Appendix 7-2. Flood Risk Assessment

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DUBLIN AIRPORT WEST APRON VEHICLE UNDERPASS

STAGE 3 FLOOD RISK ASSESSMENT

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Description	**Dublin Airport West Apron Vehicle Underpass – Stage 3 Flood Risk Assessment**

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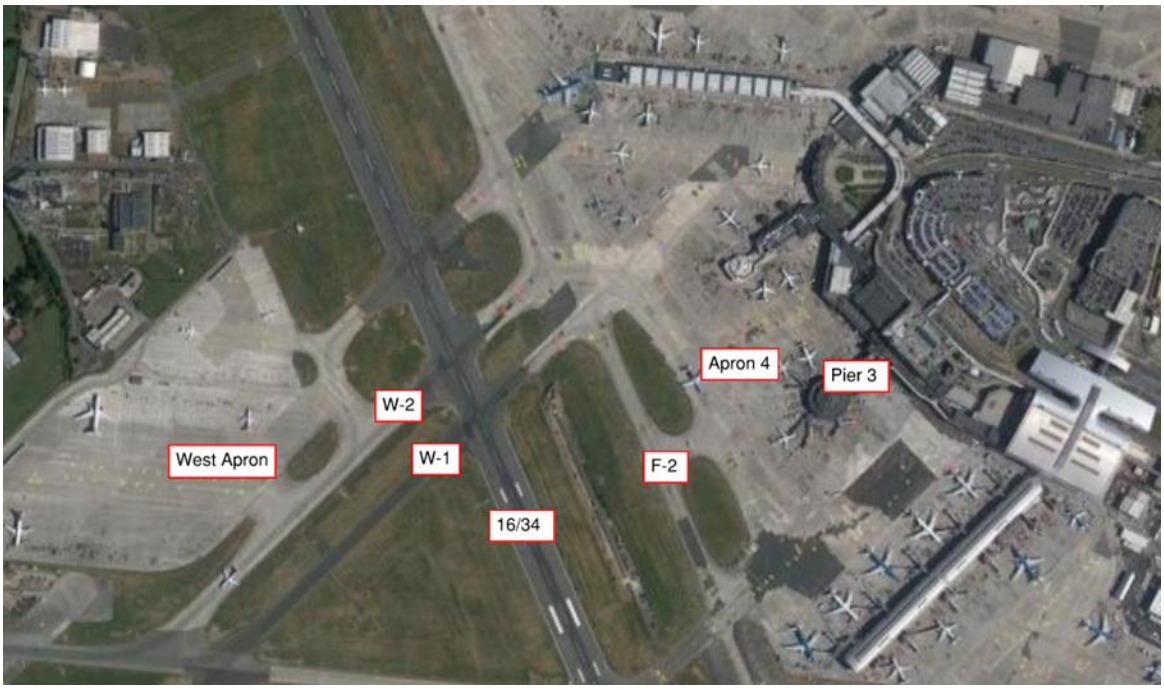
CONTENTS

1. INTRODUCTION

1.0.1 A planning application has been prepared in respect of a proposed Vehicle Underpass of Runway 16/34. This is an airfield safety project, required to improve operational safety and efficiency at the airport. The Underpass is proposed centrally within the airfield at Dublin Airport. The subject site incorporates Pier 3 and surrounding stands, Apron Taxiway 4, the Taxiway F-2, Runway 16/34 (the crosswind runway), Taxiway W1 and W2 and the West Apron, see Figure 1-1.



1.0.2 The West Apron is an area of apron west of Runway 16/34, comprising 16 NBE (narrow body) and 8 WB (wide body) stands. It is used inter alia to support cargo operations, General Aviation and provision of contingency aircraft stands. It is an integral part of the infrastructure of the airport. It is currently accessed by a surface crossing of Runway 16/34 ('the West Apron Crossing') or by the airfield perimeter roads. Use of the West Apron Crossing requires meticulous coordination and adherence to strict operating procedures to ensure safety and is coordinated between Airside Management Unit and Air Traffic Control. Using the perimeter roads entails an 8km perimeter journey which is highly inefficient in terms of managing airport operations, and results in increased travel time, fuel consumption, and vehicle emissions.

