

YOUR LONDON AIRPORT
Gatwick

Flood Resilience at
Gatwick Airport



April 2019



JACOBS

Agenda

1. Water Management at Gatwick
2. December 2013
3. Objectives of flood resilience
4. How Gatwick is delivering flood resilience
5. Lessons Learnt
6. Conclusion



1. Water Management at Gatwick

Numbers

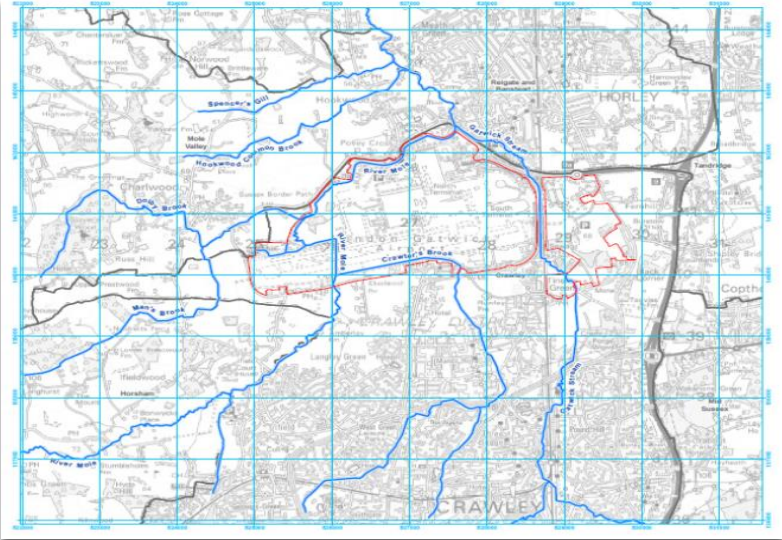
- 46.1M Passengers
- 284,000 Aircraft pa
- 55 Movements per Hour
- 120 direct rail connections
- 24,000 staff
- £1.6B for UK economy

