PLANNING AND BUILDING CONTROL
21 JUN 2012

FLOOD RISK ASSESSMENT FOR LAND OFF THORLEY GREEN, OFF THORLEY LANE, WOODHOUSE PARK, WYTHENSHAWE

FOR

MANCHESTER AIRPORT DEVELOPMENTS LTD.
OLYMPIC HOUSE,
MANCHESTER,
M90 1QX

Shepherd Gilmour Infrastructure Ltd.
Castlefield House
29 Ellesmere Street
Manchester
M15 4LZ

C853/SBS/EAJ/jt/S0153
April 2009

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

Report Title :	Thorley Green, Land off Thorley Lane, Woodhouse Park, Wythenshawe Flood Risk Assessment
Client :	Manchester Airport Developments Ltd.
Report Status:	Approval.
Date of Issue:	14th April 2009

Prepared by:

Emyr Jones B.Eng (Hons)

Checked & Approved

Stuart. B. Simpson

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

Contents

1.0 Introduction

2.0 Site Description & Background

3.0 Proposed Development

4.0 External Flood Sources

5.0 Proposed Drainage

6.0 Conclusions and Recommendations

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

Figures

Figure 1 - Site Location Map

Figure 2 - Hydrological Features Map

Appendix

Appendix A Original Environment Agency Response

Appendix B Proposed Development Plan

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

1.0 Introduction

In April 2009 Shepherd Gilmour Infrastructure Ltd (SGI) were commissioned by Manchester Airport Development Ltd. to undertake a Flood Risk Assessment for the site off Thorley Lane, close to Manchester Airport (see Figure 1 for site location).

This Flood Risk Assessment has been prepared in accordance with Planning Policy 25.

1.1 History

This site has been subject to a previously submitted Flood Risk Assessment which was prepared by Enviros Consulting Ltd. in April 2008 and references will be made to the already presented Flood Risk Assessment.

Enviros consulted with the Environment Agency in preparing their report and a copy of the consultation letter received by Enviros from the Environment Agency is included in **Appendix A.** Additionally, SGI contacted Mrs Sandra Welding, the Environment Agency's External Officer, and Mr David Astbury, the Environment Agency's Development Control Officer for the area and the form and content of this report was discussed and Mr Astbury confirmed that he could see no material reasons why the Environment Agency would object to the current application.

2.0 Site Description & Background

The site is centred on National Grid Reference (NGR) SJ820858 and is located to the North of Manchester Airport in the Wythenshawe area of Manchester. The site's location is shown on Figure 1. Shepherd Gilmour Infrastructure Ltd. carried a walkover survey on the site on Thursday 16th April and the onsite culvert and profile of the watercourses were measured during that site visit.

The site at present is divided into two car parks and covers an area of approximately 21.3 ha. Both sites are accessed from Thorley Lane. Currently the sites are used as a car park for Manchester Airport. It has not been possible to establish the exact date at which the current use commenced; however anecdotal evidence suggests that the car park, as presented onsite, has been in operation for more than ten years. The current car park is surfaced with a permeable surface of unbound loose stone, which is utilised for both car parking bays and running surface for the aisleways. The site has an

element of landscaping circa 20% of the total site area which is used as a buffer zone.

A detailed topographical survey of the site has been passed to SGI. by BDP, which was commissioned for the previous Landowners. However, level data has been taken from Survey Operations drawing dated April 2000 which was included in Enviros Consulting Ltd.'s Flood Risk Assessment.

In general both surveys show that the site levels vary between 68m AOD and 71.5m AOD. The crossfalls across the site are generally minimal and the lowest level of the site occurs adjacent to Baguley Brook.

No site investigation has been carried out by the sites current Owners.

2.1 Existing Onsite Drainage

Evidence gained from the site walkover indicates that there is no formal drainage system serving the current car park and indeed investigations with Manchester Airport, who currently operate the site, reinforces these findings.

The surface water appears to infiltrate through the surfacing. During times of extreme rainfall, surface ponding has been evident in lower areas of the site.

2.2 Onsite Watercourses

There are two watercourses flowing alongside the West and Easterly boundaries a site off Bailey Lane, Manchester. This FRA has been prepared to support an Application to continue the existing use of the site as a car park servicing the nearby Manchester airport. The site lies within flood zone 1, however the risk presented from these watercourses is required to be assessed for inclusion within this Flood Risk Assessment which will accompany the Planning Application for the site.