1.0.3 Use of the West Apron Crossing will become increasingly challenging on opening of the North Runway in 2022. Once in operation, Runway 16/34 will primarily operate as a taxiway, meaning the area currently used by the West Apron Crossing will increase, from aircraft accessing the North Runway. Accordingly, an underpass of 16/34 is required for both operational safety and efficiency reasons and is proposed between Pier 3 and the West Apron, see Figure 1-2.
If permitted, the Underpass will allow complete segregation of vehicles from aircraft and enable fast, reliable and safe access that is critical for the continued use of the West Apron.

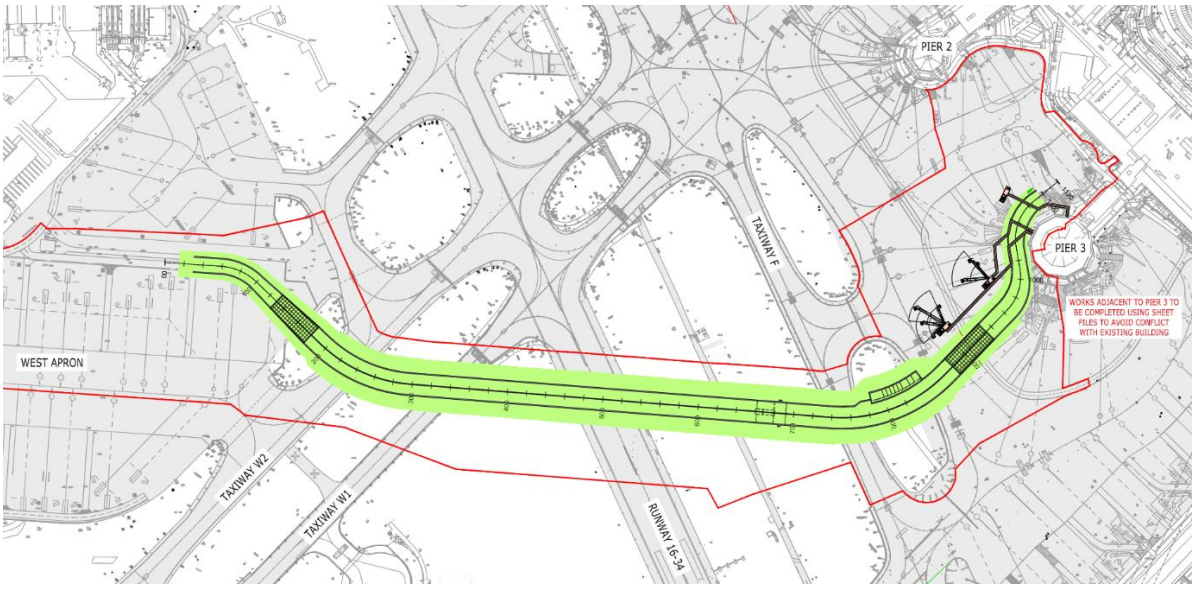


Figure 1-2: West Apron Vehicle Underpass

1.0.4 The project is strongly supported by IAA SRD as a critical safety project to enable operational safety both now and in the future.

2. REPORT OVERVIEW

2.1 Appointment and Brief

2.1.1 Ramboll UK Limited (Ramboll) is appointed by Dublin Airport Authority (daa) ('client') to prepare a Flood Risk Assessment (FRA) in support of a detailed planning application for the Dublin Airport Underpass. The proposed Underpass is located in the central area of the Dublin Airport airfield, Co. Dublin. A Site Location Plan is included in Appendix A.

2.2 Scope and Objectives

2.2.1 This assessment considers the risk of flooding to the site from a range of sources and the consequent risk of flooding to third party receptors (such as people, property, habitats, infrastructure and statutory sites). A comparison is made between the current baseline situation and the proposed future development. This FRA has been carried out in accordance with the Planning System and Flood Risk Management: Guidelines for Planning Authorities published in 2009, and provides the following:

- Collection and summary review of all information pertinent to flood risk;
- An assessment of the flood risk from all sources, and definition of a flood risk baseline;
- An assessment of the development proposals against the flood risk baseline; and
- Identification of any mitigation measures required to make the development safe from flooding over its lifetime.

2.2.2 A separate drainage strategy has been prepared (Doc Ref: 1100040489-DIP-REP-4002). Whilst the strategy for managing surface water is described in brief within this report, the full drainage report should be read in conjunction or referred to as required.