History

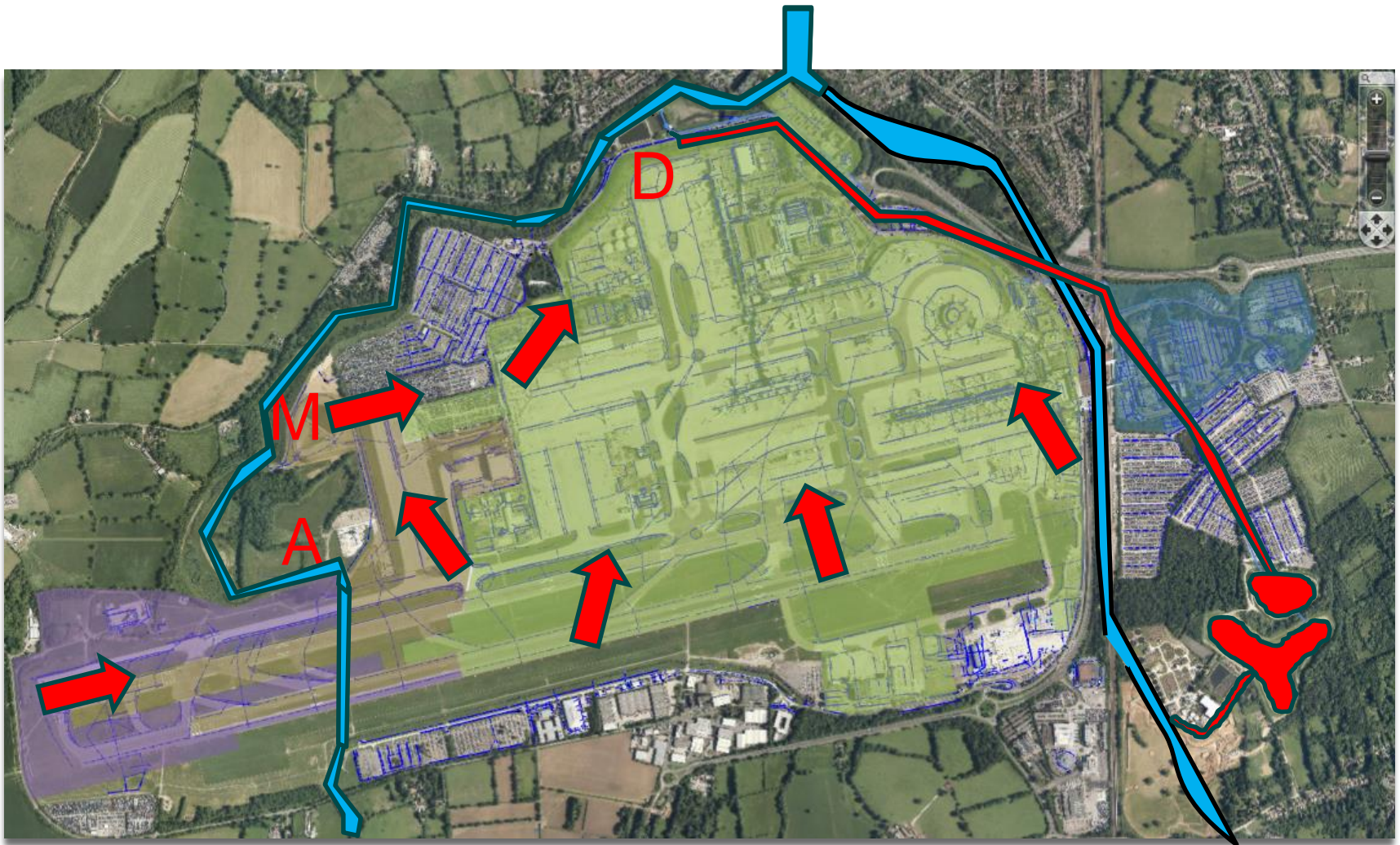
- 1930
- 1958

Geography

- 5 Rivers/ Streams
- 4 Reservoirs
- Risks/ challenges



1. Water Management at Gatwick



2. Christmas Eve 2013

Situation

- Unprecedented Rainfall
- High Winds
- Busy period for operation

Impact

- 3 x AGL subs out
- Pit & Duct
- NT Sub out

Consequence

- Flights Canx
- Major disruption
- Passenger inconvenience
- Reputational damage
- Commons Select Committee



3. Objectives of flood resilience

McMillan Report

- 27 Recommendations
- 1 – 8 Physical improvements
- 9 – 27 Contingency Planning and Communication

