

Airport City North Spine Road

Drainage Strategy Report

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1. Approvals and Revisions

Rev	Date	Details	Prepared	Checked	Approved
0.0	11/05/2015	For Information	R. Bochenek-Gasiorkiewicz	Neil Mason	Neil Byrne
1.0	06/11/2015	For planning	Thomas J. Kelly	Neil Byrne	Vin Bamford
2.0	08/06/2016	For planning	Thomas J. Kelly	Lisulo Sitali	Jim McNally
3.0	16/08/2016	For planning	Thomas J. Kelly	Neil Byrne	Jim McNally

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3. Introduction

This document outlines the approach adopted for the design of foul and surface water drainage at the proposed Manchester Airport City North Spine Road and includes the results of modelling of the surface water drainage system, along with associated external infrastructure works. The proposed location is highlighted in **Figure 1** below.



Figure 1 – Proposed Location Plan

4. Site description and background

The Site is located between Manchester Airport and the Wythenshawe area of Manchester and covers an area of approximately 21.3 ha. The site consists of car parking areas, existing roads and soft landscaping either side of Thorley Lane from which both sites are accessed.. The current car park is mainly surfaced with a permeable surface of unbound loose stone. The site has an element of landscaping approximately 20% of the total site area which is used as a buffer zone. Topographical Surveys show that the site levels vary between 68.0m AOD and 71.5m AOD. The crossfall across the site is generally minimal and the lowest level of the site occurs adjacent to Baguley Brook.

5. Existing drainage and watercourses

There are two existing watercourses flowing along the West and East side of Thorley Lane, Manchester. The watercourses are unnamed tributaries to Baguley Brook, which discharges to the pond in Painswick Park to the north of the site. Hereafter they are referred to as 'Westerly Watercourse' and 'Easterly Watercourse'.

A CCTV drainage survey (**Appendix 8**) was conducted to more accurately determine the capacity of the two tributaries. Following a detailed analysis of catchment areas and the location and source of incoming connections, the peak flow* in the Easterly Watercourse was estimated to be 992l/s and 443l/s in the Westerly Watercourse.

- ❖ **Based on a 1 in 100 year storm event plus 20% allowance for climate change.**

6. Proposed Surface Water Drainage Strategy

6.1. Overview of Surface Water Drainage Proposals

The proposed surface water drainage system will be constructed such that the road corridor drains to a new drainage system within the carriageway, with suitable online attenuation and oil interceptors, which discharges to the two existing watercourses at Greenfield runoff rates.

The two watercourses will remain in their existing locations as far as is practicable, but will flow through newly constructed culverts beneath the new road. The final proposals for the watercourses are not yet finalised. They may be accommodated within the development areas or there may be proposals to divert or culvert part of them. These proposals will need to be discussed and agreed with Manchester City Council as Lead Local Flood Authority. Preliminary discussions have been held and the eventual proposal will look to address the areas holistically rather than in a piecemeal fashion.

The Westerly Watercourse will require reconstruction between the new culvert beneath the new road and the existing culvert beneath Thorley Lane. The existing culvert beneath Thorley Lane will need to be extended slightly outside the footprint of the proposed carriageway widening to form the new road alignment.

The Easterly Watercourse will require some works to improve the channel upstream and downstream of the proposed new culvert beneath the new road.

In the short to medium term the road and sewer networks will be constructed and the plots will not be developed. As the road is to be constructed at a higher level than the surrounding area, it is proposed to construct temporary land drainage at the toe of the road embankment. As plots are developed and ground levels are raised slightly to tie into the new road, this land drainage will be abandoned and replaced with the permanent plot drainage. Existing drainage from Jetparks 1 and 2 will be picked up by new pipe runs and manholes.

Once the development plots have been constructed, they will either drain into the new surface water drainage network in the road as described in Section 6.4 or directly into the watercourse. Stub connections will be provided throughout the new drainage network to allow for these future connections.

The Surface Water System has been designed for a 1 in 100 year storm event plus 40% allowance for climate change using Micro Drainage.