2.3 Key Sources of Information

2.3.1 The key sources of information used to prepare this report include:

- Draft Dublin Airport Local Area Plan - Appendix 6: Strategic Flood Risk Assessment and Surface Water Management Plan;
- Dublin Airport Drainage Masterplan - 40MPPA Brownfield Attenuation Policy;
- Drainage Masterplan Project - daa Drainage Design Policy;
- The Office of Public Works (OPW) – The Planning System and Flood Risk Management Guidelines for Planning Authorities;
- OPW – The Planning System and Flood Risk Management (November 2009);
- OPW – The National Preliminary Flood Risk Assessment (PFRA) (March 2012);
- Floodinfo.ie online database (accessible via https://www.floodinfo.ie/map/floodmaps/);
- Environmental Protection Agency (EPA) – Catchment Data Explorer (accessible via https://www.catchments.ie/);
- Geological Survey Ireland (GSI) Spatial Resources online maps (accessible via https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228)
- Ramboll – Outline Drainage Strategy Report (Report No. 1100040489-TUN-REP-4000) (July 2020)

2.3.2 Whilst every care has been taken to ensure all information used in this assessment is up-to-date and accurate, Ramboll cannot accept liability for the accuracy or otherwise of any information derived from third party sources.

3. SITE CONTEXT

3.1 Site Location

3.1.1 The Project Element is within the wider Dublin Airport which is located is located 7 km north of Dublin City Centre in Collinstown, near Swords, Dublin. The airport is approximately centred at Grid Ref 316527, 243099.

3.2 Site Topography

3.2.1 The Underpass development area topography has been read from the spot levels included on the Underground Services plan (dwg ref: 1100040489-RAM-00-DR-ZZ-00005/00006) included in Appendix C. The wider site topography has been read from the LiDAR plan and long section within the Strategic Flood Risk Assessment and Surface Water Management Plan (SFRA & SWMP) (Figure 2.1, page.3).

3.2.2 The airport site is located on a gentle escarpment with levels rising to the west and falling to the east. At its furthest extremities the airport falls from a topographic high in the south west corner of 81 mAOD to a 50 mAOD low point along the airport's eastern boundary. Within the redline study area, at the Pier 3 entrance ground levels are around 66 mAOD falling to around 63 mAOD at the West Apron entrance.

3.3 Existing Drainage

3.3.1 A plan of the existing drainage records is incorporated into the Underground Services plan (Appendix C). A Drainage Catchment Areas map (20771-38-DC-005) is also included.

3.3.2 The surface water drainage system serving the existing development boundary, consists of discrete gravity-fed pipe networks associated with the respective apron, taxiway and paved areas. Runoff is conveyed to the underground pipe network via heavy duty slot drains, fluted channels/carrier drains and gullies that subsequently discharge into the formal drainage piped network. Along with the collection structures, there a number of large attenuation and flow diversion structures which perform a number of functions.

3.3.3 The runoff generated is discharged into the Cuckoo Stream, which in turn discharges as Cuckoo Stream once beyond the airport. It is understood that the entire Underpass development area falls within the 'Cuckoo Catchment'. Along its culverted stretch, the Cuckoo Stream is formed from a 1.2 x 1.2 m box culvert, referred to as the Airfield Trunk Culvert.

3.3.4 Along with the newly constructed drainage that will serve the Underpass and Underpass development area, a number of separate diversions of existing drainage will be required as part of the Underpass delivery.

3.4 Hydrological Setting

3.4.1 The hydrology of the site and immediately surrounding area has been established based on a review of the EPA's online data map service and the SFRA & SWMP. A plan indicating the presence an extent of all watercourses within the Dublin Airport area is included in Appendix D, and is taken from the SFRA & SWMP document.

3.4.2 Due to its location towards the top of an escarpment, the airport is the headwater for a number of watercourses draining predominantly eastwards towards the Irish Sea. Of these watercourses, the proposed Underpass is situated within the catchment of Cuckoo Stream, which is the only watercourse designated by the EPA within 1 km of the proposed vehicle Underpass. The majority

of the Cuckoo Stream channel within the airport boundary is culverted and drains eastwards into the River Mayne approximately 5.5 km east of the site. The culverted section consists of a combination of single channel and twin channel rectangular and circular pipes which range in size from 800 mm to 1200 mm.