The following approach has been taken in assessing the risk posed to the site from both watercourses. The historic flooding from the watercourses has been researched and is discussed later on in this report. An assessment of the likelihood of the watercourses flooding at the site location has been carried out. The design flows for each watercourse has been calculated using the Flood Estimation Handbook (FEH) ReFH approach, and these have been compared to a representative cross section for each watercourse to determine channel capacity in relation to the expected peak flows.

This simplistic approach has been applied to highlight the risk presented to the site from each watercourse and where further work is required as appropriate.

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

Hydrology Analysis

The catchments for both watercourses are small and with shallow gradient across the site. The site is located in the centre of a heavily urbanised area. The catchment areas have been calculated with reference to the Ordnance Survey 1:25k digital maps and the Flood Estimation Handbook (FEH) CD-Rom version 2.

The methods described in the FEH have been applied to calculate expected peak flows on both watercourses running alongside the site. A description of the catchment delineation and descriptors is provided for both watercourses below.

Easterly Watercourse

The watercourse flowing along the eastern boundary of the site is known as Baguley Brook. This flows from South to North and drains into Painswick Park Lake to the North of the site. The OS grid reference for the Eastern watercourse and the downstream limit of the site is SJ 819 860. The watercourse catchment is well delineated within the FEH CD-Rom and hence the catchment descriptors were not altered. The catchment area is calculated as 0.89km^2. These are presented below in **Table 1**.

Table 1

Easterly Watercourse Catchment Descriptors, Taken From FEH Version 2.0

Catchment Descriptor	Value	Catchment Descriptor	Value
FARL	1	RMED-1H	10.6
PROPWET	0.52	RMED-1D	31.5
ALTBAR	73	RMED-2D	41.7
ASPBAR	342	**SAAR**	829
ASPVAR	0.65	SAAR4170	802
BFIHOST	0.343	SPRHOST	40.82
DPLBAR	1.27	URBCONC	0
DPSBAR	11	**URBEXT1990**	0.2367
LDP	2.66	URBLOC	0

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

Table 2 provides the peak flows that were generated using the revitalised FEH method (ReFH).

Table 2

Peak Flows Generated for the Easterly Watercourse

Return Period	Peak Flow (m^3/s)
5 yr	1.1
10 yr	1.3
25yr	1.6
50yr	1.9
100yr	2.3
100yr + 20% increase for climate change	2.76

Westerly Watercourse

The OS grid reference for the Westerly watercourse at the downstream limit of the site is SJ 817 859. The watercourse catchment is not clearly delineated within the FEH CD-Rom and hence the catchment descriptor catchment area was altered to represent an appropriate catchment area, with reference to the Ordnance Survey maps of the study area. The catchment area was calculated as $0.52km^2$. These catchment descriptors are presented below in **Table 3**.

Table 3

Westerly Watercourse Catchment Descriptors, Taken From FEH Version 2.0

Catchment Descriptor	Value	Catchment Descriptor	Value
FARL	1	RMED-1H	10.6
PROPWET	0.52	RMED-1D	31.5
ALTBAR	76	RMED-2D	41.8
ASPBAR	336	**SAAR**	829
ASPVAR	0.76	SAAR4170	801
BFIHOST	0.337	SPRHOST	40.6
DPLBAR	0.74	URBCONC	0
DPSBAR	9	**URBEXT1990**	0.2225
LDP	1.67	URBLOC	0

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

Table 2 4 provides the peak flows that were generated using the revitalised FEH method (ReFH).

Table 4

Peak Flows Generated for the Westerly Watercourse

Return Period	Peak Flow (m^3/s)
5 yr	0.7
10 yr	0.9
25yr	1.1
50yr	1.3
100yr	1.6
100yr + 20% increase for climate change	1.92

Any uncertainty in modelling techniques should be addressed along with consideration of extreme events. This is because modelling errors (whatever technique is used) become proportionally larger when applied to the small catchment: for example, local drainage (road, drains, field drains) may significantly alter the catchment area. Hence an analysis of the sensitivity of the channel carrying capacity to variations in input flows has been carried out for this study.

