, Two Colmore Square, 38 Colmore Circus, Birmingham, B4 6BN

Development Consent Order Number: TR010054

Project Title: M54 to M6 Link Road

Development Consent Order Drawing Number: TR010054/APP/6.3

Drawing Title: FIGURE 2.1 PROPOSED CATCHMENTS

Designed	Drawn	Checked	Approved	Date
SO	JP	SB	RR	24/01/20

Internal Project No.	Suitability
60536736	S8
Scale @ A1: 1:8000H/1:8000V	Zone: Development Consent Order

Drawing Number: Highways England PIN HE514465 | Originator -ACM | Volume -DCO- | Location M54_SW_PR_Z | Type | Role -DR-CD- | Number -1600 | Rev P02

Plot Date: 24 January 2020 14:09:14
File Name C:\PWWORKING\AECOM_DSO\2_UK-CLT\JESSICA.PALMER@AECOM.COM\DMS\22559\HE514465-ACM-DCO-M54_SW_PR_Z-DR-CD-1600

Table 2.1: Borehole water level monitoring

Borehole Name	Water Level monitoring – values area Metres below ground level			
	11/07/2019	21/07/2019	31/07/2019	06/08/2019
BH04	-	-	5.48	5.42
BH05	-	-	3.79	5.42
BH06	-	-	3.52	3.47
BH07	-	-	6.45	6.44
BH08a	3.55	3.65	3.64	3.65
BH09	9.28	9.25	9.25	9.21
BH10	5.63	5.8	5.77	5.73
BH11	4.59	4.6	4.33	4.88
BH12	-	-	-	1.19
BH18	-	3.48	3.50	3.53
BH20	-	12.8	12.2	12.96
BH24	-	4.05	4.06	4.13
BH25	7.41	9.28	8.62	9.03
BH26	-	-	-	4.75
BH27	-	-	12.86	12.83
BH30	-	DRY	4.25	4.42

2.4 Flood Risk

2.4.1 A Flood Risk Assessment (FRA) has been developed for the Scheme, refer to Volume 3 of the Environmental Statement, Appendix 13.1 [TR010054/APP/6.3].

2.4.2 The FRA has been developed in parallel with this drainage strategy (as separate reports) and demonstrates that with the implementation of the recommended mitigation measures, flood risk would be controlled by the Scheme.

2.4.3 The key findings of the FRA with respect to the Scheme boundary:

- Watercourse 1 – There are no changes to the existing culverts.
- Watercourse 2 – Elimination of pond, new long culvert (182 m) with separate mammal crossing provision.
- Watercourse 3 – There is no impact on the flood risk to Watercourse 3. New culvert to convey current flow.
- Watercourse 4 – Loss of pond has no impact on the flood risk of Watercourse 4. New culvert to convey current flow.
- Watercourse 5 – New 10m free span bridge
- Watercourse 6 - There are no changes to the existing culverts.

3 Existing Drainage

3.1 Existing drainage features

3.1.1 The existing drainage information for M54 Junction 1, M6 Junction 11 and A460 is very limited.

3.1.2 The existing highway drainage features have been identified via reviewing HADDMS, Topographical Survey and Google Earth. Given the limited information available, it has been assumed the existing junctions (M54, J1 and M6 J11) drain through gullies which connect into a filter drain/ carrier pipe prior to discharging at the identified discharge points. It is understood no attenuation is provided within the network and the only treatment provided is through filter drains.

3.1.3 The Scheme drainage survey commenced w/c 17th June 2019 to further understand the existing drainage infrastructure. The initial results of the received indicative drainage survey indicate the existing drainage is in poor condition and would need replacement / upgrade. A full detailed review of the survey will be undertaken as part of detailed design. Nothing has been identified from the initial survey results that would change the approach in the drainage strategy.

3.2 Historic Flood Events

3.2.1 HADDMS database was investigated for previous flood events and are shown in Figure 3.1. Table 3.1 provides further information regarding each flood event.

3.2.2 HADDMS ranks flooding events via the Flood Severity Index (FSI). The FSI ranges from 0 (no impact) to 10 (high impact).

3.2.3 To calculate the FSI the following data is required:

- road classification;
- Annual Average Daily Traffic (AADT) range;
- maximum impact on traffic; and
- duration of impact (assumed to be from, the time of initial report to the ‘cleared’ time).

Figure 3.1 – HADDMS Flood Severity Events

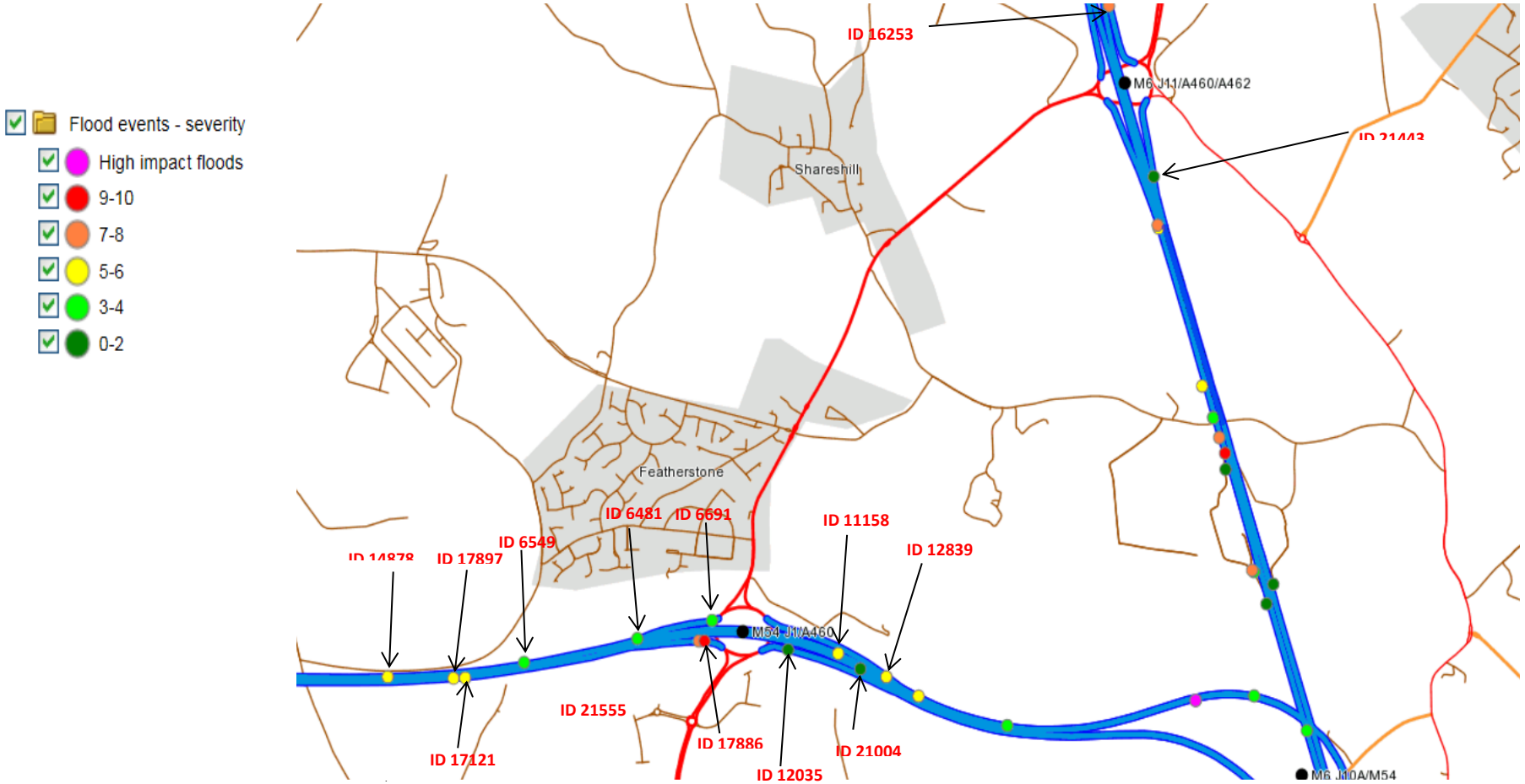


Table 3.1: HADDMS flood severity events

Flood ID	Date & Time	Severity	Description/Notes
6481	29/11/2009 0:30	4.48	Flooding, M54 EB by J1 exit slip, water pooling in lane 2
6549	02/04/2010 2:00	4.48	(PRIM) M54 E/B MP 5/8 - Blocked drain on the H/S
6691	17/11/2010 12:18	4.48	(Prim) M54 EB & WB FLOODWATCH - various locations
11158	25/11/2012 21:10	5.6	Standing water on all lanes
12035	09/02/2013 08:50	2.0	Created - HMO BESCOT 1(HMOBESCOT1) [10-FEB-2013 10:15]: Area checked and there is no heavy flooding it is just rain water running across carriageway
12839	14/10/2013 11:18	6.3	Highway Flooding
14878	08/10/14 02:00	4.8	M54 EB J2-1 MP 4/5 - Flooding on H/S (right next to Gantry
16253	10/12/2015 15:55	7.0	1. Alex Shilton reports M6 SB J11 SB Entry. Start of slip affecting H/S due to blocked drains and ponding at the bottom – jct 2. PU21 deployed. 3. AIW have dug grips to relieve flooding issue.
17121	09/03/2016 12:09	4.8	FLOODING (E.G. DEFECTIVE GULLIES, DRAINAGE)
17886	30/04/2016 14:47	9.0	Charlotte 1215 requested AIW for flooding on wB entry slip J1 M54 Flooding on slip road affected carriageway and led to a total closure of the slip road, no flood boards erected and caused by lack of drains at location. AIW cut grips at location to clear flooding. PU17 - have reported they have attended and cut 15 x grips into verge - needs a mini digger to attend and clear behind barrier
17897	07/05/2016 19:19	4.8	FLOODING (E.G. DEFECTIVE GULLIES, DRAINAGE)
21004	25/05/2018 10:07	1.6	flooding i.e. defective gullies
21443	14/10/2018 10:48	2.1	He is on scene and will dig some grips to clear this water - jl PU35 Steve Halls report - M6 J11 SB Entry. Standing water L1 PU35 advised they have uncovered 2 catchpits and the water has now cleared. 20m of the CW in L1 was affected beforehand
21555	09/11/2018 22:52	7.2	Flooding in lane one on slip rd M54 WB MP 3/3 .No gullies grips x 3 dug .Water subsiding.