Next Steps

- Great improvements
- Direction
- Co-ordination

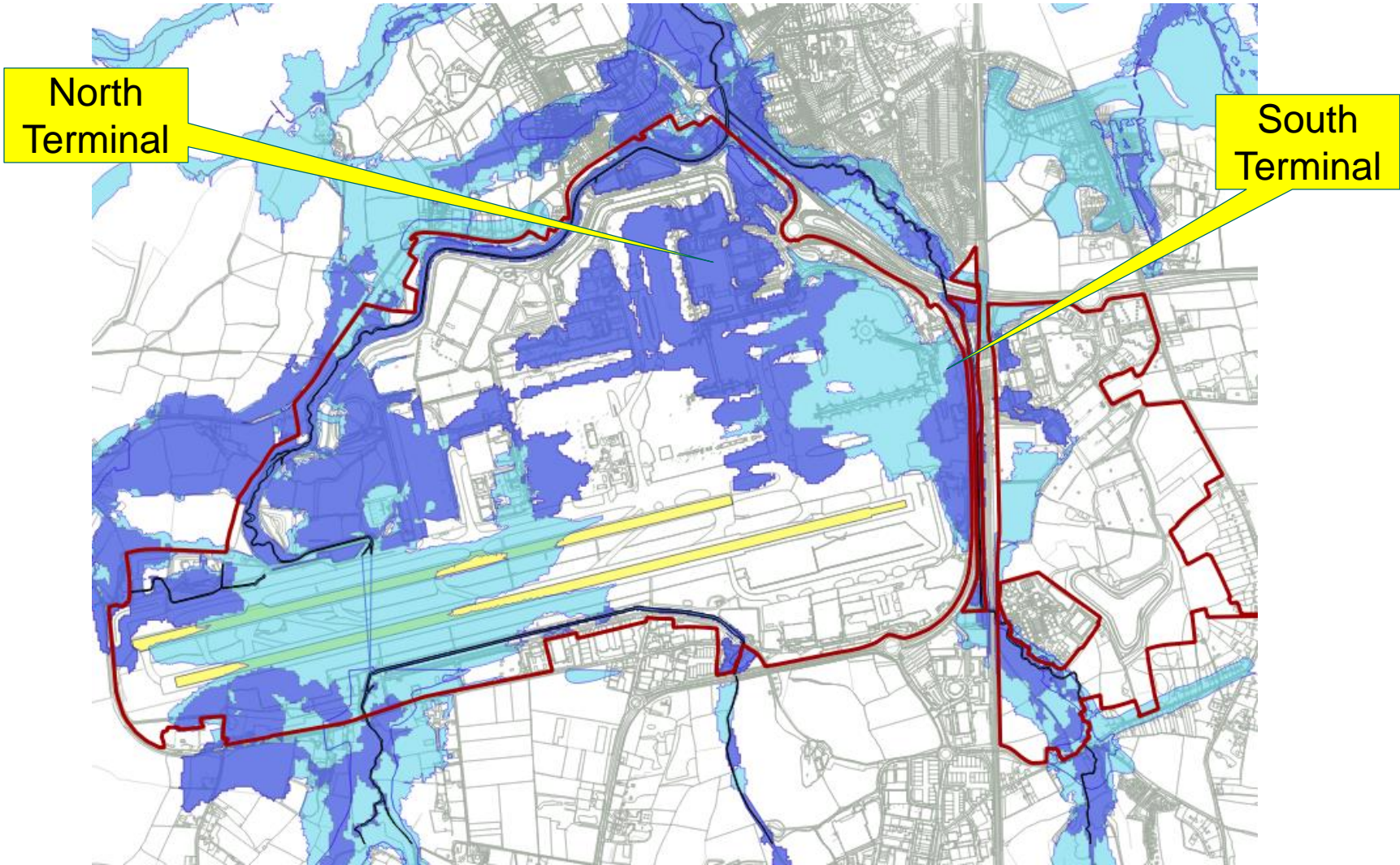
Objective

- 1:100 Dry
- 1:200 Wet but Resilient



Fluvial Flood Risk

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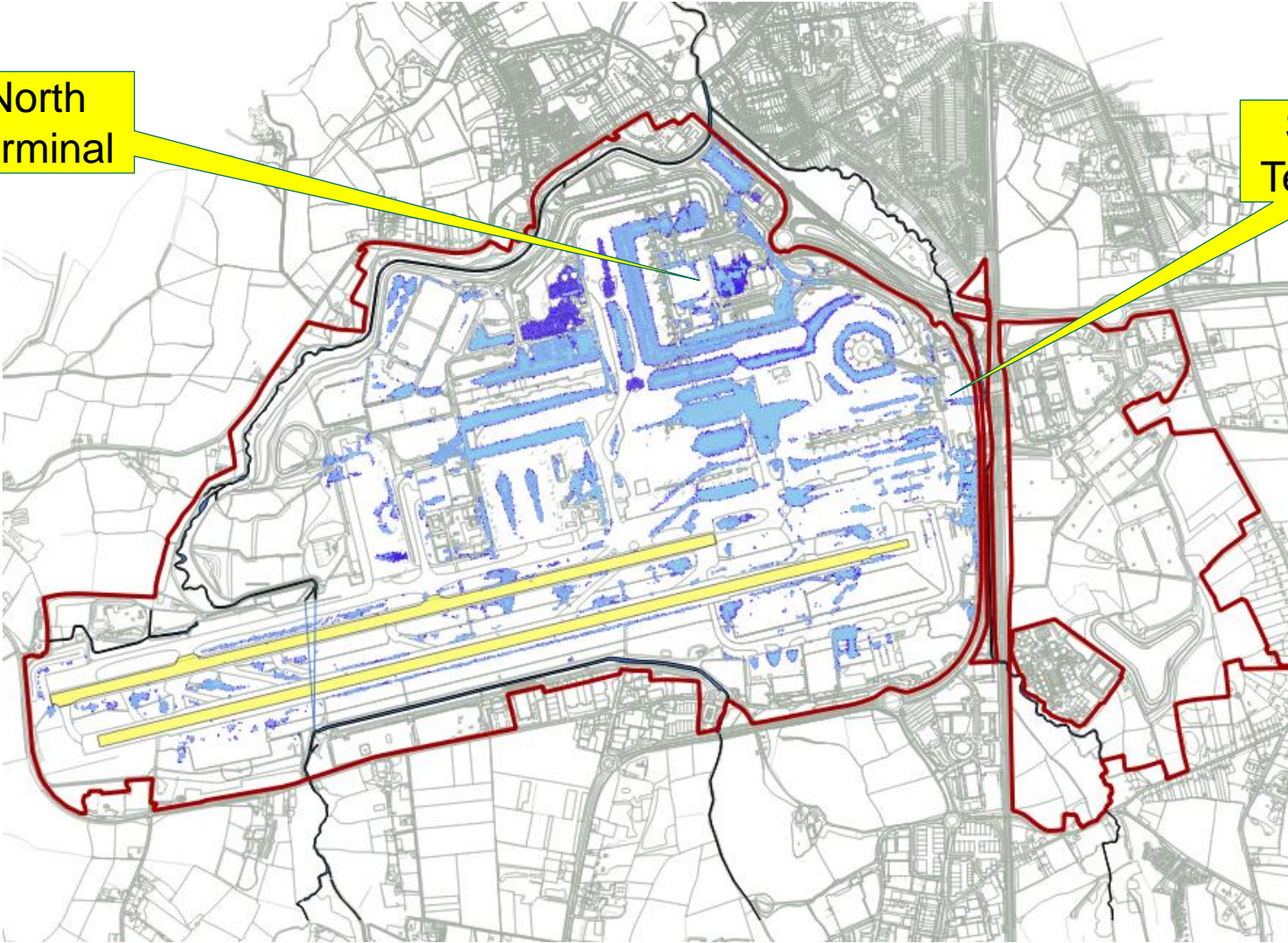


Surface Water Flood Risk

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North Terminal

South Terminal



4. Gatwick's Approach to Flood Resilience

Short-term / Immediate Fixes

- Additional flood storage on Westfield Stream
- De-silting of Crawters Brook
- Attenuation areas on Crawters Brook
- Pond D improvements (increased capacity)
- Additional storage on Westfield Stream
- Financial support of Upper Mole FAS and Gatwick Stream FAS

Longer-term Strategic

- Develop flood risk management strategy
- Define degree of risk – hydraulic models
- Define Standard of Protection

Essentially all about people, planes and baggage



4. Flood Risk Management Strategy

Response to McMillan report focussed on resilience and operational response.

Need for an over-arching strategy to address existing risk and new development

Work Package 1 Modelling and Data Management	Work Package 2 Asset Resilience and Infrastructure Development	Work Package 3 Technical Standards and Innovation	Work Package 4 Partnership Working and Capacity Building
Benefits <ul style="list-style-type: none">• Consistent approach to flood risk assessment• Supports strategic development implementation• Improved flood forecasting	Benefits <ul style="list-style-type: none">• Flood resilient infrastructure• Improved flood defences and drainage• Improved water management	Benefits <ul style="list-style-type: none">• Clear FRM governance• Reduced flood risk and capital costs• World class sustainable infrastructure	Benefits <ul style="list-style-type: none">• Win-Win partnership solutions• Partnership funding• Resilient Emergency Response



4. Flood Resilience - Approach

Phase 1:

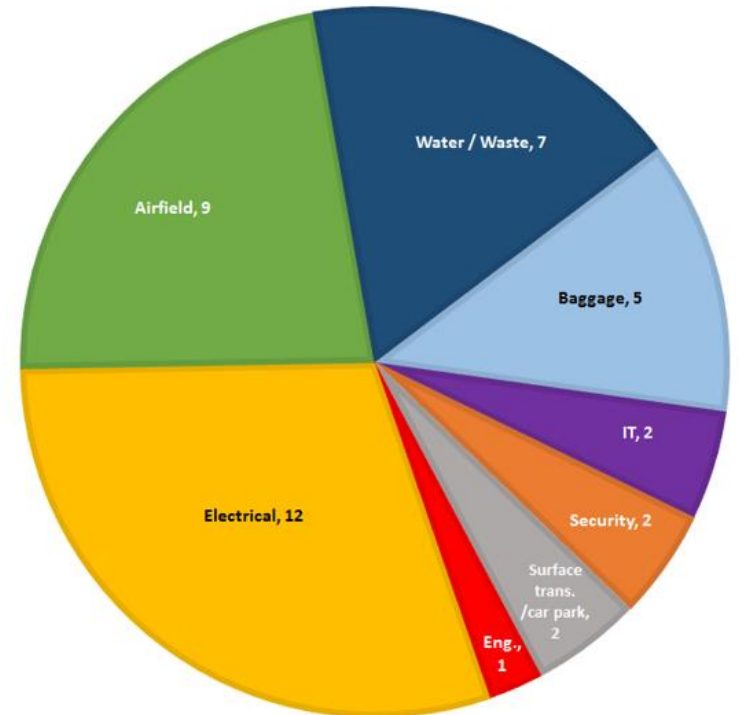
- Confirm risk (surface water and fluvial)
- Flood history
- Identify critical assets
 - Criticality (People, Bags, Planes)
 - Vulnerability
 - Inherent resilience

Phase 2:

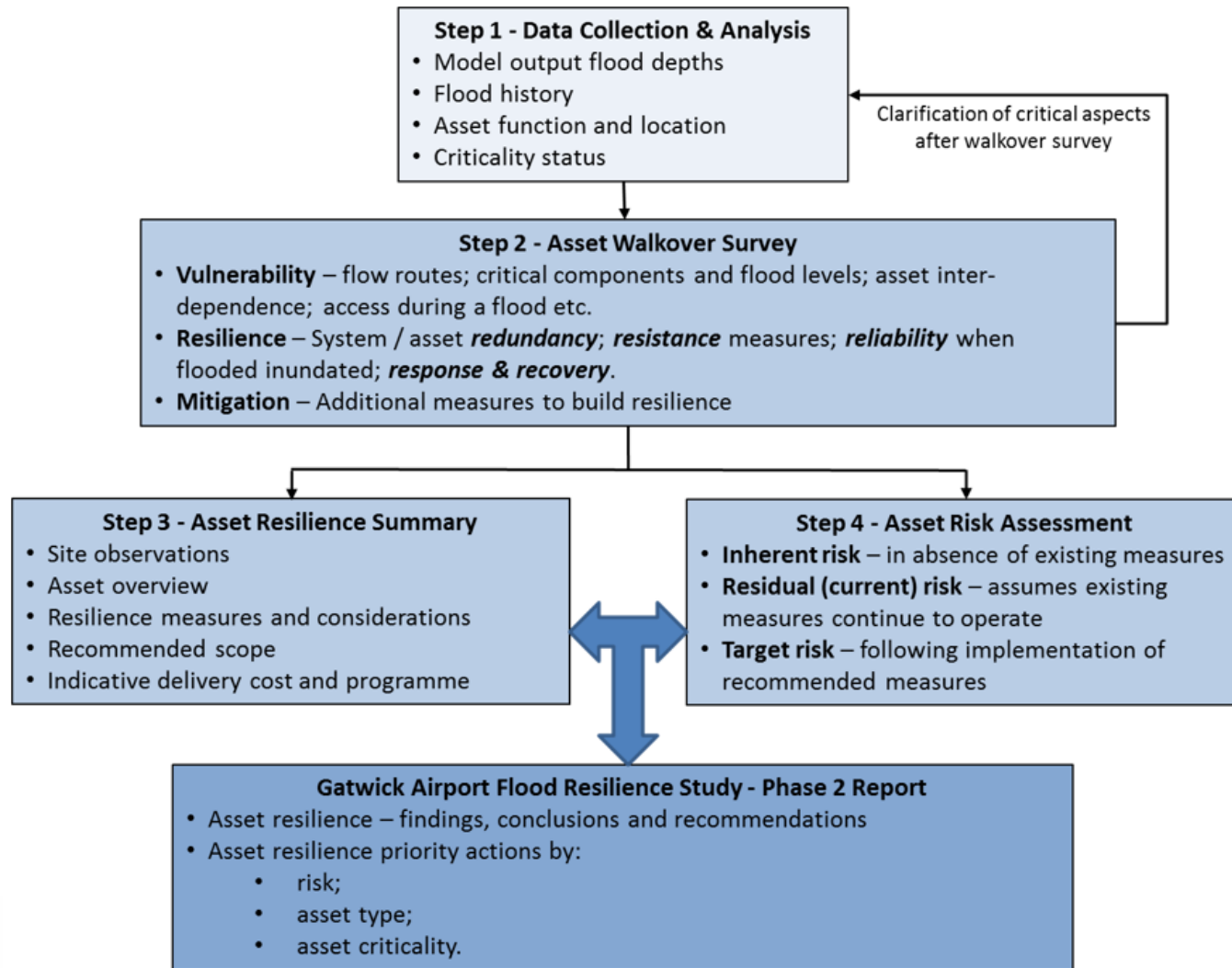
- Asset inspections
- Option identification
 - Resistance
 - Resilience
 - Emergency Response & Redundancy

