Heathrow Airport Grass Area 20 Stands – Storm Water Drainage Strategy

Document no: 1S589-XX-BD-864-000001
Revision: 2.0

Heathrow Airport Limited

Grass Area 20 Stands
1 October 2024

Heathrow Airport Grass Area 20 Stands – Storm Water Drainage Strategy

Client name:	Heathrow Airport Limited		
Project name:	Grass Area 20 Stands		
Client reference:	PRJ-001853	**Project no:**	PRJ-001853
Document no:	1S589-XX-BD-864-000001	**Project manager:**	Hannah Fraser
Revision:	2.0	**Prepared by:**	Andy Laine
Date:	1 October 2024	**File name:**	

Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
1.0	27/09/2024	For Information (A2)	A Laine	R Hodges	R Hodges	H Fraser
2.0	01/10/2024	Minor updates to Figures. Issue for Information (A2)	A Laine	R Hodges	R Hodges	H Fraser

Jacobs Solutions Inc.

2nd Floor, Cottons Centre
Cottons Lane
London SE1 2QG
United Kingdom

T +44 (0)203 980 2000
F *[Fax number]*
www.jacobs.com

© Copyright 2024 Jacobs Solutions Inc.. All rights reserved. The content and information contained in this document are the property of the Jacobs group of companies ("Jacobs Group"). Publication, distribution, or reproduction of this document in whole or in part without the written permission of Jacobs Group constitutes an infringement of copyright. Jacobs, the Jacobs logo, and all other Jacobs Group trademarks are the property of Jacobs Group.

NOTICE: This document has been prepared exclusively for the use and benefit of Jacobs Group client. Jacobs Group accepts no liability or responsibility for any use or reliance upon this document by any third party.

Contents

1. Introduction

The Grass Area 20 (GA20) Stands project at Heathrow Airport will create three new aircraft stands.

The location of the new GA20 Stands is shown in Figure 1 below:

Figure 1: Location of Proposed GA20 Stands

The purpose of this report is to outline the surface water drainage strategy for the project.

2. Existing Situation

2.1 Grass Area 20

GA20 is predominantly made up of two greenfield areas surrounded and interlaced with hardstanding surfaces and falls within Heathrow's Western Catchment Area. The existing drainage network within GA20 is part of a much larger system that drains in a southwesterly direction discharging into the Storm Water Outfall Tunnel (SWOT) and finally Clockhouse Lane Pit. The existing surface water drainage system serving GA20 and associated catchment areas is shown in Figure 2.

Figure 2: Existing GA20 Area with Surface Water Drainage and Associated Catchment Areas

3. Proposed Pavement Works

3.1 Grass Area 20 Stands

The construction of three new stands in GA20 will involve the removal of existing pavement and hardstandings and installation of new pavement as shown shaded in grey in Figure 3. The area shown highlighted in green is existing pavement that will be removed and reinstated as grass areas.

Figure 3: GA20 Stands Proposed New Pavement & Grass Areas

3.2 Change in Paved Areas

The creation of the GA20 stands will result in a net increase in paved (impermeable) area as summarised in Table 3 below.

Footprint	Existing Paved Area (m^2)	New Paved Area (m^2)	Net Increase (m^2)
GA20 Stands	22,450	35,254	12,804

Table 3: Change in Paved Areas

4. Drainage Design Standards and Supplementary Guidance

4.1 Heathrow Airport Drainage Design Standards

HAL Engineering Design Performance Standard (Ref. 00000-XX-PR-XXX-000524 Version 4.0) will used to inform the proposed surface water drainage design.

- Section 4.2 of the design standard provides general guidance with regards to Surface Water Drainage.
- Section 4.2.17 states that surface water drainage should be designed in accordance with the Wallingford Procedure and in accordance with BS EN 752 and other relevant approved industry standards.
- Section 4.2.18 states that the minimum return period for design on the airfield shall be a 1 in 5 year storm that prevents any encroachment and build-up of standing runoff on taxiways and runway pavements.
- Section 4.2.22 States that the overall drainage strategy shall take account of the impact of climate change on the surrounding environment.

HAL Public Health and Water Infrastructure Asset Standard (Ref. 10000-XX-AM-800-000003 Version 2.0) provides details regarding the provision of external drainage, surface water oil separators and other environmental considerations.