6.2. Road drainage

The Road Surface Water System is modelled as 4 separate networks (**Appendix 2**) that discharge into the nearby watercourses. Each network will contain interceptors to meet PPG3 requirements. The interceptors are to be installed on each of the outfall pipes and are to be located in the verge/embankment area within the site boundary, allowing easier maintenance access with minimum disturbance to traffic. Refer to **Appendix 3** for the Catchment Areas Plan.

Network N1 drains the southwest section of the proposed Spine Road, running from Outwood Ln West roundabout to Culvert 1. The catchment area is 0.29ha and is drained by a conventional gully and carrier drain system. It is proposed that Network N1 will discharge to the proposed Westerly Watercourse Culvert 1, through the interceptor located on the 150 dia. pipe, outgoing from Hydrobrake Chamber (MHS3) with a design head of 1.4m and max allowable discharge rate of 5l/s. The proposed Culvert 1 will be approx. 52m long, 1200mm diameter concrete culvert. Attenuation is to be provided in oversized pipes (900dia & 1050dia) for the runoff from the highway corridor.

Network N2 drains a catchment area of approx. 0.27ha by a gully system and discharges through the interceptor located on the 150 dia. pipe, outgoing from Hydrobrake Chamber (MHS7) with design head 0.95m and max allowable discharge rate of 5l/s. The flow is proposed to discharge into the existing Westerly Watercourse adjacent to Jetparks 1 via a new precast concrete headwall. The existing 900mm pipe culvert crossing Thorley Lane and headwall will be retained. Attenuation is provided in oversized pipes (750dia & 1200 dia).

Network N3 drains the catchment area of approx. 3.95ha by a gully system and combined kerb/drainage units (Charcon Hydrokerbs) with outlet units. Flow is proposed to discharge through the interceptor located on the 300dia pipe, outgoing from Hydrobrake Chamber (MHS12) with design head of 2.15m. The discharge point is on proposed Culvert 2 located on the Easterly Watercourse. Culvert 2 is a twin 1050dia concrete pipe culvert approx. 50m long. Max allowable discharge rate is 24.50l/s. Attenuation is provided in oversized pipes (1800dia). To prevent flooding in the network during the 1 in 100 + 40% storm event, an overflow pipe at MHS8 will take excess flows from network 3 to the realigned westerly watercourse which has 111m³ of spare capacity during peak flow conditions.

Network N4 drains the catchment area of approx. 7.447ha by Charcon Hydrokerbs with outlet units. Flow is proposed to discharge through 300dia pipe outgoing from Hydrobrake Chamber (MHS22) with design head of 2.1m

and max allowable discharge rate of 37.24/s. The discharge point is on proposed Culvert 2 located on the Easterly Watercourse. Culvert 2 is a twin 1050dia concrete culvert approx. 50m in length. Attenuation is provided in oversized pipes (1500dia). The 1 in 100 + 40% climate change storm event produced 28m³ of flooding which can be stored on the carriageway – the area of ponding below 69.05m (the lowest kerb top level) is 33.5m³.

Existing surface water drainage draining Jetparks 1 will temporarily be picked up by a new pipe and two new manholes constructed on the existing sewer. This will discharge directly into the Westerly Watercourse via a petrol interceptor. Existing surface water drainage draining Jetparks 2 will temporarily be picked up by a new pipe run and three new manholes and will discharge directly into new manhole MHS15 of the new surface water network within the road.

6.3. Toe Drainage /Land Drainage – Temporary Solution

Separate temporary systems have been provided to drain the proposed road embankments and existing adjacent land.

Proposed Toe Drainage is modelled as 11 separate systems discharging directly into the local watercourses. (**Appendix 5**). Proposed Toe Drain is a 150dia filter pipe laid along the road embankments within the 450mm wide trench. Trench is to be backfilled with sand and gravel with approx. cover of 500mm – 1000mm (Figure 5).