Channel Capacity

Cross section information has been collected from the previous Flood Risk Assessment submitted by Enviros for the length of both watercourses alongside the site and was presented in the topographical survey covering the site. In both cases a representative cross section has been chosen and the capacity of this cross section has been calculated with reference to the design flows provided in the previous section of this note. This is a simplistic approach and does not take into account the impacts of hydraulic structures, attenuation of flows and other point inflows but is intended to provide an indication of the likelihood of the channel presenting a risk of flooding to the application site.

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

The designated cross sectional data for both channels is summarised below in **Table 5**.

Table 5

Indicative Channel Section Dimensions

Parameter	Eastern watercourse (xs 9 from survey)	Western watercourse (xs 10 from survey)
Area $A=(b+my)y$	2.62	2.07
Wetted Perimeter = P	4.06	6.81
Hydraulic Radius $R=A/P$	0.65	0.30
Slope across site = S	0.0038	0.0031

The factors provided in **Table 5** above are used to calculate flow using the Manning's equation provided below:

Flow $Q=KS^{1/2}$

Where $K=\frac{AR^{2/3}}{n}$ = conveyance

b = bottom width
m = side slope
y = depth
n = Manning's roughness
S = channel gradient – taken from upstream channel cross section invert through to downstream channel invert for both

A trapezoidal typical cross section form has been assumed, which fits well with the uniform channel form indicated by the topographical survey. A value of manning's N value of 0.035 has been assumed for both watercourses alongside the site, representing clean, straight channels with some stones and weeds (Chow, 1959).

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

Using the above information the results have been calculated and are presented in **Table 6**.

Table 6

Summary Capacity Results

Watercourse	Section Capacity (m^3/s)	Events in channel	Events exceeding channel capacity
Eastern watercourse (Baguley Brook)	3.02	All events up to and including 1 in 100 yr + CC	None modelled
Western watercourse	1.49	Events up to and including 1 in 50 year	Events in excess of the 1 in 50 year return period event

Summary

A simplistic approach has been taken in assessing the capacity of two watercourses bordering the proposed Burford car park site near Manchester Airport. No data is available for calibration of the hydrological calculations or verification of the catchment area outlines. The channel capacity calculations do not take relevant hydraulic controls along the reaches into account. However, the approach taken does provide an indication as to the likelihood of flooding to the site from these watercourses and its likely impact.

This approach has demonstrated that Baguley Brook (the Eastern watercourse) provides more than sufficient capacity where it borders the site to carry peak flows from events up to and including the anticipated 1 in 100 year + CC rainfall event. The indicative cross section used to assess channel capacity demonstrated a capacity of up to $3.02m^3/s$. The hydrological analysis showed that a peak flow of $2.3m^3/s$ may be expected on the watercourse during the 1 in 100 year event. This demonstrates that there is significant freeboard between peak flows anticipated in channel and channel capacity.

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

The smaller watercourse to the West of the site provides sufficient capacity to carry peak flows from events up to and including the 1 in 50 year flood event on site. However, for events in excess of this return period it is possible that some out of bank flow may occur. The peak flows for this watercourse are only insignificant (1.6m^3/s for the 1 in 100 year event) and as a result any excess water would only be minimal and would be of little serious consequence to the running of the site. However, it is noted that the catchment delineation for this watercourse is poor in the FEH CD-Rom and it is likely that actual flow would be attenuated by the motorway attenuation ponds located to the south of the site.

2.3 Sewer Network

United Utilities network plans have not been obtained for the site, however making reference to Clause 2.2.4 of Enviros Group's previously submitted Flood Risk Assessment there appears to be no foul or storm drains or main water pipes under their ownership either crossing or passing adjacent to the site.

3.0 Proposed Development

In **Appendix B** we have included drawings showing the existing and proposed, Eastern and Western car park prepared by Manchester Airport Developments Ltd. It is proposed to continue the use of the site as they exist at present. The purpose of this FRA is to support a planning application to formalise the current use of the site. There are no proposals to carry out any resurfacing works as part of this application

4.0 External Flood Sources

A review of the following likely external flood sources have been carried out.