4 Preliminary Design

4.1 Introduction

4.1.1 The preliminary drainage design has been undertaken to develop a conceptual design to demonstrate the viability of the Scheme in respect of surface water management and treatment of runoff.

4.1.2 The significant drainage features are shown on the General Arrangement Plans [TR010054/APP/2.5] as well as on the Environmental Masterplans presented in Volume 2 of the Environmental Statement [TR010054/APP/6.2].

4.1.3 Figure 2.1 of this Appendix comprises of north and south outfalls distinct drainage sections; M54 outfalls, Watercourses 1 to 6 and M6 outfalls.

4.1.4 The Drainage Engineering Regulation 5(2)(o) have been produced and are contained in TR010054/APP/2.11.

4.2 Technical standards

4.2.1 The preliminary drainage design to support the development of the drainage strategy has been undertaken in accordance with the following requirements and advice documents:

- Design Manual for Roads and Bridges (DMRB):
  - CG 501 Design of Highway Drainage Systems (formally HD33/16).
  - CD 521 (formally HA 37/17 and HA 78/96) Hydraulic Design of Road-Edge Surface Water Channels and Outlets.
  - HA 39/98 Edge of Pavement Details.
  - CD533 Determination of Pipe Bedding Combinations for Drainage Works.
  - HA 41/17 A Permeameter for Road Drainage Layers.
  - LA113 (formally HD 45/09) Road Drainage and the Water Environment.
  - HA 83/99 Safety Aspects of Road Edge Drainage Features.
  - CD 526 (formally HA 102/17) Spacing of Road Gullies.
  - HA 104/09 Chamber Tops and Gully Tops for Road Drainage and Services: Installation and Maintenance.
  - CD 523 (formally HA 219/09) Determination of Pipe Roughness and Assessment of Sediment Deposition to Aid Pipeline Design.
  - HA 103/06 Vegetated Drainage Systems for Highway Runoff.
- The SuDS Manual 2015, CIRIA C753

4.3 Rainfall data and design return period

4.3.1 Site specific Flood Estimation Handbook rainfall data has been utilised for the hydraulic design of the drainage systems.

4.3.2 DMRB 4.2 CG501 specifies the design criteria for the highway drainage networks, the drainage systems would ensure:

- No surcharging of the pipe networks in a 1 year return period storm event + CC.
- No flooding of the pipe networks in a 5 year return period +CC.

4.3.3 In addition, the SuDS features would be designed in accordance with the criteria described in DMRB 4.2 HA103/06. The design would ensure no flooding a 1 in 100 year + 40% return period event, as requested by the LLFA.

4.4 Gully design & combined kerb drainage

4.4.1 Gully spacing design would be designed in accordance with CD 526. The maximum allowable flow width would be set at 1m.

4.4.2 The design of the combined kerb drainage units would be based on a 1 in 5 year return period event with a 20% allowance for climate change. A further 20% allowance for maintenance has been included but is to be agreed with Area 9 and SCC to increase the time interval required for maintenance of the units. Maintenance of the units would require lane closures and jetting equipment.

4.5 Surface water channels

4.5.1 Surface water channels would be designed to CD 521. The channels would accommodate the one year storm in channel and checked to ensure the five year storm does not encroach into the running lane; an allowance of 20% for climate change has been applied at this preliminary stage.

4.6 Attenuation

4.6.1 A Greenfield runoff rate (GRR) (5 l/s/ha) has been agreed with SCC for use within the preliminary design calculations.

4.6.2 A 300mm freeboard level is included within the proposed design.

4.6.3 Attenuation within SuD features has been provided to ensure no flooding in a 1 in 100 year + 40% return period event.

4.6.4 The 40% climate change allowance within the design would ensure enough land is taken within the Scheme boundary. The 40% climate change allowance was requested by the LLFA.

4.6.5 Attenuation within the highway drainage networks would be designed in accordance with HD33/16.

5 M54 Outfalls

5.1 Runoff collection and conveyance

5.1.1 The preliminary drainage design for the M54 Outfalls has been split into two catchments, Catchment 1 and 2, refer to Figure 2.1 of this Appendix.

5.1.2 Runoff from the carriageway would be collected via a combination of road edge channels, gullies and combined kerb drainage units (where required). Runoff would be conveyed via the upgraded (where necessary) existing drainage infrastructure. A combination of existing/upgraded filter drains and carrier pipes. Additional subsurface drainage would be provided via filter drains and/or narrow filter drains where necessary.

5.2 Attenuation and pollution control

Catchments 1 & 2

5.2.1 The runoff from these catchments would outfall to the existing drainage network (condition to be confirmed via drainage survey), which it is assumed discharges at the indicated outfalls.

5.2.2 The highway drainage would provide attenuation in accordance with CG501, through oversized pipes and flow restricted using a flow control device.

5.2.3 The preliminary design discharge rates would be restricted to the calculated existing discharge rates.

5.2.4 In accordance with the HEWRAT assessment a Hydrodynamic Separator would provide enhancement to water quality, refer to Appendix 13.3 of the Environmental Statement [TR010054/APP/6.3].

5.3 Land drainage

5.3.1 The existing M54 outfalls would not be affected by the Scheme.

5.3.2 Proposed earthwork drainage would be located at the top of cuttings or toe of embankment to capture surface flows from natural catchments.

6 Watercourse 1

6.1 Runoff collection and conveyance

6.1.1 The preliminary drainage design includes a new outfall and an existing outfall to Watercourse 1 (Catchment 3 & 4), refer to Figure 2.1 of this Appendix.

6.1.2 Runoff from the carriageway would be collected via a combination of road edge channels, gullies and combined kerb drainage units (where required). Runoff would be conveyed via a combination of filter drains and carrier pipes. Additional subsurface drainage would be provided via filter drains and/or narrow filter drains where necessary.

6.2 Attenuation and pollution control

6.2.1 A GRR (5 l/s/ha) has been agreed with SCC for use within the preliminary design calculations.

Catchment 3

6.2.2 The runoff from this catchment would discharge at GRR to a new outfall on Watercourse 1. Storage up to and including the 100 year + 40% climate change, as requested by the LLFA has been incorporated within SuDS features. This would be provided within a lined attenuation pond.

6.2.3 The highway drainage would provide attenuation in accordance with CG501.

6.2.4 A 300mm freeboard has been allowed within the design.

6.2.5 Treatment of the runoff would be provided through a lined attenuation pond and a lined ditch would convey the flow to the outfall. Penstocks would be provided upstream of the attenuation pond to allow cut off in the event of spillage on the highway (e.g. Following a road accident). The spillage would be contained within the carrier drain system.

6.2.6 The proposed attenuation pond and ditch would be lined to avoid seepage into the underlying strata.

Catchment 4

6.2.7 The runoff from this catchment will outfall to the existing drainage network (condition to be confirmed via drainage survey), which it is assumed discharges to Watercourse 1 via an existing connection. The initial results of the received indicative drainage survey indicate the existing drainage is in poor condition and would need replacement / upgrade. A full detailed review of the survey will be undertaken as part of detailed design. Nothing has been identified from the initial survey results that would change the approach in the drainage strategy.

6.2.8 In accordance with the HEWRAT assessment a Hydrodynamic Separator and Filter Drains would provide enhancement to water quality, refer to Appendix 13.3 of the Environmental Statement [TR010054/APP/6.3].

6.2.9 The preliminary design discharge rates would be restricted to the calculated existing discharge rates.

6.3 Land drainage

6.3.1 The existing culvert which passes under the M54 will not be affected by the Scheme.

6.3.2 Proposed earthwork drainage would be located at the top of cuttings or toe of embankment to capture surface flows from natural catchments.

7 Watercourse 2

7.1 Runoff collection and conveyance

7.1.1 The preliminary drainage design has been split into two catchments, Catchments 5 and 6, refer to Figure 2.1 of this Appendix.

7.1.2 Runoff from the carriageway would be collected via a combination of road edge channels, gullies and combined kerb drainage units (where required).

7.1.3 Runoff would be conveyed via a combination of filter drains and carrier pipes. Additional subsurface drainage would be provided via filter drains and/or narrow filter drains where necessary.

7.2 Attenuation and pollution control

7.2.1 A GRR (5 l/s/ha) has been agreed with SCC for use within the preliminary design calculations.

Catchment 5

7.2.2 The runoff from this catchment would discharge at GRR to a new outfall on Watercourse 2. Storage up to and including the 100 year + 40% climate change, as requested by the LLFA. This would be provided within a lined attenuation pond.

7.2.3 The highway drainage would provide attenuation in accordance with CG501. A 300mm freeboard has been allowed within the design.

7.2.4 Treatment of the runoff will be provided by a lined attenuation pond and discharge to Watercourse 2. Penstocks would be provided upstream of the attenuation pond to allow cut off in the event of spillage on the highway (eg. Following a road accident). The spillage would be contained within the carrier system.

7.2.5 The proposed pond and ditch would be lined to avoid seepage into the underlying strata.

Catchment 6

7.2.6 The runoff from this catchment will outfall to the existing drainage network (condition to be confirmed via drainage survey), which it is assumed discharges to Watercourse 2 via an existing connection. The drainage surveys commenced w/c 17th June 2019. The initial results of the received indicative drainage survey indicate the existing drainage is in poor condition and would need replacement / upgrade. A full detailed review of the survey will be undertaken as part of detailed design. Nothing has been identified from the initial survey results that would change the approach in the drainage strategy.