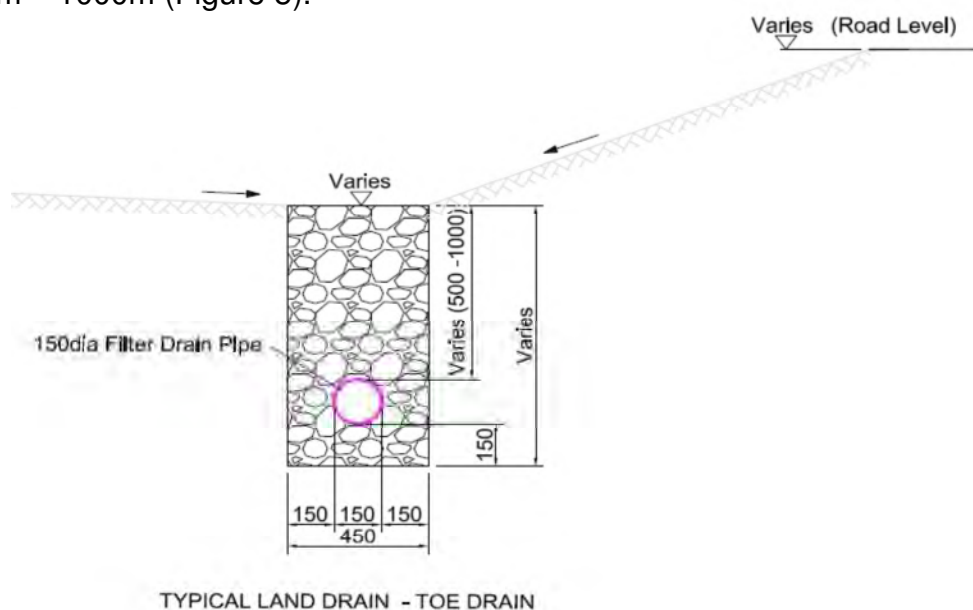


Figure 5 – Land Drain/Toe Drain - Section

Proposed Toe / Land drainage is a temporary solution to drain the land within the catchment areas (**Appendix 5**) Filter pipes are to be removed during the construction stage of the plot development, and to be replaced with the Surface Water Sewer System.

6.4. Surface Water Drainage

Developed land adjacent to the Spine Road will be drained by the numbers of pipe networks, gully connections and kerb drains. Flows from the internal roads and hard standing areas are proposed to be discharged directly into the Easterly and Westerly Watercourses (**Appendix 4**).

Future developed areas within the catchment boundary will require the provision of attenuation storage and oil interceptors within the development plot.

The surface water drainage system is designed to allow for flows from the development plots (where they would not drain directly to watercourse) at a maximum rate of 5 litres/second /hectare.

Catchment area **A1** covers approx. 4.85ha. Flows are proposed to discharge directly into the diverted length of the Westerly Watercourse, between proposed Culvert 1 and the existing 900dia Culvert under Thorley Lane. Max allowable discharge is 24.0 l/s.

Catchment area **A2** covers approx. 0.83ha. Flows are proposed to discharge directly into the Easterly Watercourse via a 225dia pipe and precast concrete headwall. Max allowable discharge is 5.00l/s.

Catchment area **A3** covers approx. 0.825ha. Flows are proposed to be discharged into the SW Sewer located within the road, via pumping station at a rate of 5.00/s and 225dia pipe connected to MHS10.

Catchment area **A4** covers approx. 0.42 ha. Flows are proposed to discharge into the SW Sewer located within the road, via connection pipe into the manhole MHS15. Max allowable discharge rate is 5.00l/s.

Catchment area **A5** covers approx. 1.90ha. Flows are proposed to discharge into the SW Sewer located within the road via a pumping station with at a rate of 9.49l/s through a 225dia pipe connected to Hydrobrake Chamber MHS12.

Catchment area **A6** covers approx. 0.80ha. Flows are proposed to discharge directly into the Easterly Watercourse via a 225dia pipe and precast concrete headwall. Max allowable discharge rate is 5.00l/s.

Catchment area **A7** covers approx. 2.36ha. Flows are proposed to discharge into the SW Sewer via a 225dia pipe connected to manhole MHS21. Max allowable discharge rate 11.78 l/s.

Catchment area **A8** covers approx. 0.80ha. Flows are proposed to be discharged into SW Sewer located within the road, via a 225dia pipe connected to manhole MHS45. Max allowable discharge rate 5.00l/s.

Catchment area **A9** covers approx. 2.38ha. Flows are proposed to be discharged into the SW Sewer located within the road, via a 225dia pipe connected to manhole MHS19. Max allowable discharge rate 11.9 l/s.