4.1 Tidal

Due to the distance to the coast tidal flooding is not considered a risk.

4.2 Fluvial

Baguley Brook and the Western site channel are both sources of potential flooding and have been considered in section 2.2 of this report. The risk posed by these watercourses has been classed as negligible.

4.3 Offsite Drainage

Discussions with United Utilities suggest that there is no history of offsite flooding of any of their sewers. However, it is recognised that the adopted sewer systems are designed to accommodate 1 in 30 year storm below ground with a potential of overland flooding form these sewers during the 1 in 100 year storm.

Due to the depth of landscaping between the site and the nearby highway network, any overland flow generated during the 1 in 100 year storm from the adopted system is assessed as having a negligible flood risk impact on the site.

5.0 Proposed Drainage

As noted previously the existing regime of drainage for the site will continue as present. All surface water falling on the site will continue to permeate through the existing surfacing into the underlying strata.

6.0 Conclusions and Recommendations

(1) From the Environment Agency flood maps it can be seen the site is located within Flood Zone 1.

(2) The development as proposed will not increase the surface water runoff from the site from the current rate of runoff.

(3) An assessment has been made of surrounding potential sources of flooding and the residual risk has been judged as being negligible.

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

APPENDIX A

Mr Daniel Watson
Regus House (1010)
Cambourne
Cambridge
CB23 6DP

Our ref: FP/2007/100057/01-L01
Your ref: SO19987

Date: 15 March 2007

Dear Mr Watson

PUBLIC REGISTER AND ENVIRONMENTAL INFORMATION REQUEST
THORLEY ROAD DATA REQUEST

Please find listed below the following information regarding the above site.

1. There are existing flooding problems associated with this site and any proposals to redevelop the site will have to be accompanied by a flood risk assessment (FRA) in accordance with PPS 25. The Environment Agency will object to any planning application without a FRA.

The Environment Agency is aware of the watercourses but they are classified as ordinary watercourses and we not carry out maintenance works on them. We have no information on culverts within the sites. The culvert under Baileys Lane is inadequate.

The watercourse on the eastern boundary of the site, Baguley Brook, rises within the airport. It will be necessary to investigate the airport drainage to determine which parts of the airport drain to Baguley Brook.

The property lies within an area where the chance of flooding from rivers in any one year is considered to be less than 0.1% (1 in 1000). This is based on current Flood Maps which are purely indicative and do not take into account any defences or blockages within nearby watercourses. We have no record of flooding at this location, but the absence of recorded flooding does not mean that the property has never been flooded, nor that flooding may not occur in the future. Based on the information currently available to the Environment Agency, we consider the risk of flooding at this location to be LOW.

Cont'd

Environment Agency
Appleton House, 430 Birchwood Boulevard, Birchwood, Warrington, Cheshire, WA3 7WD.
Customer services line: 08708 506 506
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

The watercourses in the area are non-main and our Floor Risk Mapping department (FRM) has no other data concerning this request.

The invasive species, Japanese knotweed (Fallopia japonica), has been recorded along the banks of the watercourses onsite. The spread of this alien species is prohibited under the Wildlife & Countryside Act (1981). Extended phase 1 habitat surveys should be carried out to ascertain the extent of the Japanese knotweed onsite, to ensure any works comply with current wildlife and waste legislation. Approval for herbicide applications to eradicate invasive species, such as Japanese knotweed, must be obtained from the Agency prior to use near a watercourse/waterbody.

2. The Environment Agency's prior written consent in accordance with the provisions of the Land Drainage Act 1991 will be required for any works affecting the watercourses or culverts. Any proposals should be discussed with David Astbury of the Environment Agency's Development Control Section. (Tel 01925 543412) before an application is submitted. Please note that Baguley Brook has been increased in size to provide on line surface water attenuation for the Woodhouse Park development. Any works affecting this watercourse will have to provide the same amount of attenuation.

3. We believe that the pond in Painswick Park was built in the 1950's as part of the development of the airport to provide a buffer to flows entering the culvert downstream. We have no further information on the pond. The source area will be the same as Baguley Brook upstream of Baileys Lane plus the catchment area of the tributary on Painswick Park.