7.2.7 The HEWRAT assessment indicates no additional mitigation measures are required.

7.2.8 The preliminary design discharge rates would be restricted to the calculated existing discharge rates.

7.3 Land drainage

7.3.1 Watercourse 2 would be altered due to the Scheme; a new culvert will be constructed.

7.3.2 A new discharge point would be constructed to allow the proposed attenuation pond to discharge to Watercourse 2.

7.3.3 Proposed earthwork drainage would be located at the top of cuttings or toe of embankment to capture surface flows from natural catchments.

8 Watercourse 3

Both Catchments 7 & 8 discharge to the local authority road (A460). This road is owned and maintained by SCC.

8.1 Runoff collection and conveyance

8.1.1 The preliminary drainage design has been split into two catchments, Catchments 7 and 8, refer to Figure 2.1 of this Appendix.

8.1.2 Runoff from the carriageway would be collected via a combination of road edge channels, gullies and combined kerb drainage units (where required). Runoff would be conveyed via a combination of filter drains/carrier pipes and ditch. Additional subsurface drainage would be provided via filter drains and/or narrow filter drains where necessary.

8.2 Attenuation and pollution control

8.2.1 A GRR (5 l/s/ha) has been agreed with SCC for use within the preliminary design calculations.

Catchment 7

8.2.2 The runoff from this catchment will outfall to the existing drainage network (condition to be confirmed via drainage survey), which it is assumed discharges to Watercourse 3 via an existing connection. The drainage surveys commenced w/c 17th June 2019. The initial results of the received indicative drainage survey indicate the existing drainage is in poor condition and would need replacement / upgrade. A full detailed review of the survey will be undertaken as part of detailed design. Nothing has been identified from the initial survey results that would change the approach in the drainage strategy.

8.2.3 The highway drainage would provide attenuation in accordance with CG501.

8.2.4 This catchment remains as existing with a slight reduction in drained area. Consequently, no effect on HEWRAT assessment.

8.2.5 The preliminary design discharge rates would be restricted to the calculated existing discharge rates.

Catchment 8

8.2.6 The runoff from this catchment would outfall at GRR to the existing drainage network on the A460. Attenuation storage would be provided up to and including the 100 year + 40% climate change event within a lined ditch and lined pond.

8.2.7 The highway drainage would provide attenuation in accordance with CG501.

8.2.8 A 300mm freeboard has been allowed within the design.

8.2.9 Treatment of the runoff would be provided via a lined ditched and a lined attenuation pond. Penstocks would be provided upstream of the lined attenuation pond to allow cut off in the event of spillage on the highway (eg. Following a road accident). The spillage would be contained within the carrier drain system.

8.2.10 The proposed pond and ditch would be lined to avoid seepage into the underlying strata.

8.3 Land drainage

8.3.1 A new culvert would be constructed to convey the existing flow of Watercourse 3. The existing ditches would need to be re-aligned.

8.3.2 The existing culvert which passes under Dark Lane would not be affected by the Scheme. The existing highway discharge points would be retained.

8.3.3 Proposed earthwork drainage would be located at the top of cuttings or toe of embankment to capture surface flows from natural catchments.

9 Watercourse 4

9.1 Runoff collection and conveyance

9.1.1 The preliminary drainage design has been split into two catchments, Catchments 9 and 10, refer to Figure 2.1 of this Appendix.

9.1.2 Runoff from the carriageway would be collected via a combination of road edge channels, gullies and combined kerb drainage units (where required).

9.1.3 Runoff would be conveyed via a combination of filter drains and carrier pipes. Additional subsurface drainage would be provided via filter drains and/or narrow filter drains where necessary.

9.2 Attenuation and pollution control

9.2.1 A GRR (5 l/s/ha) has been agreed with SCC for use within the preliminary design calculations.

Catchment 9

9.2.2 The runoff from this catchment would outfall to the existing drainage network (condition to be confirmed via drainage survey), which it is assumed discharges to Watercourse 4 via an existing connection. The drainage surveys commenced w/c 17th June 2019. The initial results of the received indicative drainage survey indicate the existing drainage is in poor condition and would need replacement / upgrade. To date nothing has been identified on the surveys that would change the approach in the drainage strategy.

9.2.3 The highway drainage would provide attenuation in accordance with CG501. In accordance with the HEWRAT assessment Filter Drains would provide enhancement to water quality, refer to Appendix 13.3 of the Environmental Statement [TR010054/APP/6.3].

9.2.4 The preliminary design discharge rates would be restricted to the calculated existing discharge rates.

Catchment 10

9.2.5 The runoff from this catchment would discharge at GRR to a new outfall into Watercourse 4. Storage up to and including the 100 year + 40% climate change even within a lined ditch and lined attenuation pond.

9.2.6 The highway drainage would provide attenuation in accordance with CG501.

9.2.7 A 300mm freeboard has been allowed within the design.

9.2.8 Treatment of the runoff would be provided through a lined attenuation pond, a lined ditch and Filter Drains where possible. Penstocks would be provided upstream of the lined attenuation pond to allow cut off in the event of spillage on the highway (eg. Following a road accident). The spillage would be contained within the carrier drain system.

9.2.9 The proposed pond and ditch would be lined to avoid seepage into the underlying strata.

9.3 Land drainage

9.3.1 A new culvert would be constructed to convey the existing flow of Watercourse 4.

9.3.2 A new discharge point would be constructed to allow the proposed attenuation pond to discharge to Watercourse 4.

9.3.3 Proposed earthwork drainage would be located at the top of cuttings or toe of embankment to capture surface flows from natural catchments.

10 Watercourse 5

10.1 Runoff collection and conveyance

10.1.1 The preliminary drainage design has been split in to four catchments, Catchments 11 to 14, refer to Figure 2.1 of this Appendix.

10.1.2 Runoff from the carriageway would be collected via a combination of road edge channels, gullies and combined kerb drainage units (where required).

10.1.3 Runoff would be conveyed via a combination of filter drains and carrier pipes. Additional subsurface drainage would be provided via filter drains and/or narrow filter drains where necessary.

10.2 Attenuation and pollution control

10.2.1 A GRR (5 l/s/ha) has been agreed with SCC for use within the preliminary design calculations.

Catchment 11

10.2.2 Catchment 11 discharges to the local authority road (A460). This road is owned and maintained by SCC.

10.2.3 The runoff from this catchment would outfall to the existing drainage network (condition to be confirmed via drainage survey), which it is assumed discharges to Watercourse 5 via an existing connection. The drainage surveys commenced w/c 17th June 2019. The initial results of the received indicative drainage survey indicate the existing drainage is in poor condition and would need replacement / upgrade. To date nothing has been identified on the surveys that would change the approach in the drainage strategy.

10.2.4 The highway drainage would provide attenuation in accordance with CG501.

10.2.5 The HEWRAT assessment indicates no additional mitigation measures are required.

10.2.6 The preliminary design discharge rates would be restricted to the calculated existing discharge rates.

Catchment 12

10.2.7 The runoff from this catchment would free discharge via toe drains to a new outfall to Watercourse 5. The runoff is purely from the embankments.

Catchment 13

10.2.8 The runoff from this catchment would free discharge via toe drains to a new outfall to Watercourse 5. The runoff is purely from the embankments.

Catchment 14

10.2.9 The runoff from this catchment would outfall at GRR into Watercourse 5. Storage up to and including the 100 year + 40% climate change even within a lined attenuation pond.

10.2.10 A 300mm freeboard has been allowed within the design.

10.2.11 Treatment of the runoff would be provided by a lined attenuation pond and Filter Drains. Penstocks would be provided upstream of the lined attenuation pond to allow cut off in the event of spillage on the highway (eg. Following a road accident).

10.2.12 The proposed pond would be lined to avoid seepage into the underlying strata.

10.3 Land drainage

10.3.1 A new 10 m free span bridge to be constructed over Watercourse 5.

10.3.2 A new discharge point would be constructed to allow the proposed attenuation pond to discharge to Watercourse 5.

10.3.3 Proposed earthwork drainage would be located at the top of cuttings or toe of embankment to capture surface flows from natural catchments.

11 Watercourse 6

11.1 Runoff collection and conveyance

11.1.1 The preliminary drainage design includes 1 catchment, Catchment 15, refer to Figure 2.1 of this Appendix.

11.1.2 Runoff from the carriageway would be collected via a combination of road edge channels, gullies and combined kerb drainage units (where required).

11.1.3 Runoff would be conveyed via a combination of filter drains and carrier pipes. Additional subsurface drainage would be provided via filter drains and/or narrow filter drains where necessary.

11.2 Attenuation and pollution control

11.2.1 A greenfield runoff rate (GRR) (5 l/s/ha) has been agreed with SCC for use within the preliminary design calculations.

Catchment 15

11.2.2 The runoff from this catchment would outfall to the existing drainage network which it is assumed discharges to watercourse 6 via an existing connection. The drainage surveys commenced w/c 17th June 2019. The initial results of the received indicative drainage survey indicate the existing drainage is in poor condition and would need replacement / upgrade. To date nothing has been identified on the surveys that would change the approach in the drainage strategy.

11.2.3 In accordance with the HEWRAT assessment a lined ditch and Filter Drains would provide enhancement to water quality, refer to Appendix 13.3 in Volume 3 of the Environmental Statement [TR010054/APP/6.3].

11.2.4 The preliminary design discharge rates would be restricted to the calculated existing discharge rates.

11.3 Land drainage

11.3.1 Watercourse 6 would not be affected by the Scheme.

11.3.2 The existing culvert which passes under the M54 would not be affected by the Scheme. The existing highway discharge points would be retained.

11.3.3 Proposed earthwork drainage would be located at the top of cuttings or toe of embankment to capture surface flows from natural catchments.

12 M6 Southbound & Northbound Outfalls

12.1 Runoff collection and conveyance

12.1.1 The preliminary drainage design has been split in to two catchments, Catchments 15 and 16, refer to Figure 2.1 of this Appendix.