3.4.3 The Cuckoo Stream currently receives surface runoff from both Pier 3 and the West Apron, and as such will be the recipient of runoff from the Underpass development area. The Cuckoo catchment upstream of the Underpass is highly urbanised, consisting largely of positively drained impermeable areas of hardstanding associated with the airport, although the contributing catchment also includes areas of grass/soft landscaping within the airport. Upstream of the airport to the north west, the head of the catchment consists of a series of agricultural fields.

3.5 Geological Setting

3.5.1 The geology underlying the site has been established based on a review of the Geological Survey of Ireland's (GSI) online Spatial Resources viewer. The Underpass development area is underlain by the Lower Brown Dublin Boulder Clay, which is described as firm to very stiff sandy gravelly clay. Borehole logs from a 2018 ground investigation[1] identified cobbles, gravels and sandy/gravelly lenses typical to the Dublin Boulder Clay. Above the boulder clay, Made Ground of varying thickness is present.

3.5.2 The underlying bedrock is the Tober Colleen Formation. Depths and descriptions of the strata are outlined in Table 3.1 and are based on information gathered from borehole logs. The proposed vehicle Underpass is understood to be excavated within the superficial strata only (Made Ground and Dublin Boulder Clay).

Table 3.1 Descriptions of strata and logged depths across site area

Strata	Description	Estimated thickness (m)
Made Ground	In areas of soft landscaping: Grass over sandy, brown, cohesive, organic topsoil. In areas of hardstanding: Concrete/tarmacadam overlying very sandy GRAVEL.	Approximately 0.5 m to 2.5 m mBGL
Lower Brown Dublin Boulder Clay	Firm to very stiff, black, sandy, very gravelly CLAY with occasional cobbles. Occasional layers of very dense brown, slightly silty SAND and lenses of brown, sandy, clayey GRAVEL.	Approximately 17 m to 28 m mBGL
Tober Colleen Formation	Medium strong, grey, fine to medium LIMESTONE. Partially to distinctly weathered. Interbedded with a weak to medium strong thickly laminated MUDSTONE.	Encountered to 33.5 m mBGL

3.6 Hydrogeological Setting

3.6.1 The site is situated above the Dublin Urban WFD groundwater waterbody and is underlain by two aquifers separated by a bedrock aquifer fault beneath the approximate centre-west of the Underpass. The aquifer beneath the western section of the site is categorised as a Locally Important Aquifer, meaning bedrock that is moderately productive in local zones. The aquifer beneath the eastern portion is categorised as a Poor Aquifer, meaning bedrock is generally unproductive except for local zones. No locally or regionally important gravel aquifers, which are superficial and distinct from the bedrock aquifers, are noted within 1 km of the site.

[1] Ground Investigations Ireland Ltd, 2018

4. ASSESSMENT OF FLOOD RISK

4.1 Historical Flooding

4.1.1 A review of the OPW maps did not indicate the presence of any previously reported incidents of flooding within the Underpass development area. However, during discussions with the wider client and design team a number of incidents of existing drainage issues and flooding were reported. Although no formal records of the flooding events exist, anecdotal accounts from the airport operations team indicate that a number of maintenance interventions are often required to prevent flooding occurring.

4.2 Coastal Flooding

4.2.1 A review of the OPW Floodinfo online database indicates that the closest source of tidal flooding is at Malahide, and that the closest modelled tidal flood extent is located approximately 5 km to the north east. As a result, there is no risk of coastal flooding to the site.

4.3 Inland Flooding – Overland Flow

4.3.1 The risk to the site from overland flow and surface water has been established based on a review of a) the local topography and presence of any overland flow routes and b) the Fingal County Council pluvial mapping. The pluvial flood mapping is included in Appendix D. It should be noted that the pluvial flood mapping does not explicitly account for the presence of the airport drainage system, which is designed to remove surface water from areas of hardstanding.

4.3.2 At surface level, the Underpass has two portal entrances to which access to the airport above is achieved. The Underpass portal entrances are the point of entry for surface water into the Underpass, and rather than considering the risk along the entire alignment, the risk will be assessed based on the likelihood of flooding at each entrance.

East Portal Entrance at Pier 3

4.3.3 The airport-wide pluvial flood map indicates a series of small areas immediately north of the eastern entrance to be at risk of surface water flooding, with between 0.1-0.6 m depth expected during a 1 in 100 year, 1hr event. Whilst these areas of flooding do not directly adjoin the east entrance, a review of the ground level in the vicinity of the entrance has been undertaken to assess whether topography around the entrance would support the entry of surface water into the Underpass.