Painswick Park fishing lake has suffered historically from poor water quality inflows. There is anecdotal evidence to suggest that this shallow lake was capped at some stage to prevent pollution from the contaminants in the sediment. Consequently, we have been actively involved in a fishery enhancement project for the site. This is in partnership with the local angling group (Woodhouse Park Anglers), Manchester Airport (Dr. Tim Walmsley, Environment Manager), and Manchester City Council.

We do not wish to see water quality standards in this lake exacerbated. From an ecology perspective, we would not support proposals to use Painswick Park Lake as a direct receptor for runoff. A separate surface water attenuation site should be incorporated into the scheme.

Under the terms of the Salmon & Freshwater Fisheries Act (1975), it is an offence to cause or knowingly to permit to flow, or put, into any waters containing fish, any liquid or solid matter to such an extent as to cause the water to be poisonous or injurious to fish or the spawning grounds, spawn or food of fish.

4. The maximum rate of discharge into the watercourses will be Qbar rural calculated from the Institute of Hydrology Report 124 . Flows upto Q100 20% should be attenuated on site. Although on-line attenuation was provided for the Woodhouse Park, the Environment Agency does not favour this type of attenuation as the watercourses can suffer from siltation and blockages which reduce the storage capacity.

end

The information provided is based on that currently available to the Agency. The Agency and its officers accept no liability whatsoever for any loss or damage arising from the interpretation or use of the information.

Please be advised that in line with new Re-use of Public Sector Information Regulations, we have introduced a single integrated set of charges for all commercial re-use of our data and information. Re-use means more than what you are entitled to do under the Freedom of Information Act/Environmental Information Regulations (FoI) which in general terms is restricted to giving you the right to access and read information. For commercial requests received on or after 1 April 2007, in addition to the current cost recovery charge we apply under FoI, there will be a £10 re-use charge. This will give you extra rights to use our information commercially. These will be set out in our Standard Notice (Commercial) available from 1 April 2007.

If you have any further queries please contact myself on the telephone number below.

Yours sincerely

Mrs Sandra Welding
External Relations Officer

Direct dial 01925 543347
Direct fax 01925 852260
Direct e-mail weldis.Warrington1.NW@environment-agency.gov.uk