12.1.2 Runoff from the carriageway would be collected via a combination of road edge channels, gullies and combined kerb drainage units (where required).

12.1.3 Runoff would be conveyed via a combination of filter drains and carrier pipes. Additional subsurface drainage would be provided via filter drains and/or narrow filter drains where necessary.

12.2 Attenuation and pollution control

12.2.1 A greenfield runoff rate (GRR) (5 l/s/ha) has been agreed with SCC for use within the preliminary design calculations.

Catchment 16 & 17

12.2.2 The runoff from this catchment would outfall to the existing drainage network which it is assumed discharges to M6 Southbound and Northbound Outfalls via an existing connection. The initial results of the received indicative drainage survey indicate the existing drainage is in poor condition and would need replacement / upgrade. To date nothing has been identified on the surveys that would change the approach in the drainage strategy.

12.2.3 If no existing treatment mechanisms area identified within the drainage survey, than water quality enhancement would be provided in the form of mitigation measures stated within Appendix 13.3 in Volume 3 of the Environmental Statement [TR010054/APP/6.3].

12.2.4 The preliminary design discharge rates would be restricted to the calculated existing discharge rates.

12.3 Land drainage

12.3.1 The existing M6 outfalls would not be affected by the Scheme.

12.3.2 Proposed earthwork drainage would be located at the top of cuttings or toe of embankment to capture surface flows from natural catchments.

13 Water Quality

13.1.1 Water quality assessments, which assess the road drainage preliminary design proposals, would be undertaken in accordance with DMRB LA113: Road drainage and the water environment (formerly HD45/09). The results of the assessment are included in Appendix 13.3 in Volume 3 of the Environmental Statement [TR010054/APP/6.3].

13.1.2 The Highways England Water Risk Assessment Tool (HEWRAT) assessment indicates passes for each of the highway drainage catchments. The HEWRAT assessments assessed the effects of accidental spillages and routine road drainage runoff on surface water quality.

13.1.3 The features included within the Scheme design as reported in Sections 5 to 12 provides an improvement regarding water quality when compared to the existing situation.

13.1.4 All the new Scheme outfalls pass all aspects of the simple HEWRAT assessment except for the copper EQS. These were subjected to metals bioavailability assessment (M-BAT) and pass this assessment.

13.1.5 The HEWRAT assessment identified failures for existing catchments 1 and 2 for copper EQS and suspended sediment. Following the proposed mitigation measures only copper EQS remains, this is an improvement when compared to the existing situation. Catchment 14, 15 and 16 fails copper EQS, suspended sediment and acute copper. The HEWRAT assessment still fails after the additional proposed mitigations. Effects of the Scheme on these catchments are assessed as neutral.

14 Hydraulic Modelling

14.1 Preliminary modelling

14.1.1 Preliminary hydraulic modelling has been undertaken using MicroDrainage Software to demonstrate the validity of the drainage design proposals.

15 Maintenance

15.1.1 Maintenance of any conventional pipe network and sustainable drainage systems (SuDS) would be required during Scheme operation. For a conventional pipe network, access for maintenance and inspection would be provided with pipework laid to achieve self-cleansing velocities. Table 15.1 shows the maintenance activities for typical SuDS components as advised in HA 103/06 Vegetated Drainage Systems for Highway Runoff (Highways Agency, 2006).

15.1.2 Access tracks to ponds would be provided to allow maintenance vehicles to safely park up and undertake inspections, grass cutting etc.

Table 15.1: Inspection and maintenance requirements for vegetative systems (extract from HA 103/06)

	Swale	Infiltration Basin	SF Wetland	SSF Wetland	Balancing Pond/ Sedimentation Pond
INSPECTIONS: • Inflow/outfalls • Integrity/erosion • Debris/rubbish	Quarterly or after each major storm	Quarterly	Quarterly or after each major storm	Monthly or after each major storm	Monthly
• Build-up of sediment or invasive weeds	Annually	Twice annually	Annually	Annually	Annually
• Vegetation cover/ vigour	Monthly or after each major storm	Annually	Annually	Annually	Annually
• Check for protected species/breeding birds	Specialist advice to be sought, as described in paragraph 6.2				
ROUTINE WORKS: • Clearance of rubbish/debris	Monthly or after each major storm	Quarterly	Quarterly	Monthly or after each major storm	Quarterly
• Cutting vegetation	Monthly or after each major storm	Annual	10 year cycle and remove	1-5 year cycle and remove	5-10 year cycle and remove
• Removal of plant litter	N/A	N/A	N/A	5-10 year cycle if required	N/A
• Removal of sediment	To be determined annually	To be determined annually	To be determined annually	To be determined annually	To be determined annually