Catchment area **A10** covers approx. 1.20ha. Flows are proposed to be discharged into the SW Sewer located within the road, via a 225dia pipe connected to manhole MHS19. Max allowable flow rate 6.0l/s.

Catchment area **A11** covers approx. 4.24ha. Flows are proposed to discharge directly into the Westerly Watercourse via a 225dia pipe and precast concrete headwall. Max allowable flow rate 21.19l/s.

7. Proposed Foul Water Drainage Strategy

Land adjacent to the spine road will ultimately be occupied by a series of plots comprising offices and hotels as indicated in the latest masterplan.

The masterplan is subject to change as development plots are sold and the arrangement shown is the best data currently available. As plots are developed the masterplan will develop accordingly and consequently it is not possible to fix specific pipe routes within the developable area at this stage. Therefore the foul network has been designed to be as flexible as possible given the site constraints.

A foul water drainage network has been designed to convey the peak flows of foul water from these developments – see the foul water loading schedule in (**Appendix 7**). It is proposed to connect the network onto the existing United Utilities Public Combined Sewer onto Manhole F12 in Bailey Lane. This has been discussed with UU and agreed in principle. Correspondence from UU is included in (**Appendix 9**).

Foul flows will be routed via a main gravity sewer in the new road corridor with stubs for connections to future developments. The proposed foul water sewer is to be composed of 150, 225 & 300mm diameter pipes (**Appendix 6**).

At this stage it is proposed to construct the main foul ‘spine’ within the proposed road corridor. Foul sewer stubs will be constructed for future connections to avoid excavating in the road corridor in the future. The development plots and associated foul carrier pipes will be constructed at a later date to suit the plot developments.

The intention is that the new foul network would be adopted by United Utilities under a Section 104 Agreement (Water Industry Act) once developments are connected.

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Appendix 1

Location Plan

PROJECT

Airport City North
Spine Road 2015

CLIENT

Airport City Manchester
曼彻斯特空港城

CONSULTANT

AECOM Manchester
Bridgewater House, Whitworth Street,
Manchester, M1 6LT
0161 907 3500 tel 0161 907 3599 fax
www.aecom.com

CONSULTANTS

Street Lighting Designer
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Manchester, M9 6AB
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KEY