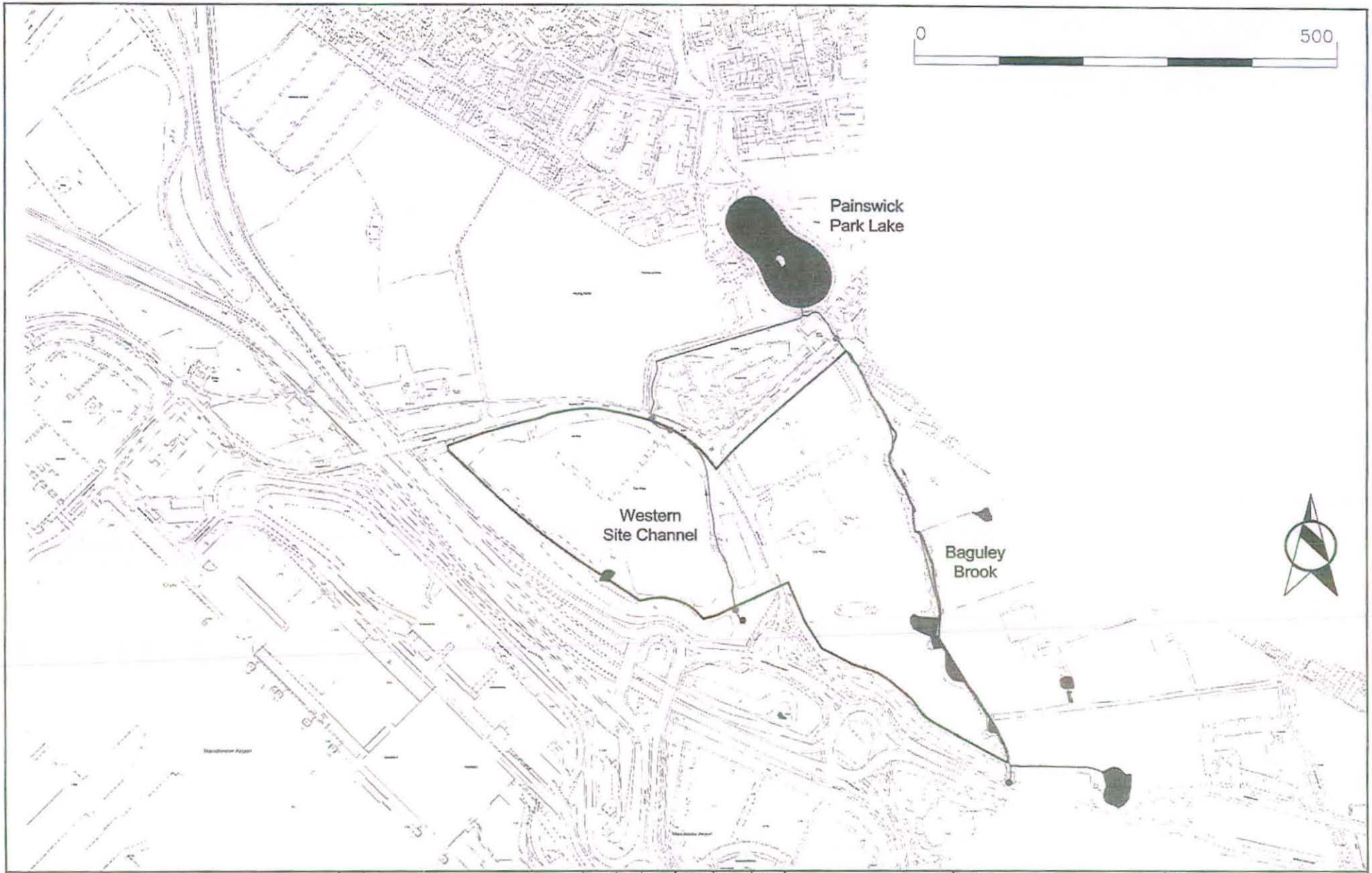
end

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

APPENDIX B

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