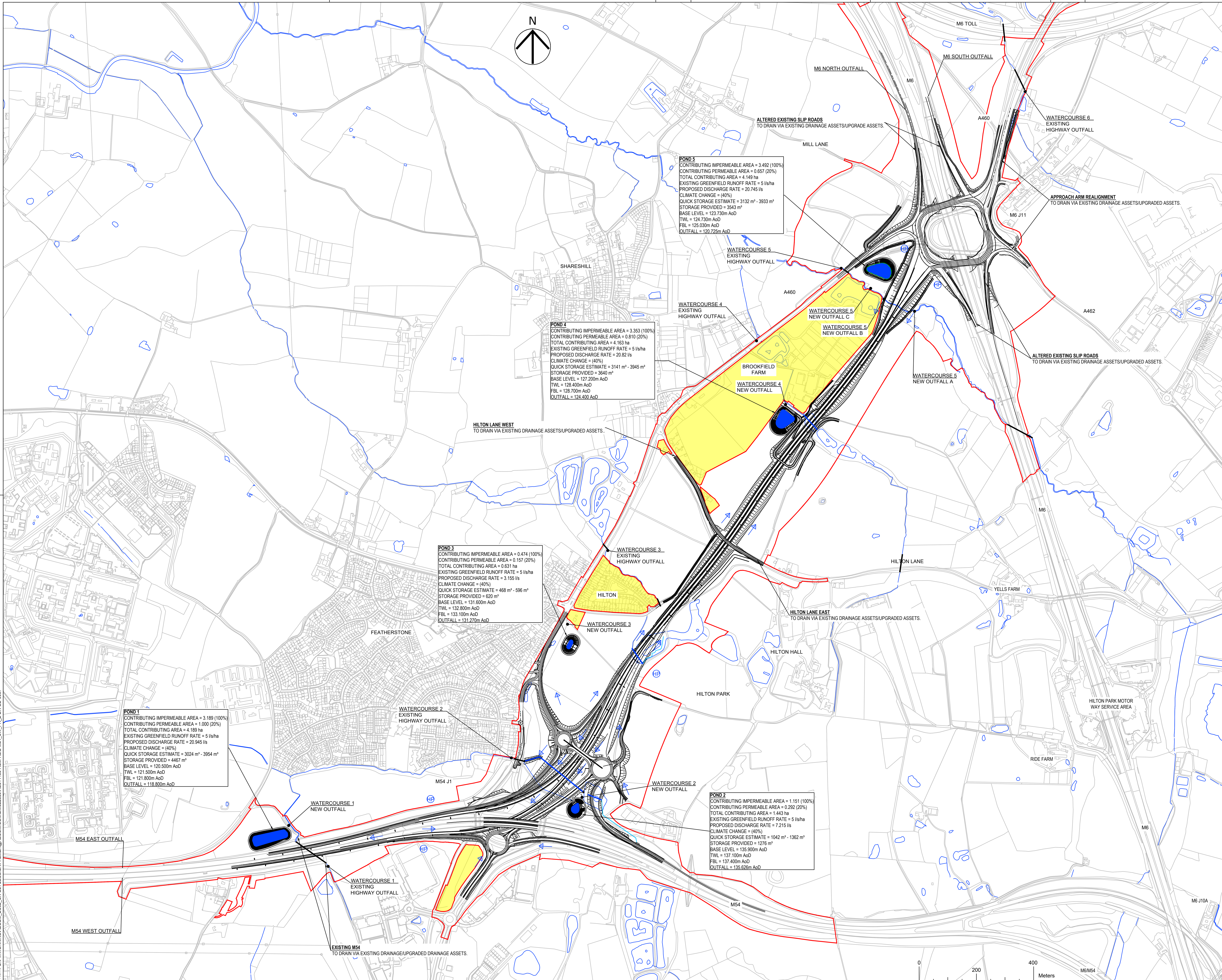
Annexes

Annex A: Drainage Strategy Drawing

Annex B: Ground Investigation Borehole sites

Annex A: Drainage strategy drawing

HE514465-ACM-HDG-M54_SW_PR_Z-DR-CD-0007


N
M6 TOLL
M6 SOUTH OUTFALL
M6 NORTH OUTFALL
M6
A460
WATERCOURSE 6
EXISTING
HIGHWAY OUTFALL
ALTERED EXISTING SLIP ROADS
TO DRAIN VIA EXISTING DRAINAGE ASSETS/UPGRADE ASSETS.
MILL LANE
POND 5
CONTRIBUTING IMPERMEABLE AREA = 3.492 (100%)
CONTRIBUTING PERMEABLE AREA = 0.657 (20%)
TOTAL CONTRIBUTING AREA = 4.149 ha
EXISTING GREENFIELD RUNOFF RATE = 5 l/s/ha
PROPOSED DISCHARGE RATE = 20.745 l/s
CLIMATE CHANGE = (40%)
QUICK STORAGE ESTIMATE = 3132 m³ - 3933 m³
STORAGE PROVIDED = 3543 m³
BASE LEVEL = 123.730m AoD
TWL = 124.730m AoD
FBL = 125.030m AoD
OUTFALL = 120.725m AoD
APPROACH ARM REALIGNMENT
TO DRAIN VIA EXISTING DRAINAGE ASSETS/UPGRADED ASSETS.
M6 J11
WATERCOURSE 5
EXISTING
HIGHWAY OUTFALL
SHARESHILL
A460
A462
WATERCOURSE 4
EXISTING
HIGHWAY OUTFALL
WATERCOURSE 5
NEW OUTFALL C
WATERCOURSE 5
NEW OUTFALL B
POND 4
CONTRIBUTING IMPERMEABLE AREA = 3.353 (100%)
CONTRIBUTING PERMEABLE AREA = 0.810 (20%)
TOTAL CONTRIBUTING AREA = 4.163 ha
EXISTING GREENFIELD RUNOFF RATE = 5 l/s/ha
PROPOSED DISCHARGE RATE = 20.82 l/s
CLIMATE CHANGE = (40%)
QUICK STORAGE ESTIMATE = 3141 m³ - 3945 m³
STORAGE PROVIDED = 3640 m³
BASE LEVEL = 127.200m AoD
TWL = 128.400m AoD
FBL = 128.700m AoD
OUTFALL = 124.400 AoD
ALTERED EXISTING SLIP ROADS
TO DRAIN VIA EXISTING DRAINAGE ASSETS/UPGRADED ASSETS.
BROOKFIELD
FARM
WATERCOURSE 4
NEW OUTFALL
WATERCOURSE 5
NEW OUTFALL A
HILTON LANE WEST
TO DRAIN VIA EXISTING DRAINAGE ASSETS/UPGRADED ASSETS.
M6
POND 3
CONTRIBUTING IMPERMEABLE AREA = 0.474 (100%)
CONTRIBUTING PERMEABLE AREA = 0.157 (20%)
TOTAL CONTRIBUTING AREA = 0.631 ha
EXISTING GREENFIELD RUNOFF RATE = 5 l/s/ha
PROPOSED DISCHARGE RATE = 3.155 l/s
CLIMATE CHANGE = (40%)
QUICK STORAGE ESTIMATE = 468 m³ - 596 m³
STORAGE PROVIDED = 620 m³
BASE LEVEL = 131.600m AoD
TWL = 132.800m AoD
FBL = 133.100m AoD
OUTFALL = 131.270m AoD
WATERCOURSE 3
EXISTING
HIGHWAY OUTFALL
HILTON LANE
HILTON
YELLS FARM
HILTON LANE EAST
TO DRAIN VIA EXISTING DRAINAGE ASSETS/UPGRADED ASSETS.
WATERCOURSE 3
NEW OUTFALL
FEATHERSTONE
HILTON HALL
HILTON PARK
HILTON PARK MOTOR
WAY SERVICE AREA
WATERCOURSE 2
EXISTING
HIGHWAY OUTFALL
POND 1
CONTRIBUTING IMPERMEABLE AREA = 3.189 (100%)
CONTRIBUTING PERMEABLE AREA = 1.000 (20%)
TOTAL CONTRIBUTING AREA = 4.189 ha
EXISTING GREENFIELD RUNOFF RATE = 5 l/s/ha
PROPOSED DISCHARGE RATE = 20.945 l/s
CLIMATE CHANGE = (40%)
QUICK STORAGE ESTIMATE = 3024 m³ - 3954 m³
STORAGE PROVIDED = 4467 m³
BASE LEVEL = 120.500m AoD
TWL = 121.500m AoD
FBL = 121.800m AoD
OUTFALL = 118.800m AoD
RIDE FARM
M54 J1
WATERCOURSE 2
NEW OUTFALL
WATERCOURSE 1
NEW OUTFALL
POND 2
CONTRIBUTING IMPERMEABLE AREA = 1.151 (100%)
CONTRIBUTING PERMEABLE AREA = 0.292 (20%)
TOTAL CONTRIBUTING AREA = 1.443 ha
EXISTING GREENFIELD RUNOFF RATE = 5 l/s/ha
PROPOSED DISCHARGE RATE = 7.215 l/s
CLIMATE CHANGE = (40%)
QUICK STORAGE ESTIMATE = 1042 m³ - 1362 m³
STORAGE PROVIDED = 1276 m³
BASE LEVEL = 135.900m AoD
TWL = 137.100m AoD
FBL = 137.400m AoD
OUTFALL = 135.626m AoD
M6
M54 EAST OUTFALL
WATERCOURSE 1
EXISTING
HIGHWAY OUTFALL
M54
M6 J10A
M54 WEST OUTFALL
EXISTING M54
TO DRAIN VIA EXISTING DRAINAGE/UPGRADED DRAINAGE ASSETS.
0
200
400
Meters
M6/M54

Plot Date : 24 January 2020 13:55:54

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KEY

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- LAND NOT INCLUDED WITHIN THE ORDER LIMITS
- PROPOSED WATERCOURSE
- EXISTING WATERCOURSE
- HIGH POINT
- INDICATIVE DRAINAGE FLOW
- HIGHWAY ATTENUATION POND
- EXISTING CULVERT
- PROPOSED CULVERT

Revision Details	By / Check	Date	Suffix
First Issue	SO / AM	07/10/19	P01
Position of Pond 1 altered.	MH / AM	14/10/19	P02
Catchments updated to reflect preliminary drainage survey. Pond figures updated	JP / RR	24/01/20	P03

Purpose of issue

DCO APPLICATION

Client
Highways England
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of
highways england

Project Title

M54 to M6 Link Road

Drawing Title

DRAINAGE STRATEGY

Designed	Drawn	Checked	Approved	Date
SO	JP	SB	RR	24/01/20

Internal Project No.	Suitability
60536736	S8
Scale @ A1	Zone: Drainage

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Highways England PIN | Originator | Volume
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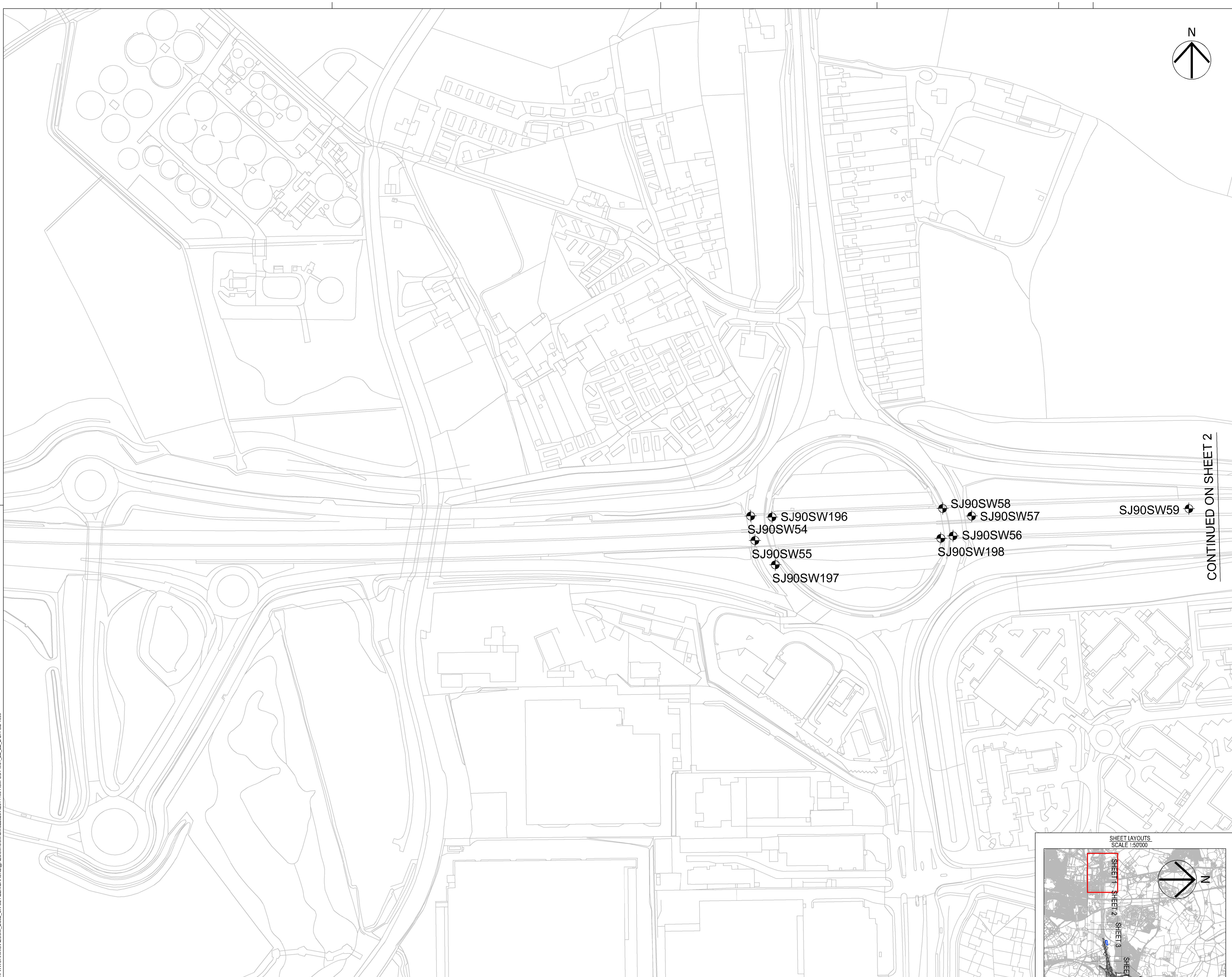
M54_SW_PR_Z -DR-CD-0007
Location | Type | Role | Number

Rev
P03

Annex B: Ground Investigation Borehole sites



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KEY
- BH GROUND INVESTIGATION BOREHOLE LOCATION
- TP GROUND INVESTIGATION TRIAL PIT LOCATION
- HISTORIC BOREHOLE LOCATION
- HISTORIC TRIAL PIT LOCATION
- HISTORIC HAND AUGER LOCATION
- PROPOSED POND

Revision Details	By / Check	Date	Suffix
For Technical Quality Review	AK / PM	28/11/19	P01