4.3.4 On the basis that existing ground levels are to be retained, and the proposed Underpass carriageway will tie into the existing, the level at the Underpass entrance will be 66.85 mAOD. The levels at Pier 3 slope gently towards the Underpass entrance, and as such there is potentially a route for surface water into the Underpass from a total catchment area of around 0.44 ha.

West Apron Portal Entrance

4.3.5 The Fingal County Council pluvial flood mapping indicates flooding around the West Apron to be severe, with deep areas of flooding indicated to occur in proximity to the Underpass entrance. For the 1 in 100 year event, this can cause flooding to a depth of >1.0 m. The Underpass entrance is located in an area at a slightly shallower depth of indicative flooding, bands 0.1 – 0.3 m and 0.3 – 0.6 m). The flooding is due to a topographic low point located in the eastern corner of West Apron, with the large area of impermeable hardstanding being located upslope to the south and west.

Summary

4.3.6 A review of the pluvial flood maps and topography indicates there is a risk to the Underpass from overland flow and the resultant surface water flooding. This is due to rainfall on large areas of associated hardstanding, which notwithstanding the presence of the airport drainage, could result in the ingress of overland flow into the Underpass. Based on this risk, mitigation will be required to ensure this can be safely managed.

4.4 Inland Flooding – Fluvial

4.4.1 A review of the OPW fluvial flood mapping indicates the site is located within Flood Zone C; where the probability of flooding from rivers and sea is low (less than 1 in 1000 annual probability). The closest modelled fluvial flood extent is located approximately 1 km east of the proposed Underpass route, which is the upstream modelled extent of Cuckoo Stream. Whilst this seemingly would suggest a low risk of flooding, as the route is beyond the modelled upstream boundary more information is required to be certain that this risk is low.

4.4.2 In response, a request for more information regarding the current capacity was made to the wider project team. Within the response, it was confirmed that hydraulic modelling of the culvert has been undertaken to ascertain the existing capacity and to calculate inflows from the existing airfield and catchment upstream. The study concluded there is sufficient capacity with the existing Airfield Trunk Culvert to convey the 1 in 100 year event, including 30% uplift for climate change.

4.4.3 There is, however, a residual risk of flooding to the Underpass occurring during an extreme event (>1 in 100 year climate change event) which will require mitigation. As such, the risk of flooding from fluvial sources is considered to be low, but with a residual risk of flooding during an extreme event.

4.5 Inland Flooding – Drainage/Sewer Flooding

4.5.1 As referred to in Section 4.1, the client and wider project team have reported existing issues with airport drainage which require regular operative interventions from the airport team to prevent flooding. As the reporting is anecdotal, it is difficult to ascertain what aspect of the network is subject to flooding/capacity issues, and which return periods would see the onset of flooding.

4.5.2 Should the capacity of the existing airport drainage around either the eastern or western entrance be exceeded and cause flooding, surface water could begin to spill from existing manholes and gullies. Due to the availability of information and in the absence of a formal drainage model, it is not possible to ascertain likely flooded depths/extents for given return periods, but it can be assumed that the flooding would be similar in nature to surface water/overland flow, occupying lower lying areas.

4.5.3 Given the nature of the risk to the Underpass, mitigation of drainage/sewer flooding is required.

4.6 Groundwater Flooding

4.6.1 The risk of groundwater flooding is particularly prevalent given the nature of the development, which is formed largely below ground. Shallow groundwater was previously identified at the site in trial pits (dug to around 1 m depth), boreholes (drilled to 7.3 m) and a groundwater monitoring well. Whilst these results are not conclusive evidence for the Underpass (being taken at a neighbouring location), it does suggest that groundwater levels are, at the very least, likely to be variable across the Underpass route. Based on an assessment of the information available, the risk from groundwater is likely to be such that mitigation measures are required.

4.7 Flood Risk to Downstream Receptors

4.7.1 Along with the risk to the Underpass itself, there is a risk that the development proposals could exacerbate flood risk elsewhere, either through displacement of flood water, or through increasing impermeable areas and associated runoff.

