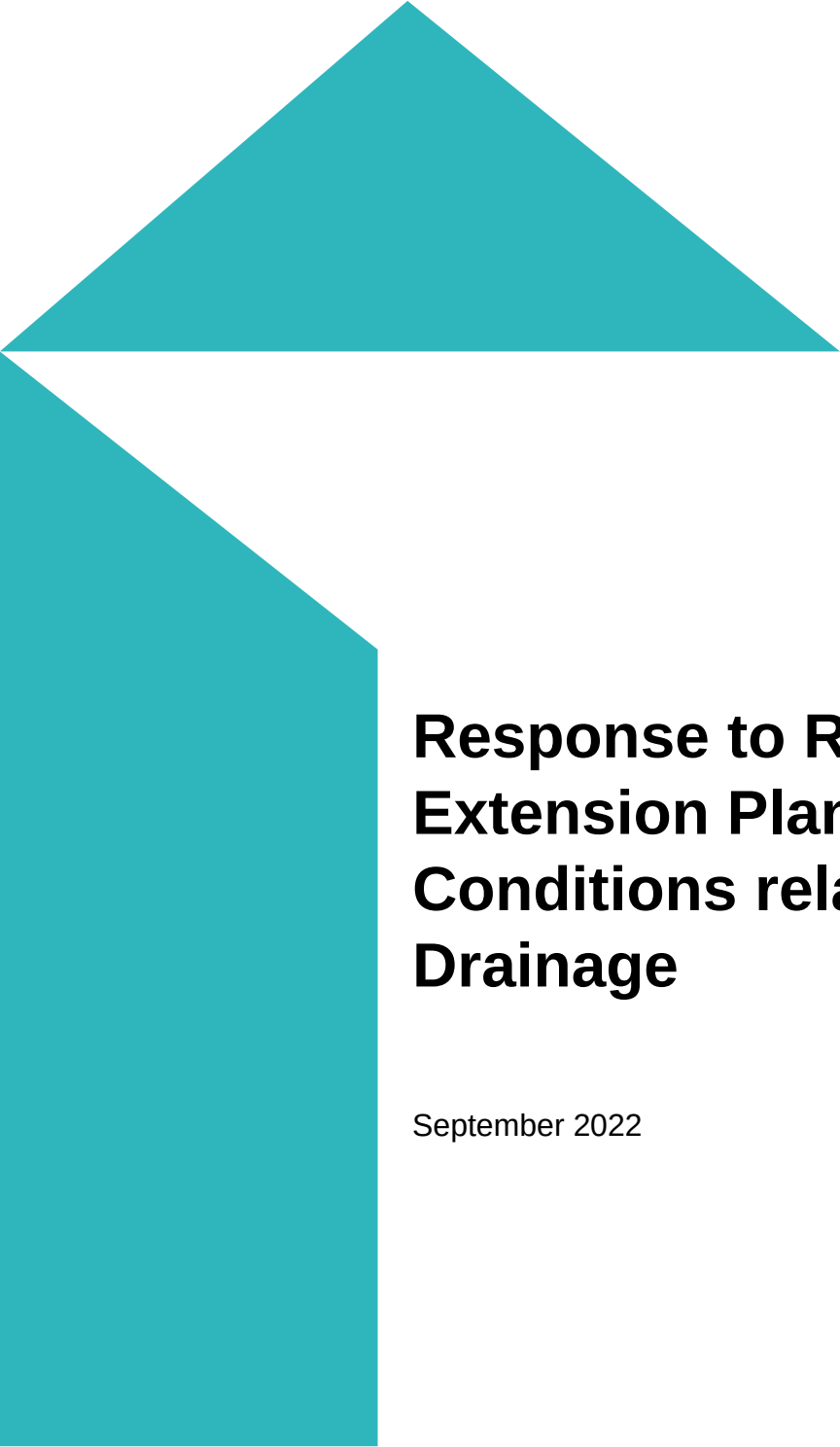


A large teal graphic element on the left side of the page. It consists of a large triangle pointing upwards, with a smaller triangle pointing downwards from its base, creating a shape that resembles a stylized 'M' or a mountain peak. The right side of this shape is a vertical rectangle.

Response to Runway Extension Planning Discharge Conditions relating to Drainage

September 2022

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Response to Runway Extension Planning Discharge Conditions relating to Drainage

September 2022

Issue and Revision Record

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1 A technical summary highlighting any changes to the design from that within the submitted Flood Risk Assessment

Southampton International Airport Ltd (SIAL) Flood Risk Assessment (FRA), dated May 2020 (Appendix A), was completed with reference to Mott MacDonald's RIBA Stage 4 Runway Extension design.

Updates to the design from that discussed within the submitted FRA are:

- An infiltration rate of 250mm/hr was used in the design, based on the Geotechnical Investigation STL J14044
- The Crate Soakaway (called Attenuation Storage by the FRA) has the dimensions 26m x 13m x 1m.
- The drainage field comprises three 17.5m x 1.5m infiltration trenches

These updates are a recalibration of the system capacity due to updated infiltration information. There is no resultant change to surface runoff or site discharge. Thus, the conclusions drawn in the FRA in relation to the runway extension works are still valid.