Purpose of issue
SUITABLE FOR REVIEW & COMMENT

Client
Highways England
Floor 5
Two Colmore Square
38 Colmore Circus
Birmingham
B4 6BN

Working on behalf of highways england

Project Title
M54 to M6 Link Road

Drawing Title
GROUND INVESTIGATION LOCATION PLAN (SHEET 1 OF 8)

Designed	Drawn	Checked	Approved	Date
---	AK	BB	PM	28/11/19

Internal Project No.	Suitability
60536736	S3
Scale @ A1	Zone: Geotechnical

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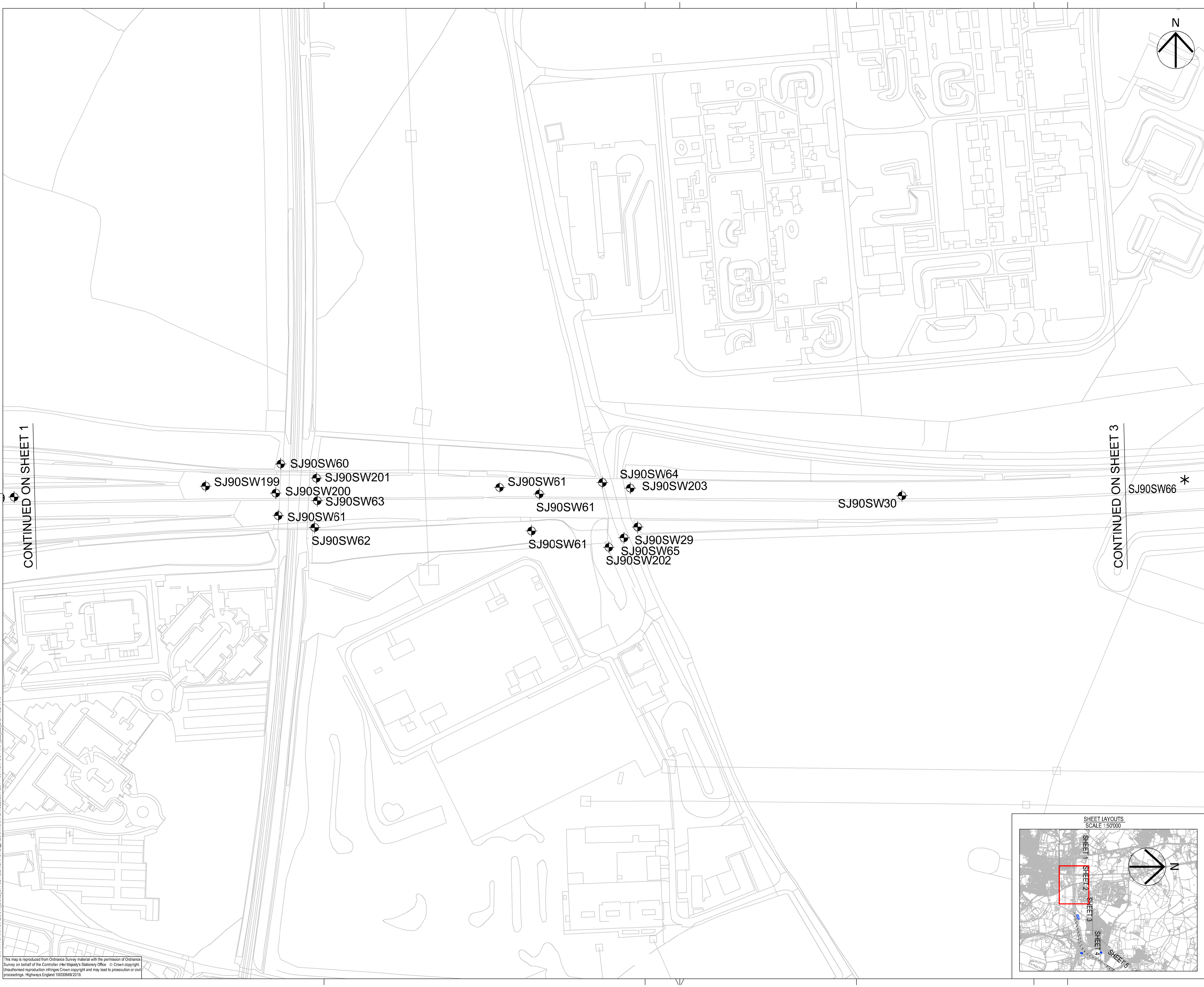
Location | Type | Role | Number

Rev
P01



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KEY

- BH — GROUND INVESTIGATION BOREHOLE LOCATION
- TP — GROUND INVESTIGATION TRIAL PIT LOCATION
- HISTORIC BOREHOLE LOCATION
- HISTORIC TRIAL PIT LOCATION
- HISTORIC HAND AUGER LOCATION
- PROPOSED POND

Revision Details	By	Check	Date	Suffix
For Technical Quality Review	AK	PM	28/11/19	P01

Purpose of issue

SUITABLE FOR REVIEW & COMMENT

Client
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Two Colmore Square
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Birmingham
B4 6BN

Working on behalf of highways england

Project Title

M54 to M6 Link Road

Drawing Title

GROUND INVESTIGATION LOCATION PLAN (SHEET 2 OF 8)

Designed	Drawn	Checked	Approved	Date
---	AK	BB	PM	28/11/19

Internal Project No. 60536736 | Suitability S3

Scale @ A1 | Zone Geotechnical

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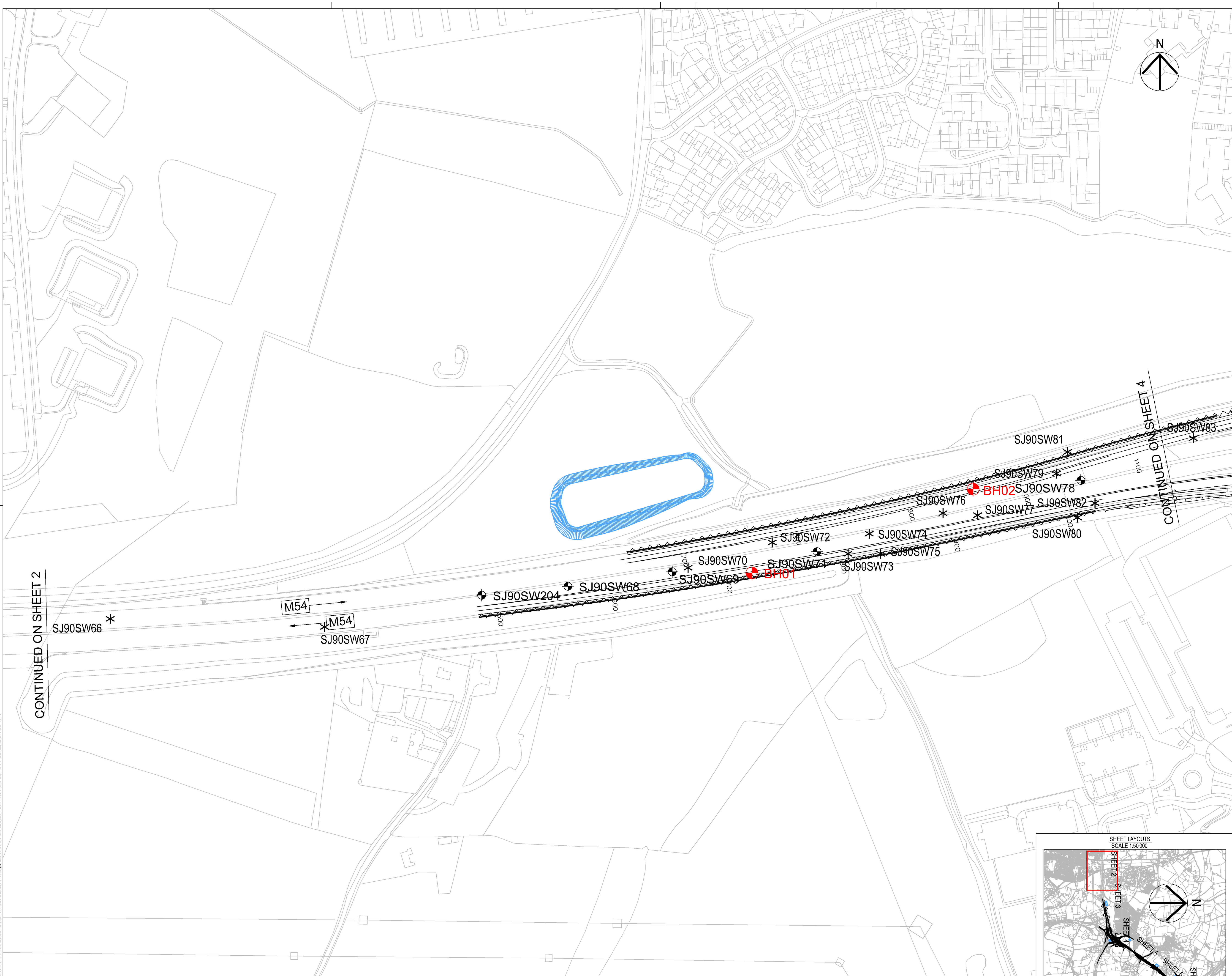
M54_ZZ_ZZ_Z		DR GE 1010	
Location		Type / Role / Number	



KEY

- GROUND INVESTIGATION BOREHOLE LOCATION (BH)
- GROUND INVESTIGATION TRIAL PIT LOCATION (TP)
- HISTORIC BOREHOLE LOCATION
- HISTORIC TRIAL PIT LOCATION
- HISTORIC HAND AUGER LOCATION
- PROPOSED POND

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Revision Details	By / Check	Date	Suffix
For Technical Quality Review	AK / PM	28/11/19	P01

Purpose of issue

SUITABLE FOR REVIEW & COMMENT

Client
Highways England
Floor 5
Two Colmore Square
38 Colmore Circus
Birmingham
B4 6BN

Working on behalf of highways england

Project Title

M54 to M6 Link Road

Drawing Title

GROUND INVESTIGATION LOCATION PLAN (SHEET 3 OF 8)