4.7.2 Based on each potential source of flooding, the following assessment has been made regarding the downstream impact on flood risk as a result of the development:

- **Coastal:** Not at risk from coastal flooding;
- **Overland flow/surface water:** The flood mapping indicates large volumes of flooding at the proposed west portal, which due to the water exclusion measures from the tunnel could result in some flood water being displaced to other areas. However, this is likely to be a relatively small volume (<50 m^3 based on flooded extent and depth) which may locally cause an increase in flooded depth, but is unlikely to impact receptors downstream beyond the airport boundary;
- **Fluvial:** Flood Zone C designation indicates no fluvial flooding, and as such no displacement of flood water. This will however be reviewed upon receipt of a response confirming the Airfield Trunk Culvert capacity;
- **Drainage/sewer flooding:** The development will reduce runoff to a peak rate of 2 l/s, and as such reduce loading on the existing sewer network ensuring no adverse impacts; and
- **Groundwater:** There is the potential for some displacement of groundwater due to waterproofing of the Underpass. This will prevent groundwater from occupying any part of the Underpass alignment. However, due to the volume of groundwater locally present it is unlikely that this displacement would result in increased flood risk elsewhere.

4.7.3 Based on the assessment above, but subject to confirmation of the Airfield Trunk Culvert capacity, the impact of the development on flood risk to neighbouring locations is considered to be low.

4.8 Summary

4.8.1 The risk from all sources has been assessed, and any source which has been identified to be above low will necessitate the inclusion of mitigation measures to ensure the development can remain safe over its lifetime. The risk from each source is summarised in Table 4.1 below.

Table 4.1 Summary of Flood Risk from all Sources

Source	Summary	Mitigation Required?
Coastal	Not at risk from coastal sources	No
Overland flow/surface water	Discernible risk requiring mitigation	Yes
Fluvial	Low, but residual risk from extreme event	No
Drainage/sewer flooding	Discernible risk requiring mitigation	Yes
Groundwater flooding	Discernible risk requiring mitigation	Yes
Flood risk passed downstream	No increased downstream flood risk subject to inclusion of mitigation measures	Not directly

4.8.2 Based on the assessment undertaken of flooding from all sources, mitigation is required for the risk of flooding from overland flow/surface water, sewer flooding and groundwater flooding.

5. MITIGATION

5.1 Protection of Underpass Entrance

5.1.1 A review of the topographic levels around existing West Apron and Pier 3 areas and those proposed for the Underpass entrance identify the potential for overland flow of surface water entering the Underpass during heavy rainfall. This represents a particular risk at the West Apron, where significant surface water flooding could take place.

5.1.2 To protect the Underpass, it is proposed to elevate ground levels slightly around the entrance to act as barrier to overland flow, minimising entry into the Underpass. This ground raising could be integrated with the linear slot drains at the entrances described in the drainage strategy, which would combine to not only minimise the flow of surface water into the Underpass, but also facilitate the removal away from the Underpass entrance into the drainage system. The extent to which ground levels are raised will be subject to detailed design but would typically be required to be 150 mm above the surrounding apron level.

5.2 Tanking/Water Proofing of Underpass

5.2.1 The assessment of flood risk has identified a potential risk of groundwater flooding to the Underpass. Should high groundwater come into contact with the Underpass structure, this could cause seepage into the Underpass and potentially flooding. As part of the Underpass design, the structure will be surrounded by a waterproofing membrane, with a design life of 120 years. This will minimise entry of groundwater from the surrounding ground into the Underpass.

5.3 Pumping Capability

5.3.1 Primarily forming part of the surface water strategy, a series of pumping units will be located within the base/low point of the Underpass. The pumping capability is required as no gravity connection can be made directly to the Airfield Trunk Culvert due to the relative depth of the culvert compared to the proposed vertical alignment of the Underpass, i.e. the base of the Underpass is located below the invert level of the culvert.

5.3.2 Although primarily designed to remove surface water collected at the Underpass entrances, the pumping facility will also allow collection of runoff or groundwater entering the Underpass which will then be pumped to Airfield Trunk Culvert, preventing build-up of surface/ground water which could cause flooding.

5.4 Surface Water Strategy

5.4.1 The drainage strategy proposes to limit runoff from the Underpass development area to 2 l/s for all return periods (up to and including 1 in 100-year storm +30%). The overall attenuation required at the proposed limiting discharge rate equates to circa 640 m^3. Additional emergency storage volume of 125 m^3 will also be provided at Underpass level in case of pump failures. This will result in reduced loading of Cuckoo Stream and reduce the risk of future flooding.