FIGURE 1



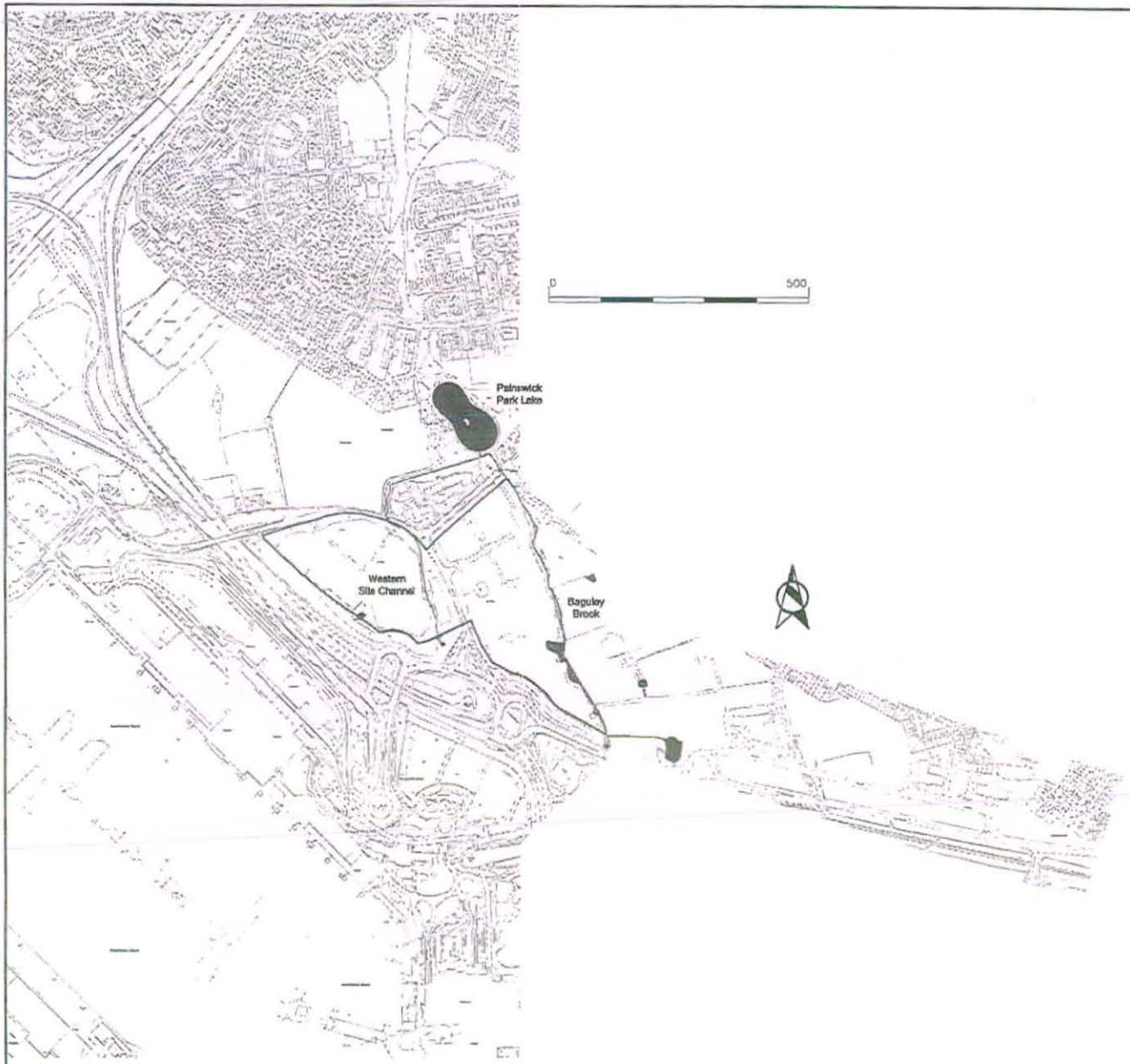
REV	DESCRIPTION	DRAWN	DETAILS	DATE	Dwg STATUS	CHECKED BY	DATE