It should also be noted that the Contractor has also proposed amendments to the Drainage Design which are currently being considered for incorporation within the design. Details for these proposed amendments are as below:

- An amendment to all pipes being changed to Plastic Twinwall (polypipe Ridgidrain) with concrete surrounds where necessary.
- A proposal to utilise a NSBE015 Kingspan Klargester as Bypass Separator
- A proposal to use GEOLite 400 units to meet the required capacity of 320m³ (26x13x1m) with 100mm coarse sand surround to the crates.

There is no resultant change to surface runoff or site discharge as a result of these Contractor proposals, thus, the conclusions drawn in the FRA in relation to the runway extension works shall remain valid.

2 Infiltration test results undertaken in accordance with BRE365 and providing a representative assessment of those locations where infiltration features are proposed

Refer to pages of Factual Ground Investigation Report, Revision 6 (25th July 2019) by Southern Testing /ST Consult (Appendix B), for requested confirmation. Relevant extracted information below for ease of reference:

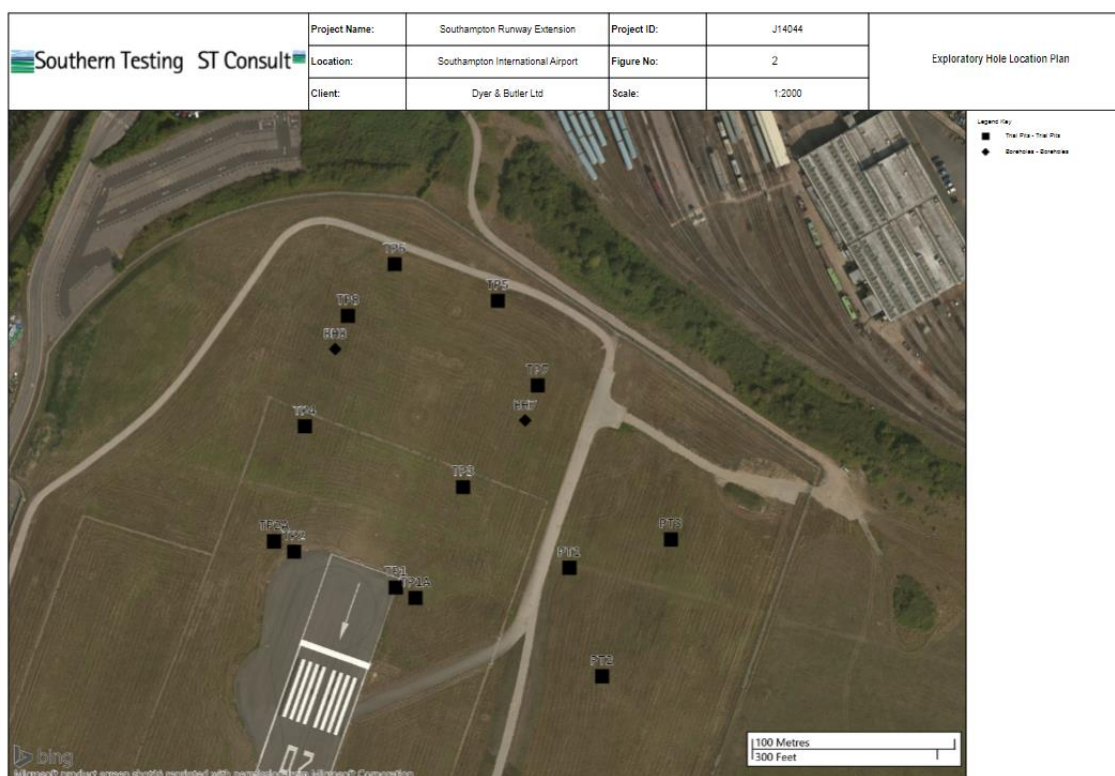
Page 9, Clause 13.3 - Confirmation that soakage tests were in accordance with BRE365:

13.3 Soakage Testing

Soakage testing was undertaken in PT1, PT2 and PT3 in accordance with BRE365. The results are attached in Appendix B.

The trial pits were gravel-filled due to the anticipated instability of the River Terrace Deposits during testing.

Second page of Appendix A (page 15 of the file) – Image showing testing locations, note PT3 is in the location of the proposed infiltration measures:



Within Appendix B (page 112 of the file) – Soakage rate of PT3 is 6.94×10^{-5} m/sec. Taken as 250mm/hr for the design:



Southern Testing: Keeble House, Stuart Way, East Grinstead, West Sussex RH19 4QA
ST Consult: Twickenham, Brixworth Road, Creton, Northampton NN6 8NN