5.4.2 In order to protect the Underpass drainage during an extreme event, a non-return valve (NRV) will be fitted to drainage outfall into Airfield Trunk Culvert. Notwithstanding that an extreme rainfall event would most likely also cause flooding to the Underpass drainage, the NRV will

prevent backflow from Cuckoo Stream into the Underpass drainage, helping to manage the residual fluvial risk.

5.5 Management of Underpass

5.5.1 The measures above summarise the types of mitigation that will be used to reduce the likelihood of flooding within the Underpass. There are however some events in which the mitigation measures could be insufficient leading to the Underpass becoming impassable should a sufficient of depth of flooding occur, for example, during an extreme rainfall event, power failure or fire incident (from water used to supress the fire).

5.5.2 In such an eventuality, and to ensure these is no risk to personnel, the Underpass will be closed as a safeguard until maintenance and further inspections can be carried out. It should be emphasised however that with the mitigation measures in place, the likelihood of the requirement to close the Underpass is considered to be low and is considered a residual risk.

6. SUMMARY

6.0.1 A Flood Risk Assessment has been undertaken to support the planning, design and construction of a new Underpass at Dublin Airport that will connect Pier 3 in the east of the campus to the West Apron in the west of the campus in order to bypass the existing runway and taxiway crossings required to access the western airfield.

6.0.2 The development will be a twin bore construction with two portal entrances, a length of below-ground tunnel aligning below the existing western airfield, a carriageway conveying transport vehicles and new drainage system complete with storage, pumping and failsafe system.

6.0.3 In order to demonstrate that the development can remain safe from flooding over its lifetime, a robust assessment of flood risk has been undertaken. This assessment has collected and reviewed data from a number of sources, established a baseline flood risk and used this baseline to assess the risk to the proposals.

6.0.4 A review of all available information indicates that the main risks of flooding to the Underpass are from surface water/overland flow, sewer/drainage flooding and groundwater. In particular, a rainfall-runoff model of the airport has indicated a number of areas of potentially deep flooding at the West Apron. A summary of the flood risk from each source is summarised as follows:

- Surface water/overland flow: High risk to West Apron area with deep flooding possible, and potential route for overland flow into the eastern portal at Pier 3;
- Drainage/sewer flooding: Extensive drainage system present within the airport reflecting large impermeable areas. The client and project team reported existing issues with drainage capacity and flooding; and
- Groundwater: Across testing pits and boreholes groundwater level was found to be variable, and in some cases high leading to a risk that the underpass structure could intersect groundwater levels.