Designed	Drawn	Checked	Approved	Date
---	AK	BB	PM	28/11/19

Internal Project No.	Suitability
60536736	S3
Scale @ A1	Zone: Geotechnical

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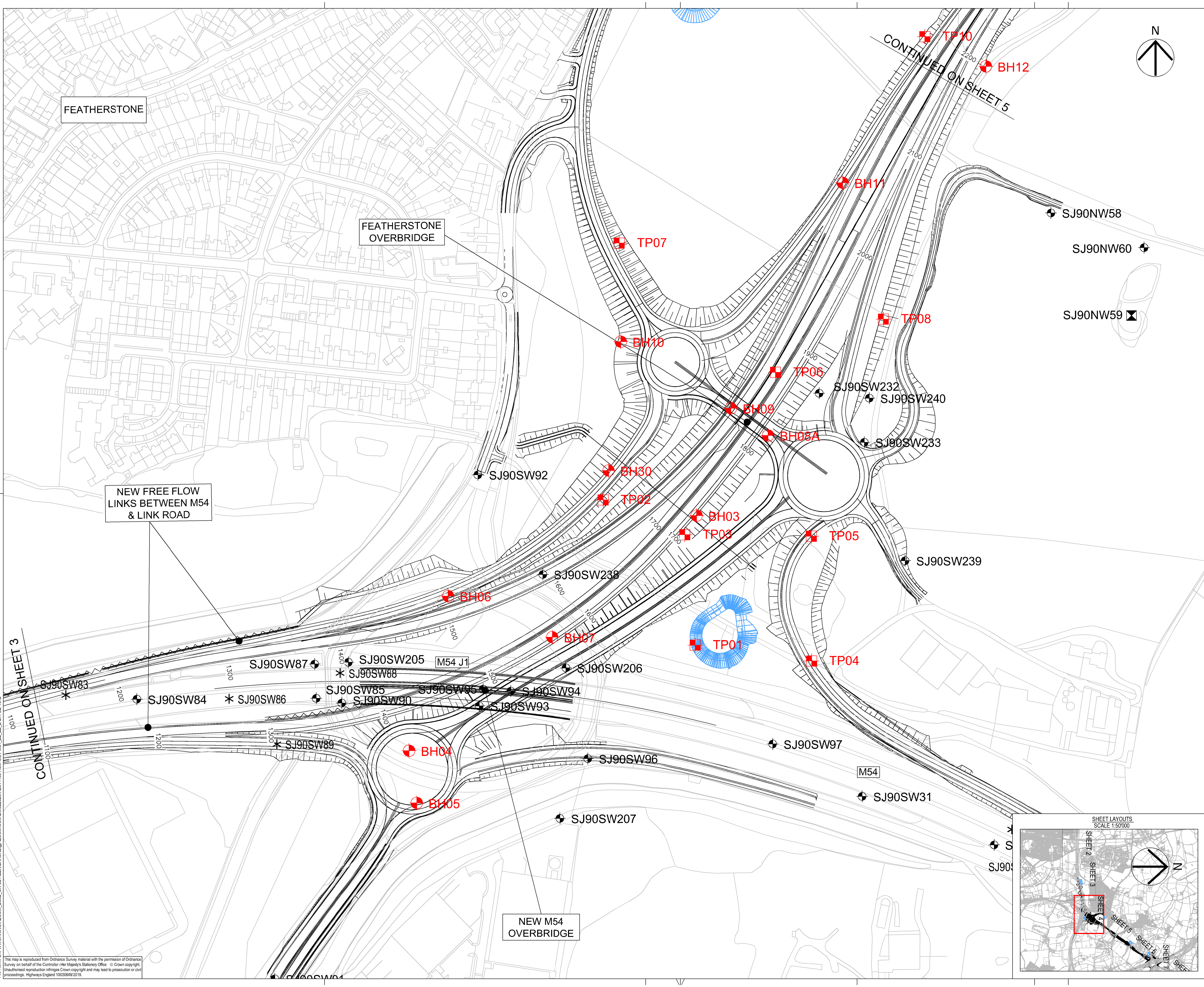
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hanpshire RG21 7PP

Drawing Number

Highways England PIN	Originator	Volume	Rev
HE514465	-ACM	-SGT -	P01
Location: M54_ZZ_ZZ_Z		Type / Role / Number: -DR-GE-1011	

Plot Date : 03 December 2019 11:54:45
File Name C:\PWWORKING\AECOM_DS02_UK-CLT\BEN.BRAUND@AECOM.COM\DMS22825\HE514465-ACM-SGT-M54_ZZ_ZZ_Z-DR-GE-1011



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Plot Date : 03 December 2019 12:11:46
File Name: C:\PWWORKING\AECOM_DS02_UK-CL\TIEN.BRAUND@AECOM.COM\DMS22829\HE514465-ACM-SGT-M54_ZZ_ZZ_Z-DR-GE-1012

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

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EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
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4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.

KEY

- BH — GROUND INVESTIGATION BOREHOLE LOCATION
- TP — GROUND INVESTIGATION TRIAL PIT LOCATION
- HISTORIC BOREHOLE LOCATION
- HISTORIC TRIAL PIT LOCATION
- HISTORIC HAND AUGER LOCATION
- PROPOSED POND

Revision Details	By / Check	Date	Suffix
For Technical Quality Review	AK / PM	28/11/19	P01

Purpose of issue

SUITABLE FOR REVIEW & COMMENT

Client

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Floor 5
Two Colmore Square
38 Colmore Circus
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Working on behalf of highways england

Project Title

M54 to M6 Link Road

Drawing Title

GROUND INVESTIGATION LOCATION PLAN (SHEET 4 OF 8)

Designed	Drawn	Checked	Approved	Date
---	AK	BB	PM	28/11/19

Internal Project No.	Suitability
60536736	S3
Scale @ A1	Zone: Geotechnical

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Drawing Number

Highways England PIN	Originator	Volume	Location	Type	Role	Number	Rev
HE514465	ACM	SGT	M54_ZZ_ZZ_Z	DR	GE	1012	P01

HILTON

TP09

TP07

TP10

BH11

TP06

BH12

SJ90SW232

TP08

SJ90SW240

SJ90SW283

SJ90NW58

TP11

BH13

SJ90NW50

HILTON LANE
OVERBRIDGE

BH15

TP12

BH14

BH16

TP13

SJ90NE217

SJ90NE305

SJ90NE218

SJ90NW60

SJ90NW59

HILTON HALL

CONTINUED ON SHEET 4

CONTINUED ON SHEET 6

2000
2100
2200
2300
2400
2500
2600
2700
2800
2900

W239

Plot Date: 13 December 2019 12:35:19
File Name: C:\PW\WORKING\AECOM_D302_UK-CLTIBEN.BRAUND@AECOM.COM\DMS22605\HE514465-ACM-SGT-M54_ZZ_ZZ_Z-DR-GE-1013

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

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CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

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KEY

- GROUND INVESTIGATION BOREHOLE LOCATION
- GROUND INVESTIGATION TRIAL PIT LOCATION
- HISTORIC BOREHOLE LOCATION
- HISTORIC TRIAL PIT LOCATION
- HISTORIC HAND AUGER LOCATION
- PROPOSED POND

Revision Details	By	Check	Date	Suffix
For Technical Quality Review	AK	PM	28/11/19	P01

Purpose of issue

SUITABLE FOR REVIEW & COMMENT

Client
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Two Colmore Square
38 Colmore Circus
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Working on behalf of
highways england

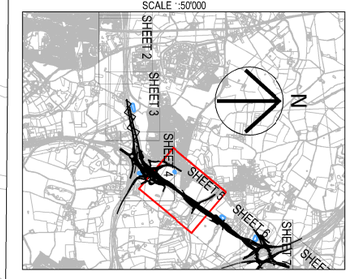
Project Title

M54 to M6 Link Road

Drawing Title

GROUND INVESTIGATION LOCATION PLAN (SHEET 5 OF 8)