Phase 3:

- Implement Works
- Pilot works being progressed



4. Asset Resilience – Stage 2



4. Asset Resilience – Example 1

Substation G

Asset Number	Location (description)	Asset Category	Asset Criticality	Flood Depth – Surface Water 1% AEP event +CC	Flood Depth – Fluvial 1% AEP event +CC	Previous Flooding?
26	S. Perimeter Road	Electrical	Mission Critical	NULL	0.8m	Yes

Risk			Change in Risk	
Inherent	Current	Target	I - T	C - T
80	40	10	70	30

1.1 Observed Issues (February 2017)

The location of the substation within a low level area makes it vulnerable to significant flood depths as flood water would naturally pond in the area.

However, there are resilience measures in place comprising a raised building threshold, an adjacent underground pumping station No. 26 (with a duty and a standby pump), flood gates fixed in place by default, vent covers, and some raised cable entry points. There is also a back-up generator on site in the event of pump failure due to power outage.

The resilience measures already in place could be overwhelmed in a significant fluvial flood event, although for surface water and groundwater/seepage the system has a good level of resilience provided by the pumping station arrangement.

In the event of a power failure for the pumping station, there is a standby generator located within the compound.

In addition to the flood resistance/resilience measures incorporated at the Substation G compound, immediately across the road and to the south, between Perimeter Road South and London Road, a previously heavily wooded area has been developed to create a 30,000 m³ attenuation pond alongside Crawler's Brook. A Reservoirs Act (1975) 'Panel Engineer' has been appointed for the attenuation pond.

1.2 Recommended Project Scope

Option 1 - Seal any remaining low level cable and duct entry points that provide a potential flow route into building. Improve surface water drainage of adjacent car park. (Risk score based on this option due to major scale of works for Option 2).

Option 2 - Relocate Substation G and associated airfield lighting systems to an area of lower flood risk. This is consistent with the recommendation made in the Power Resilience Study (2016). If the substation/key functions were relocated to a suitable area the Target Risk score could be reduced to 1.