SHEPHERD • GILMOUR
Infrastructure Limited
Castlefield House, 39 Dickinson Street, Manchester M1 4LZ.
Phone: 0161 832 7002. Fax: 0161 832 1543.
E-mail: sg@shepherd-gilmour.co.uk
Web: www.shepherd-gilmour.co.uk

JOB TITLE: THORLEY GREEN
CLIENT: MADL - MANCHESTER AIRPORT DEVELOPMENTS LTD
DRAWING TITLE: THORLEY GREEN FLOOD RISK ASSESSMENT
SITE LOCATION PLAN
SCALE: AS SHOWN
DRAWN BY: SWH
DATE: 08/04/2009
DRAWING No: C853/Figure 1

FIGURE 2

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

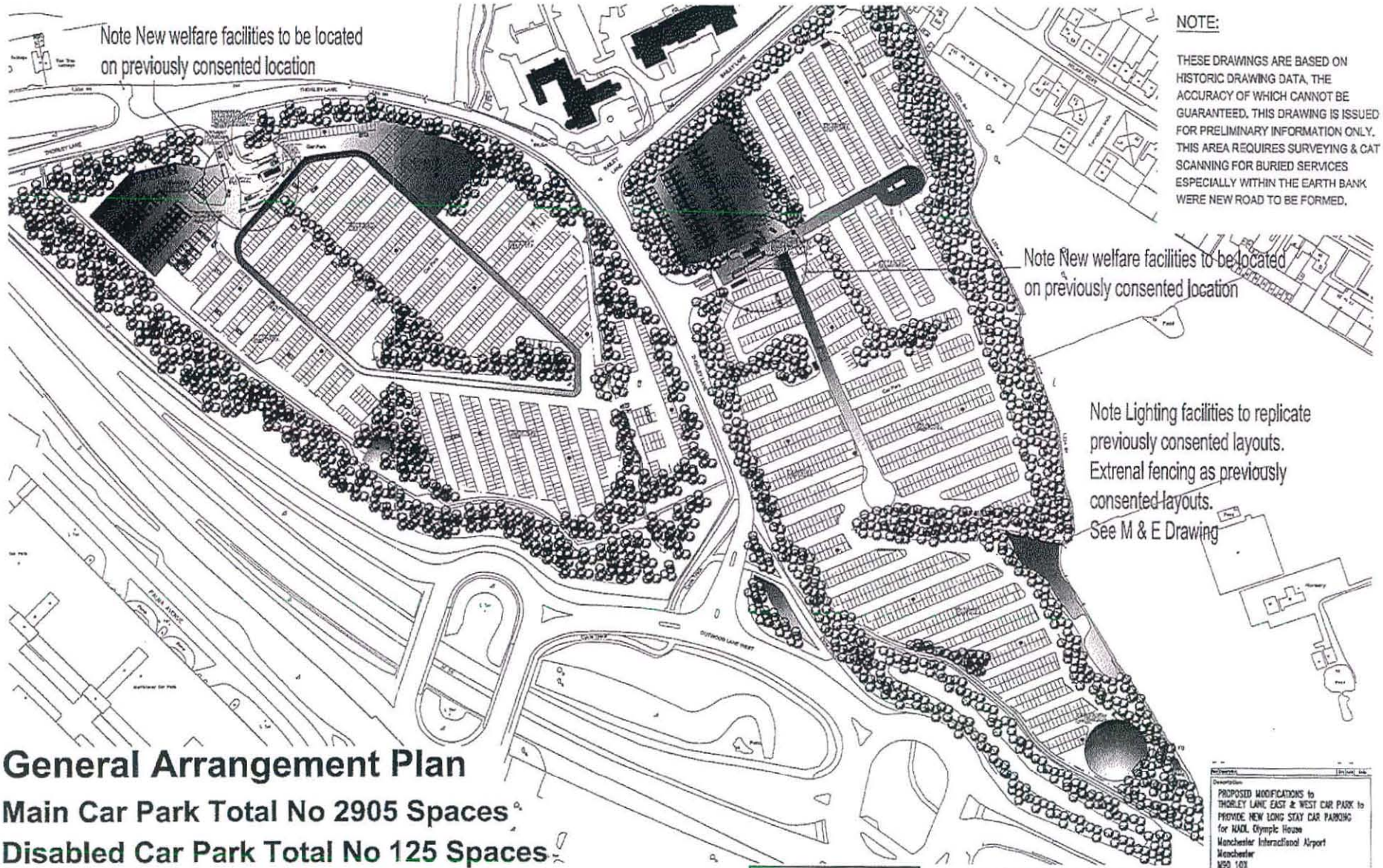


REV	DESCRIPTION	DRAWN	INITIALS	DATE	Dwg STATUS	CHECKED BY	DATE

SHEPHERD • GILMOUR
Infrastructure Limited
Castlefield House, 29 Ellesmere Street, Manchester M15 4LZ.
Phone: 0161 832 7802. Fax: 0161 832 1540.
E-mail: sg@shepherd-gilmour.co.uk
Web: www.shepherd-gilmour.co.uk

JOB TITLE: THORLEY GREEN
CLIENT: MADL - MANCHESTER AIRPORT DEVELOPMENTS LTD
DRAWING TITLE: THORLEY GREEN FLOOD RISK ASSESSMENT
SITE LOCATION PLAN

SCALE	ORIGINAL SIZE A[1]	DRAWN BY	DATE	DRAWING No	REVISION
AS SHOWN		SWN	08/04/2009	C853/Figure 2	-



General Arrangement Plan

Main Car Park Total No 2905 Spaces

Disabled Car Park Total No 125 Spaces

Proposed Planning Layout of Thorley Lane East & West Long Stay Car Parking

MADL
MANCHESTER AIRPORT DEVELOPMENTS
Olympic House, Manchester M90 1QX
Managing Director: JOHN ATKINS

R. & M. DEVELOPMENTS LTD.
AIRPORT SERVICES AND PLANT HIRE LTD.
55 CLIFTON STREET
MILES PLATTING
MANCHESTER
M40 8HP
Telephone: 0161 202 3930
Fax: 0161 202 2123
Email: office@randmdev.co.uk
Website: www.randmdev.co.uk

PROPOSED MODIFICATIONS to THORLEY LANE EAST & WEST CAR PARK to PROVIDE NEW LONG STAY CAR PARKING for MADL Olympic House
Manchester International Airport
Manchester
M90 1QX

Drawn By	Checked By	Authorised By
AMF		

Scale	Date
1:1000	16.04.09

Project	Planning	Drawing	Element	Number	Rev	D.T.
	R	&	M	002	–	