- EXISTING WATERCOURSE
- WATERCOURSE TO BE ABANDONED
- PROPOSED WATERCOURSE DIVERSION

ISSUE/REVISION

NO	DATE	DESCRIPTION
0.0	xx/xx/15	FOR INFORMATION

PROJECT NUMBER

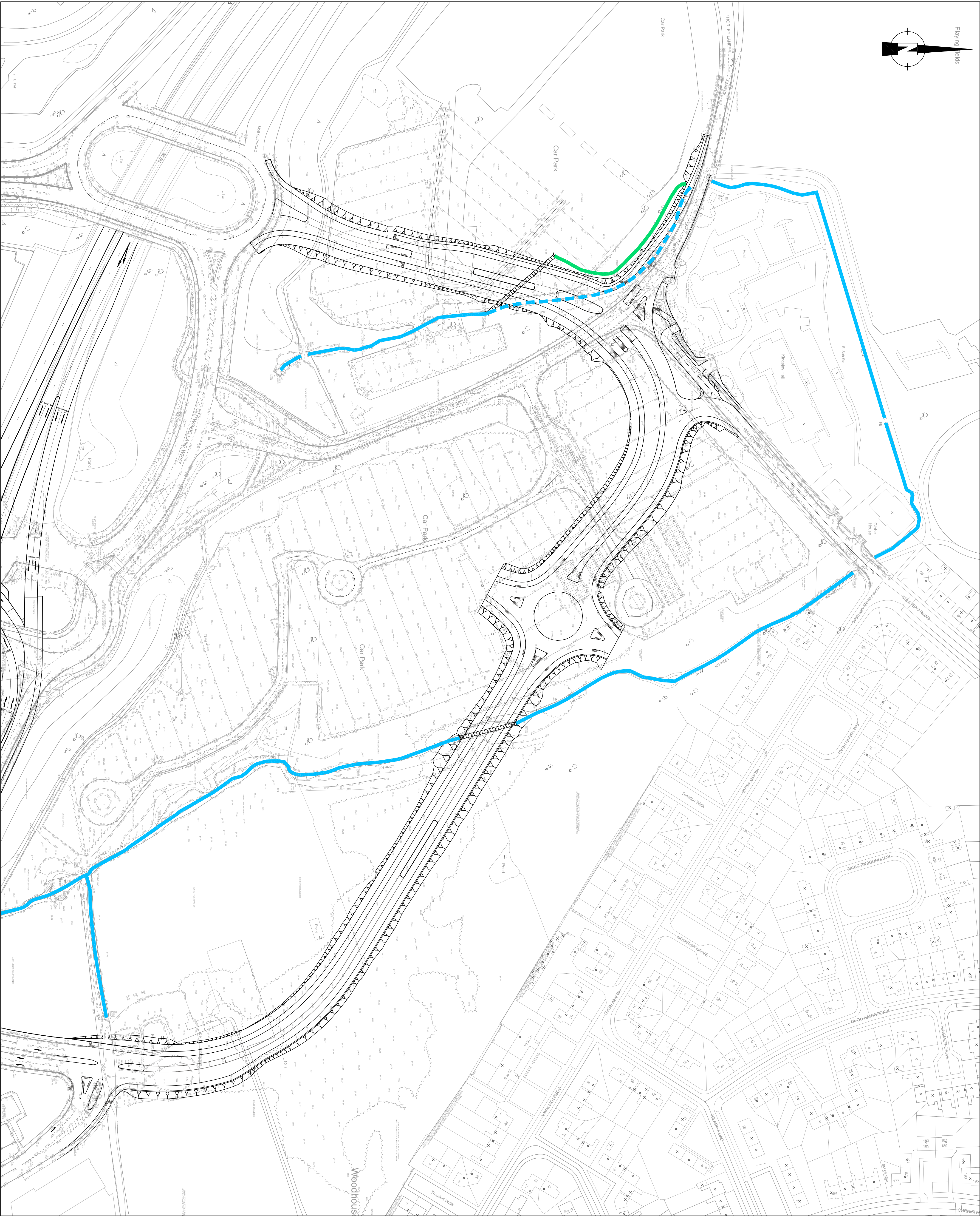
47070180

SHEET TITLE

Watercourse Location Plan

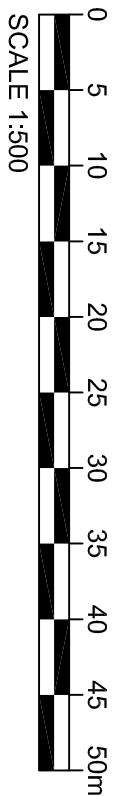
SHEET NUMBER

???



Appendix 2

Surface Water Networks



Airport City North
Link Road 2016

Link Road 2016

CLIENT

Airport City Manchester

曼彻斯特空港城

CONSULTANT

AECOM Manchester
Bridgewater House, Whitworth Street,
Manchester, M1 6LT
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Manchester M4 3F

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Design of Reinforced Earth Embankments

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Birchwood

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NOTES

1. ALL PIPE DIAMETERS ARE IN MILLIMETRES AND ALL LEVELS ARE IN METRES UNLESS OTHERWISE STATED.
2. REFER TO DRAWING NO. 4/7070180, ACSNR_2002-2004 FOR SURFACE WATER DRAINAGE LONG-SECTIONS.
3. REFER TO DRAWING NO. 4/7070180, ACSNR_2005 FOR SURFACE WATER MANHOLE SCHEDULE.
4. REFER TO DRAWING NO. 4/7070180, ACSNR_2006 & 2007 FOR PROPOSED CULVERT AND HEADWALL DETAILS.

KEY

- | | |
|---|----------------------|
| | SURFACE WATER NETWO |
|  | SURFACE WATER NETWO |
|  | SURFACE WATER NETWO |
|  | SURFACE WATER NETWO |
|  | EXISTING WATERCOURSE |

ISSUE/REVISION

R1	XX/12/15	FOR APPROVAL
P3	13/11/15	FOR PLANNING
P2	10/06/15	FOR INFORMATION
P1	11/05/15	FOR INFORMATION
IR	DATE	DESCRIPTION

PROJECT NUMBER

47070180

SHEET TITLE

Sheet 1

SHEET NUMBER

47070180_ACNSR_2010