1.3 Cost and Programme

	Option 1	Option 2
Cost	LOW	HIGH
Programme	0 to 6 months	> 1yr

1.4 Project Headlines

This asset has a high level of criticality but resilience measures have already been incorporated due to its potential vulnerability to fluvial flooding. More work could be carried out to further increase flood resilience.

The Power Resilience Study recommended the relocation of Substation G. However, in the event that Substation G is NOT relocated, then further local resilience measures should be implemented.

1.5 Snapshot



5. Asset Resilience – Lessons Learnt

- What is an asset?
- How to prioritise visits and works – working airport
- Relating modelling results to reality
- How robust is a seal and ensuring integrity maintained (see below)
- Chain of impact – ‘vulnerability on the 10th floor’
- Previous use of buildings/structures
- Who holds the key?
- Interaction between target and back-up assets
- Access during an event
- Could remedial measures hinder emergency services?
- Understand asset connectivity (comms box>PA>emergency)
- Future use / rapidly changing situation (asset obsolete in six months)

Services Entry Sealing

FLOOD PROTECTION
Ensure duct service entry points are re-sealed after any works that disturb the integrity of the seal.
(Contact Principal Engineering)

FLOOD PREVENTION DOOR

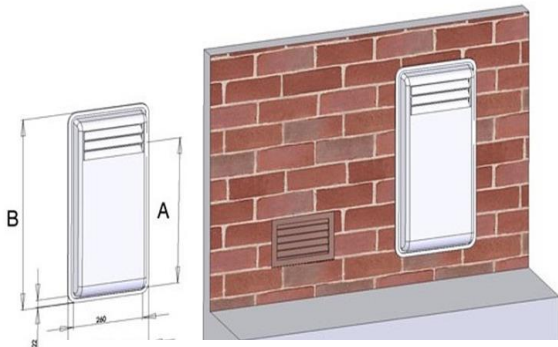
DO NOT PROP DOOR OPEN
Report ALL damage immediately to the Fault Line
KEEP LOCKED SHUT

FLOOD WALL

**DO NOT PENETRATE
PAINTED AREA**



5. Asset Resilience Measures



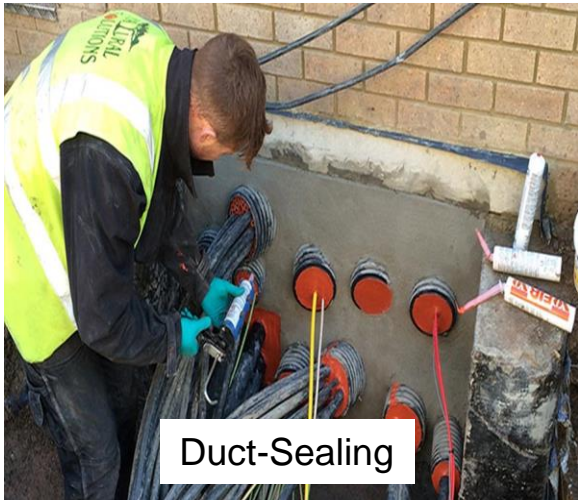
"Snorkel" Air-Vent Protection



Water-proof epoxy painting



"Barn-door" flood doors



Duct-Sealing



Raising external equipment



Off-the-shelf sump pumps



6. Conclusions

Draft Master Plan 2018


- Making best use of existing infrastructure
- 57 to 70 Million Passengers by 2032

Lessons Learned

- Understand the risk
- Develop strategy
- Understand big picture
- Big ideas... small details.



Anticipated or potential developments

- | | |
|---|--|
| 1 Terminal improvements including security and bag-drop | 5 Partial decking of surface car parking |
| 2 One pier project (in one of the three location options shown) | 6 Robotic parking technology |
| 3 Forecourt improvements | 7 Additional car parking area |
| 4 Additional bus/coach station capacity | 8 Additional car parking area |
| | 9 Office / hotel development |
| | 10 Site for new hangar |
- Airport Boundary
- 

PLAN 18 - Airport Layout Main Runway - 2032

(Additional infrastructure compared to 2022)