- Section 2.1.6.3.5 states no flooding of the storm water system for a 5 year storm return period (airside)
- Section 2.1.6.3.5 also states that the flood path of the surface water drainage system for a 1 in 100-year return period event plus 20% climate change allowance should be assessed such that the flow path has no impact to the operation of the airport, provides no risks to buildings and has no impact to third parties/neighbours.
- Section 2.1.6.3.5 states no flooding of the storm water system for a 5 year storm return
- period (airside)
- Section 2.1.6.3.15 states that surface water run-off from stands, taxiways and runways shall be collected positively i.e. by slot drainage.
- Section 2.1.6.4 of the asset standard provides information in relation to Surface Water Oil Separators.
- Section 2.1.6.4.3 states that interceptors shall be compliant with BE EN 858-1, BS EN 858-2 and PPG3 (PPG3 has been withdrawn).

4.2 Climate Change Allowance

An allowance will be made to account for the potential impact of climate change (i.e. increased rainfall intensity) over the design life of the proposed GA20 Stands in accordance with Environment Agency (EA) climate change guidance. The effects of climate change have to be mitigated to minimise the risk of surface water flooding in the future.

A climate change uplift factor, central estimate, of 20% for rainfall intensity has been applied for the initial hydraulic modelling undertaken by AtkinsRéalis. The final modelling will be in accordance with the EA's latest guidance.

5. Drainage Design Strategy

5.1 Design Methodology

5.1.1 GA20 Stands Drainage

The following key tasks have been completed to date in the development of the surface water drainage network for the GA20 stands:

- The existing site condition runoff rates (pre-development site conditions) have been determined. Existing paved area runoff rates have been calculated using the Modified Rational Method and Greenfield runoff rates have been calculated using the FEH statistical method for existing grassed areas.
- The existing and proposed paved/unpaved catchment areas have been reviewed and the attenuation storage requirements for the additional paved catchment areas have been assessed.
- A hydraulic model has been set up in MicroDrainage for the proposed surface water drainage system including attenuation storage in the form of oversized pipes and any associated flow controls.
- The pollution control requirements have been reviewed and measures have been proposed to ensure fuel/oil spillages are captured within the proposed stands and do not enter the main airport surface water drainage system.
- MicroDrainage hydraulic model simulations have been run to optimise the proposed surface water drainage system, including attenuation storage, to accommodate a 1 in 5yr storm design return period with no increase in peak discharge rates and flooding on site. The 1 in 100-year critical event has also been modelled to assess overland flow due to flooding. All simulated events included a climate change allowance of 20%.

5.1.2 Wider Drainage Network

AtkinsRéalis have previously undertaken a hydraulic modelling assessment using the airport surface water drainage model to investigate the impact of the proposed drainage network (see Section 5.1.1 for details of proposed drainage network) on the wider drainage network.

In summary the assessment in 2020 concluded:

- The proposed drainage network for GA20 Stands (see Section 5.2), including four flow control devices and existing pavements to be broken out (Stand 528 and Compensatory Pavement Breakout Areas) identified to alleviate any detrimental impact as a result of the proposed development, were simulated against 1 in 5-year and 1 in 100-year design storms with and without a 20% allowance for climate change.
- The 5-year modelling results indicate that the proposed drainage network will provide a reduction in flood volumes within the GA20 proposed development site and the wider catchment against baseline levels. However, minor increases in peak flows were predicted for flows from the SWOT to Clockhouse Lane Pit.
- The 100-year modelling results suggest that the proposed solution will have a detrimental impact on flood volumes at the proposed development site however, reduction in flood volumes were predicted within the wider catchment.

The hydraulic modelling undertaken by AtkinsRéalis in 2020 will be reviewed based on current standards and recent changes to the locations of compensatory redundant pavement breakout. The project will then respond to any changes in the conclusions of the updated modelling.

5.2 Summary of Proposed Surface Water Drainage

5.2.1 Surface Water Drainage Network

A new surface water drainage network will be provided to collect surface water runoff from the three new stands in GA20 and associated roads and taxiway tie-ins. See Figure 5.1 for an indicative schematic of the proposed surface water drainage system.

Surface water runoff will be collected by heavy duty slot drains at the head and back of the stands and the edges of the adjacent taxiways and will discharge via new carrier drains to the existing drainage network through Outfalls OU1, OU2 and OU3.