SHEET LAYOUTS
SCALE 1:50'000



Designed	Drawn	Checked	Approved	Date
---	AK	BB	PM	28/11/19

Internal Project No.	Suitability
60536736	S3
Scale @ A1	Zone
	Geotechnical

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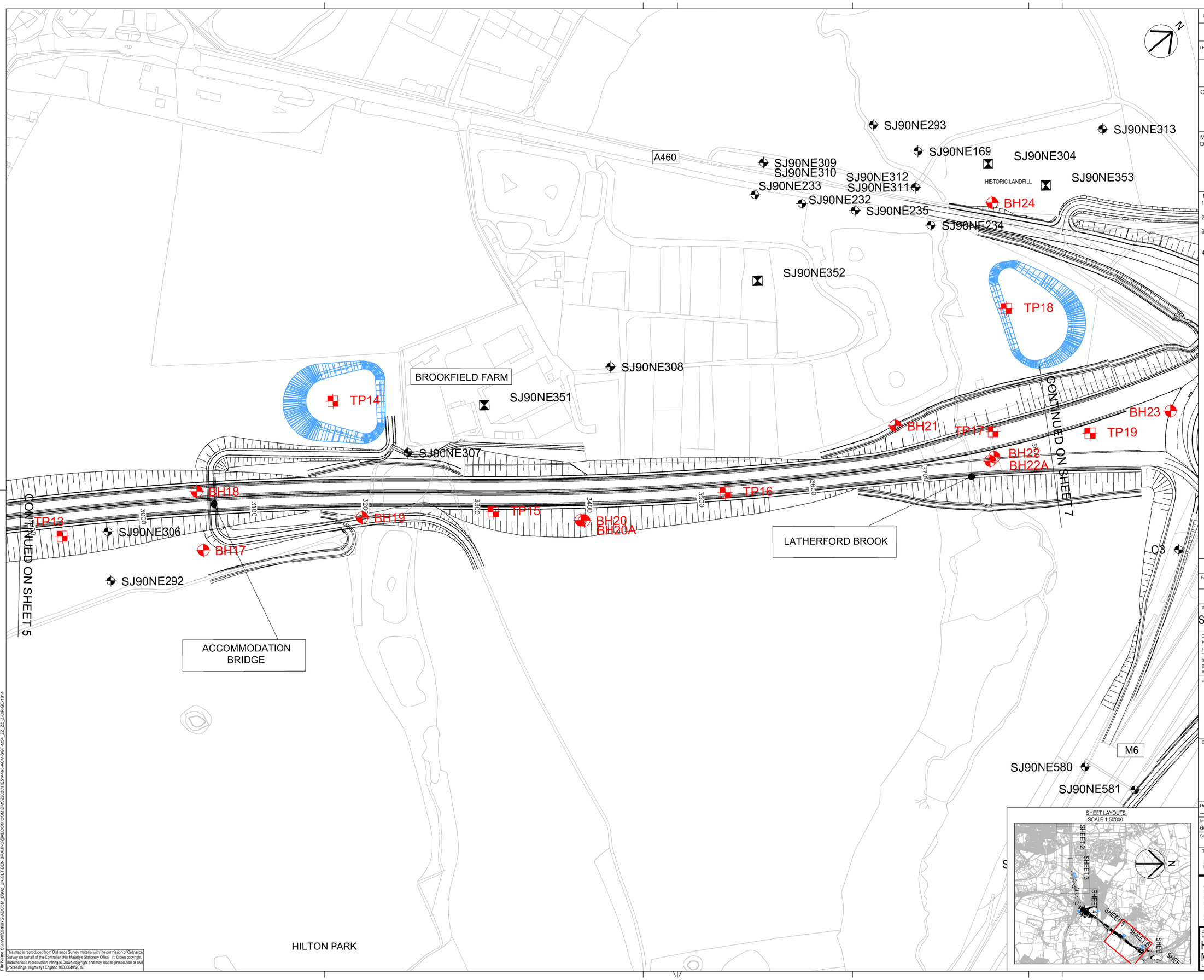
Drawing Number	Originator	Volume	Rev
Highways England PIN: HE514465	ACM	SGT	P01
Location: M54_ZZ_ZZ_Z	Type: DR	Role: GE	Number: 1013



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

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MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

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KEY

- GROUND INVESTIGATION BOREHOLE LOCATION
- GROUND INVESTIGATION TRIAL PIT LOCATION
- HISTCRIC BOREHOLE LOCATION
- HISTCRIC TRIAL PIT LOCATION
- HISTCRIC HAND AUGER LOCATION
- PROPOSED POND

For Technical Quality Review	AK	PM	28/11/19	P01
Revision Details	By	Check	Date	Suffix

Purpose of issue

SUITABLE FOR REVIEW & COMMENT

Client
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Two Colmore Square
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Working on behalf of
highways england

Project Title

M54 to M6 Link Road

Drawing Title

GROUND INVESTIGATION LOCATION PLAN (SHEET 6 OF 8)

Designed	Drawn	Checked	Approved	Date
---	AK	BB	PM	28/11/19

Internal Project No. 60536736	Suitability S3
Scale @ A1	Zone Geotechnical

SHEET LAYOUTS
SCALE 1:50000

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Drawing Number	Orginator	Volume	Type	Role	Number	Rev
Highways England PIN HE514465	ACM	SGT	DR	GE	1014	P01
Location M54_ZZ_ZZ_Z						

Plot Date: 10 December 2019 15:56:36
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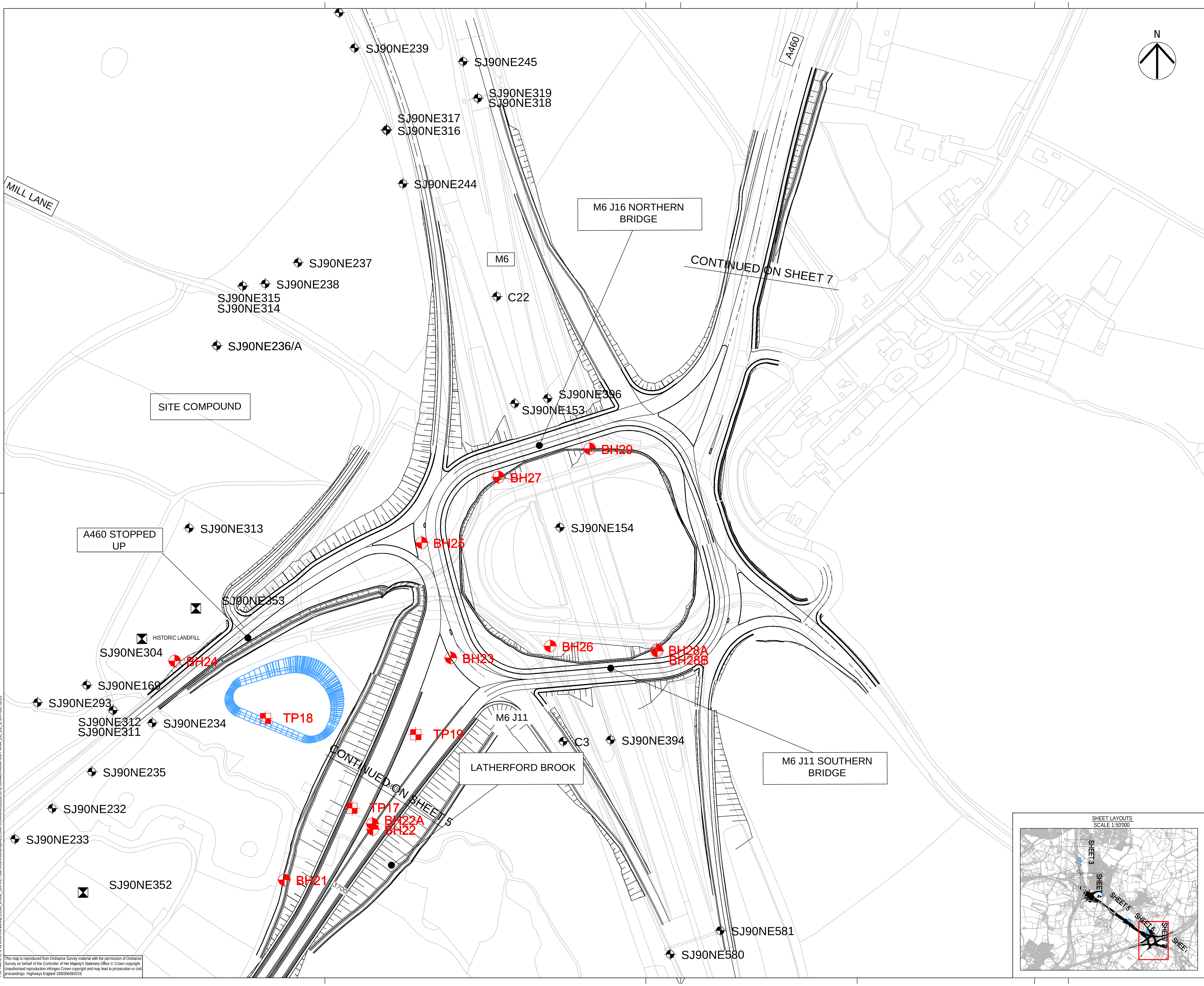

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

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CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

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KEY

- GROUND INVESTIGATION BOREHOLE LOCATION
- GROUND INVESTIGATION TRIAL PIT LOCATION
- HISTORIC BOREHOLE LOCATION
- HISTORIC TRIAL PIT LOCATION
- HISTORIC HAND AUGER LOCATION
- PROPOSED POND

Revision Details	By	Check	Date	Suit	Rev
For Technical Quality Review	AK	PM	28/11/19		P0

Purpose of issue

SUITABLE FOR REVIEW & COMMENT

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Working on behalf of highways england

Project Title

M54 to M6 Link Road

Drawing Title

GROUND INVESTIGATION LOCATION PLAN (SHEET 7 OF 8)

Designed	Drawn	Checked	Approved	Date
---	AK	BB	PM	28/11/19

Internal Project No.	Suitability
60536736	S3
Scale @ A1	Zone: Geotechnical

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Drawing Number

Highways England PIN	Originator	Volume	Rev
HE514465	ACM	SGT	P01
Location: M54_ZZ_ZZ_Z	Type: DR	Role: GE	Number: 1015

Plot Date : 03 December 2019 13:32:26
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C22
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SJ90NE355
A460
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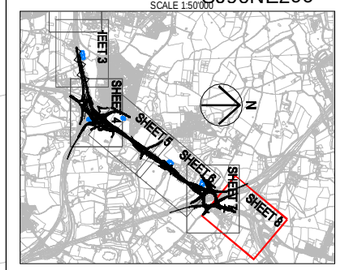
SHEET LAYOUT
SCALE 1:50000



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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

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KEY

- GROUND INVESTIGATION BOREHOLE LOCATION
- GROUND INVESTIGATION TRIAL PIT LOCATION
- HISTORIC BOREHOLE LOCATION
- HISTORIC TRIAL PIT LOCATION
- HISTORIC HAND AUGER LOCATION
- PROPOSED POND

Revision Details	By	Check	Date	Suffix
For Technical Quality Review	AK	PM	28/11/19	P01

Purpose of issue
SUITABLE FOR REVIEW & COMMENT

Client
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Birmingham
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Working on behalf of highways england

Project Title
M54 to M6 Link Road

Drawing Title
GROUND INVESTIGATION LOCATION PLAN (SHEET 8 OF 8)

Designed	Drawn	Checked	Approved	Date
---	AK	BB	PM	28/11/19

Internal Project No.	Suitability
60536736	S3
Scale @ A1	Zone
	Geotechnical

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Drawing Number
Highways England PIN | Originator | Volume
HE514465 - ACM - SGT -
Location | Type | Role | Number
M54_ZZ_ZZ_Z - DR - GE - 1016

Rev P01