Summary Sheet							
Results of BRE Digest DG365 Soakage Tests							
Site : Southampton Airport				Job No : J14044			
Client : Dyer and Butler				O S Reference : SU 45111 16818			
Tested By : FTD/JS			Engineer: TL		Test Date : 24/04/2019		
Hole No	Test No	Hole Depth <i>m</i>	Soakage Rate for Each Test <i>litre/m²/min</i>	Soakage Rate for Each Hole <i>litre/m²/min m/sec</i>		Water Level at Finish of Test	Remarks
PT3	No 1	3.20	6.60	4.16 6.94E-5		Nearly empty pit.	2000L
PT3	No 2	3.20	4.16			Nearly empty pit.	1800L
PT3	No 3	3.20	4.31			Nearly empty pit.	1900L

3 Detailed drainage plans to include type, layout and dimensions of drainage features including references that link to the drainage calculations

The RIBA 4 design report and associated appendices / drawings includes this information but not the raw drainage calculations.:

For ease of reference we include detailed drainage plans including type, layout, and dimensions in Appendix C and also drainage calculations output from MicroDrainage in Appendix D.

4 Detailed drainage calculations to demonstrate that existing runoff rates are not exceeded and there is sufficient attenuation for storm events up to and including 1:100 + climate change

The RIBA 4 design report states that this has been proven with hydraulic modelling, but raw drainage calculations were not included in RIBA4 deliverables.

For ease of reference drainage calculations output from MicroDrainage is included in Appendix D. These demonstrate that existing runoff rates are not exceeded, and there is sufficient attenuation (when including ponding on the drainage field) for storm events up to and including 1in100 + 40% for climate change.

5 Confirmation that sufficient water quality measures have been included to satisfy the methodology in the Ciria SuDS Manual C753

The RIBA4 Report states that design is in accordance with Ciria SuDS Manual C753 but did not provide information to substantiate this statement. Further detail to support this statement is included below:

The design incorporates sufficient water quality measures to satisfy Ciria 753 by utilising a 100% infiltration approach. Infiltration as a design solution is favoured by Ciria 753 as it reduces/removes flooding risk in the downstream catchment and recharges groundwater. The design also includes a bypass separator to capture pollutants prior to infiltration.

Ciria 753 identifies the below points as some of the considerations for design of an infiltration system. These are evidence of the design aligning with Ciria 753 methodology.

Soil type and infiltration capacity

Soakage tests undertaken by ST Consult and documented within Factual Ground Investigation Report, Revision 6 (25th July 2019) (Appendix B) indicate that the infiltration rate in the area of the infiltration features is 6.94×10^{-5} m/s. This can be considered a good infiltration rate, suitable for infiltration features. Ciria 753 states that “*Infiltration viability should be given full consideration where rates of 10^{-6} m/s or greater exist on the site*”.

Risk of ground instability, subsidence, or heave. Risk of slope instability or solubefication.

Soakaway is not in close proximity of any slope or structural element that may be at risk by ground instability caused by increased infiltration.

Risk of pollution from mobilising existing contaminants on site.

No existing contaminants have been identified in the area. Factual Ground Investigation Report, Revision 6 (25th July 2019) (Appendix B) confirms in section 11.1 that no evidence of contamination was observed in any of the exploratory holes.

Risk of pollution from infiltrating polluted surface water runoff.

A bypass interceptor is proposed within the design, upstream of the infiltration features to capture any hydrocarbons spilt on the runway. Other pollutants that may be expected such as glycol are water soluble and pose no threat to water quality downstream.

Risk of groundwater leakage into combined sewer due to infiltration.

A foul water rising main has been identified in the area of the proposed works. A 12m corridor either side of this rising main has been allowed for to avoid any risk of interaction between that service and the proposed works.

6 Exceedance plans demonstrating the flow paths and areas of ponding in the event of blockages or storms exceeding design criteria

Only an exceedance plan for ponding in the critical storm (100yr) was included in our RIBA 4 design.

The RIBA 4 design report indicates that the design can be expected to contribute 100m³ to ponding in an existing depression (termed 'drainage field') off the eastern side of the runway. Extrapolating the Microdrainage simulation to consider larger storm events has indicated that the design can be expected to contribute to temporary ponding in the drainage field, with volumes of the magnitude below.

720-minute, 1 in 200-year storm event:	Volume in excess of 170m ³
600-minute, 1 in 500-year storm event:	Volume in excess of 240m ³
600-minute, 1 in 1000-year storm event:	Volume in excess of 310m ³

All storms are the critical duration for the event reoccurrence and include an additional 40% allowance for climate change.

All of these volumes can be contained within the drainage field, although it is important to note that this does not factor rainfall beyond the extended section of runway. It is also important to consider the level of instability when modelling events of such rarity and magnitude. Assumptions and safety factors have a significant impact on results when extrapolated to extremes.

Appendices

Appendix A [1.1 - Environmental Statement Addendum Appendix 10.1 - Revised Flood Risk Assessment.pdf](#)

Appendix B [2.1 - STL J14044 Southampton Northern Runway Extension - Factual Report V6.pdf](#)

Appendix C [3.1 - 400602-MMD-00-XX-DR-D-0001 - Storm Water Layout Plan.pdf](#)

Appendix D [3.2 - Microdrainage Results Southampton Airport Runway Extension.pdf](#)