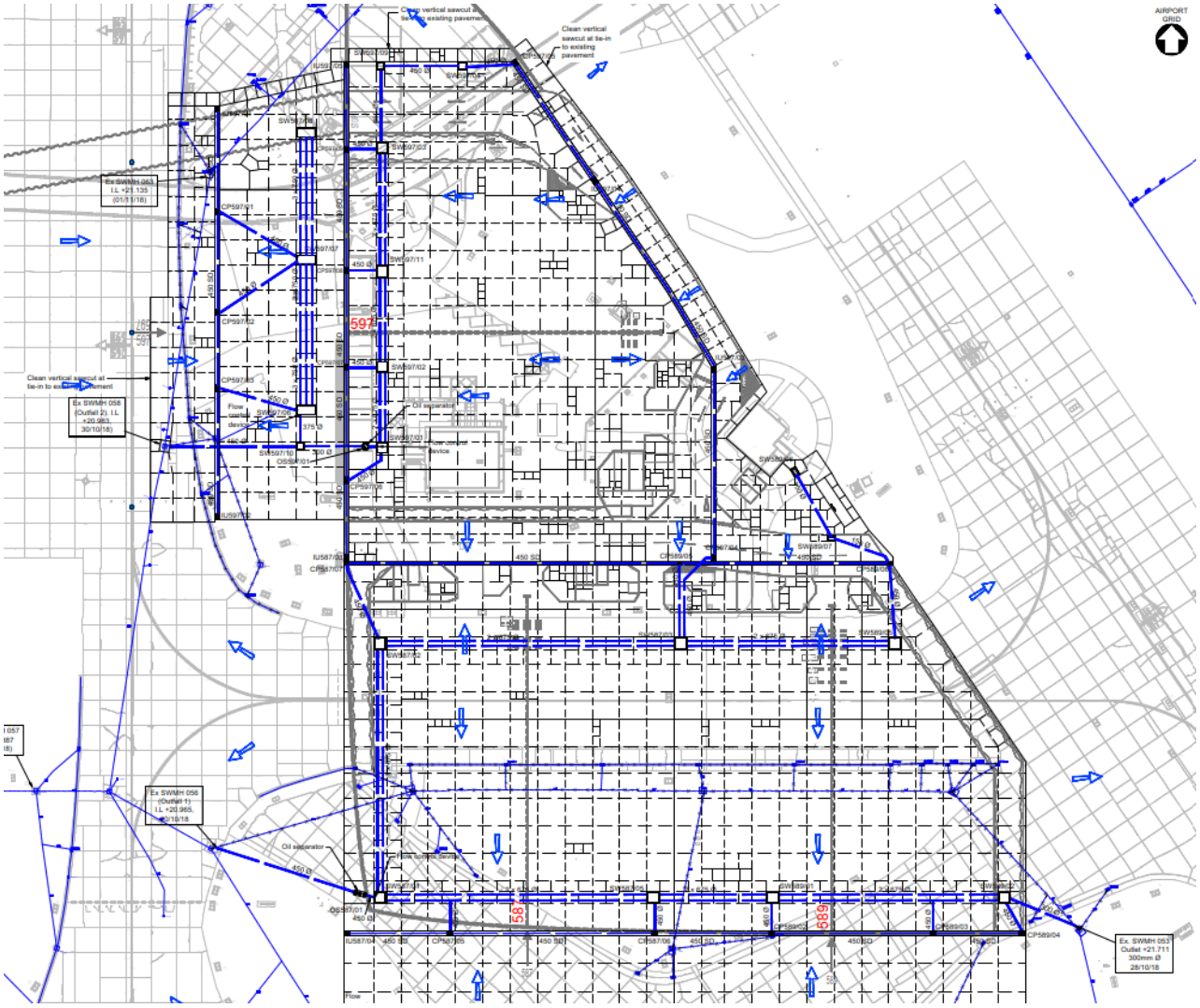

Figure 5.1: GA20 Stands Layout with Proposed Surface Water Drainage

5.2.2 Pollution Control Measures

Pollution controls measures will be provided for the surface water drainage network serving each stand using bypass oil separators to collect oil and fuel spillages on the stands and roads.

5.2.3 Attenuation Storage Strategy

To minimise the risk of affecting the performance of the existing downstream drainage system the proposed GA20 stands drainage will attenuate the runoff from the new paved areas by storing run-off water in oversized underground pipes and restricting the outflow rate to no more than the existing runoff rate using Hydrobrake flow control devices.

5.2.4 Existing Network Constraints

The hydraulic performance of the proposed drainage network is largely dependent on that of the existing upstream and downstream surface water drainage network. The proposed surface water drainage network and associated alterations to the existing drainage system has previously been modelled by AtkinsRéalis, who operate/maintain Heathrow's airport wide surface water drainage model, to understand the impact and any required improvements. See Section 5.1.2.

6. Compensatory Pavement Breakout Strategy

Planning requirements dictate that there should be no net increase in paved area as a result of this project.

Three areas of existing redundant pavement were previously identified for removal to compensate for the proposed increase in impermeable paved area in Grass Area 20. However the three areas have since been allocated for removal by another project. Two alternative areas of existing redundant pavement within the Western Catchment have been identified as potentiality being suitable to be broken out and returned to grassed permeable areas to compensate for the proposed increase in impermeable paved area in Grass Area 20. The two areas are shown in Figure 6.

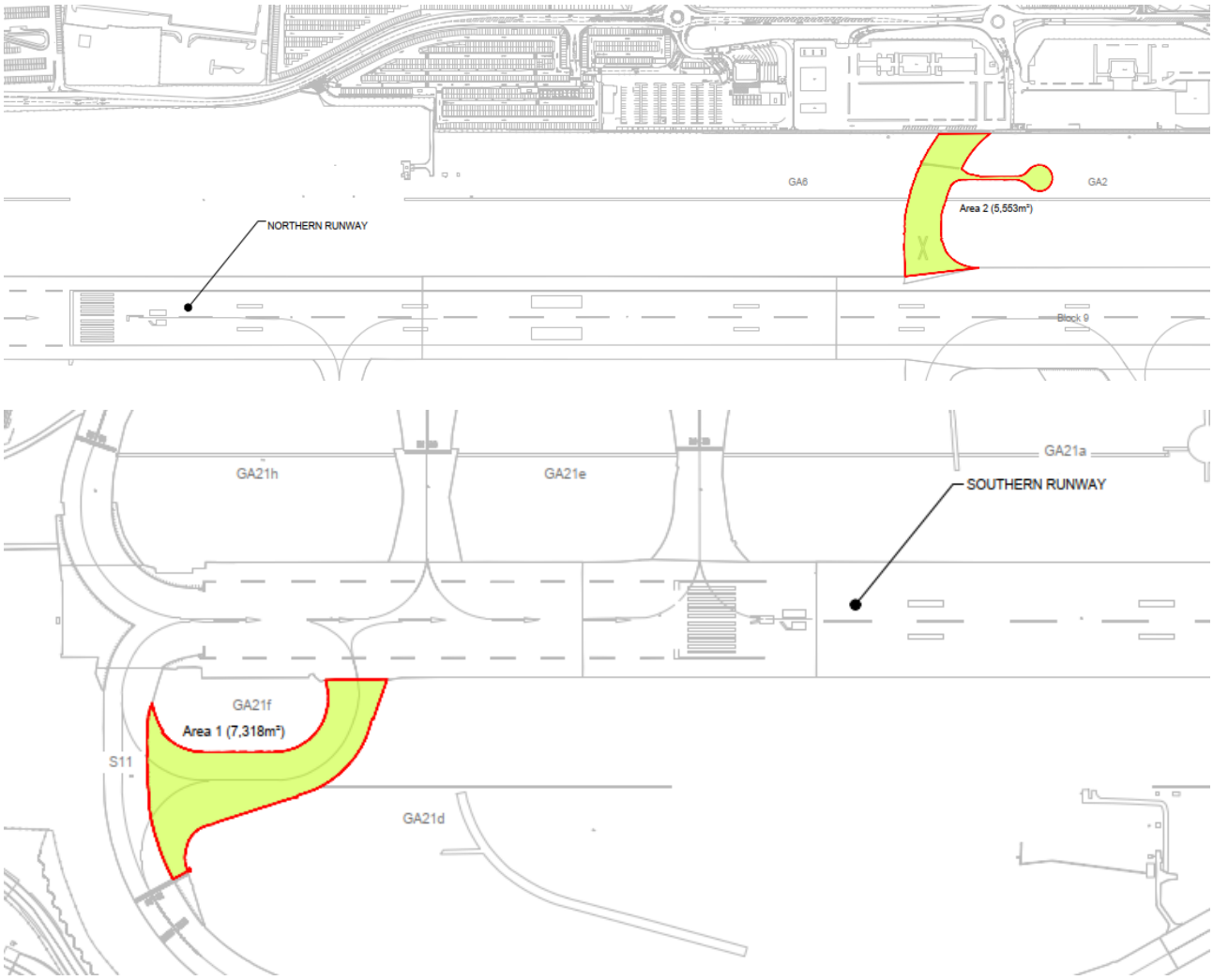

Figure 6: Compensatory Redundant Pavement Breakout

The two areas of pavement that will be removed are summarised in Table 6.

Area	Pavement Breakout Area (m^2)
Area 1 (adjacent to southern runway Link S11)	7,318
Area 2 (north side of northern runway opposite Link A11)	5,553
Total	12,871

Table 6 - Existing Areas of Pavement to be Removed

The increase in impermeable pavement for the GA20 Stands, as shown in Table 3, is 12,804m^2 which is offset by the breakout of approximately 12,871m^2 of redundant pavement.

The impact of removal of these two areas of pavement from the Western Catchment together with impact on additional pavement and the proposed drainage network in GA20 will be remodelled by AtkinsRéalis. It is expected that remodelling will have similar results to the previous modelling completed in 2020 and show only a minor increase in peak discharge rates to the South Western Balancing Reservoir (Clockhouse Lane Pit).