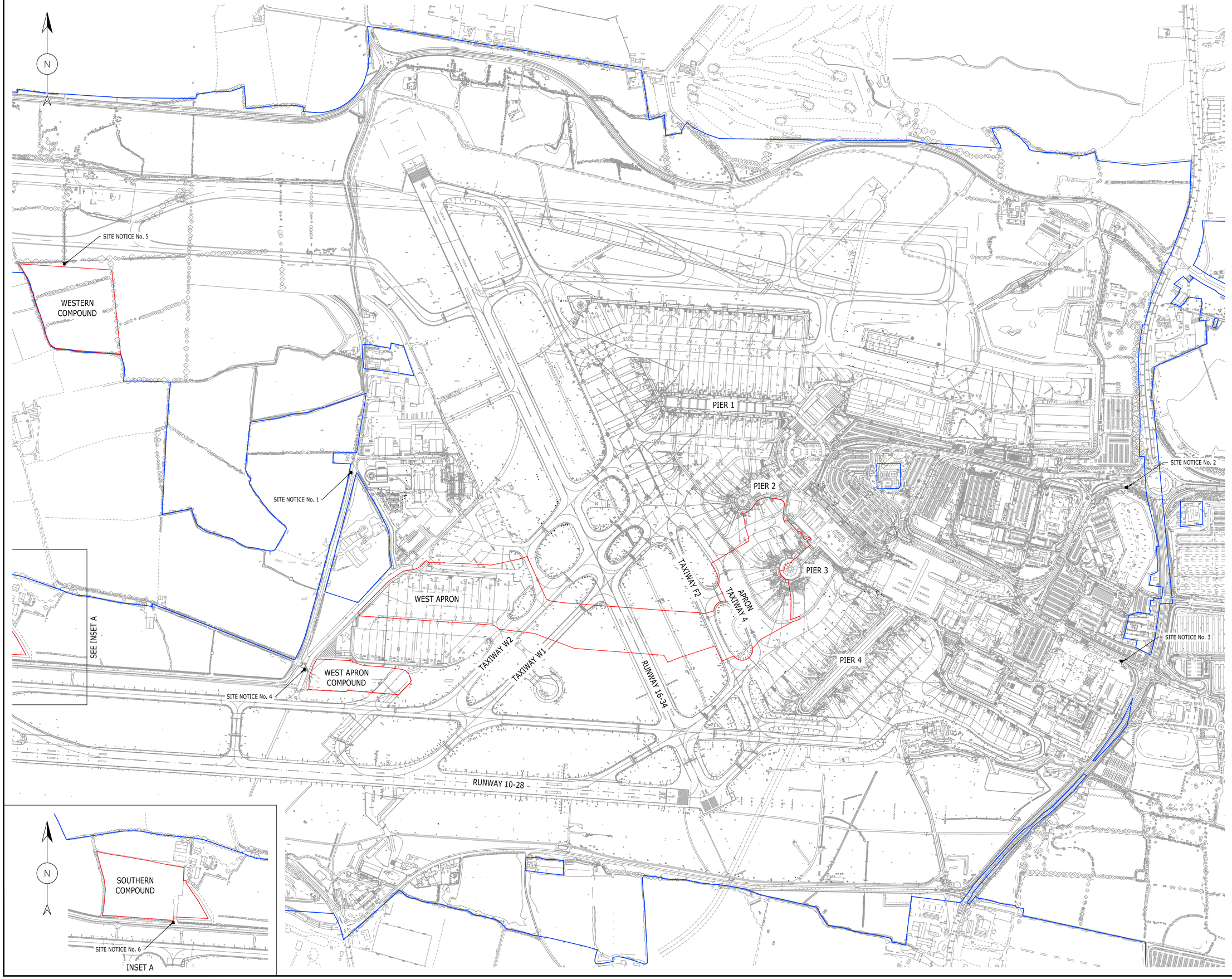
6.0.5 The risk of flooding from all other sources was considered to be low.

6.0.6 In response to the risks identified, a number of mitigation measures are proposed. The measures range from minimising entry of water into the Underpass, pumping away of water that enters and closure of the Underpass during extreme events. The measures proposed are summarised as follows:

- During an extreme event, should the measures above be overwhelmed, the Underpass would be closed to prevent entry to reduce the risk of airport personnel, vehicles or members of the public coming into contact with flood water;
- Fitting a waterproofing membrane to the underpass to prevent ingress of groundwater, with a 120 year design life;
- Designing of ground levels at each portal to prevent the runoff of water into either entrance;
- A system of pumps located within the Underpass to remove ground/surface water; and
- Design of drainage system that will provide 640 m^3 of storage along with 125 m^3 of emergency storage (used in the event of pump station failure) to reduce the peak flow into Cuckoo Stream (Airfield Trunk Culvert) to 2 l/s and use a non-return valve.

6.0.7 Based on the assessment of flood risk, and subject to inclusion of all identified mitigation measures, it is anticipated that flood risk to the new Underpass at Dublin Airport can be managed in a safe and sustainable manner.

APPENDIX A
SITE LOCATION PLAN



Legend

- Planning Application Boundary
- daa Land Ownership
- Site Notice Location

Notes

1. Do not scale from this drawing.
2. All dimensions are in millimetres UNO.
3. All levels are in metres above ordance datum UNO.
4. This drawing is to be read in conjunction with all the relevant drawings and specifications.
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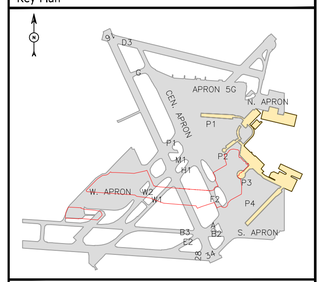
Key Plan



Status

Rev	Description	Issued By	Date
5	Preliminary	SP	27.06.22
4	Preliminary	CAS	16.02.22
3	Preliminary	CAS	03.12.21
2	Preliminary	CAS	04.12.20
1	Preliminary	CAS	25.09.20

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PROJECT:

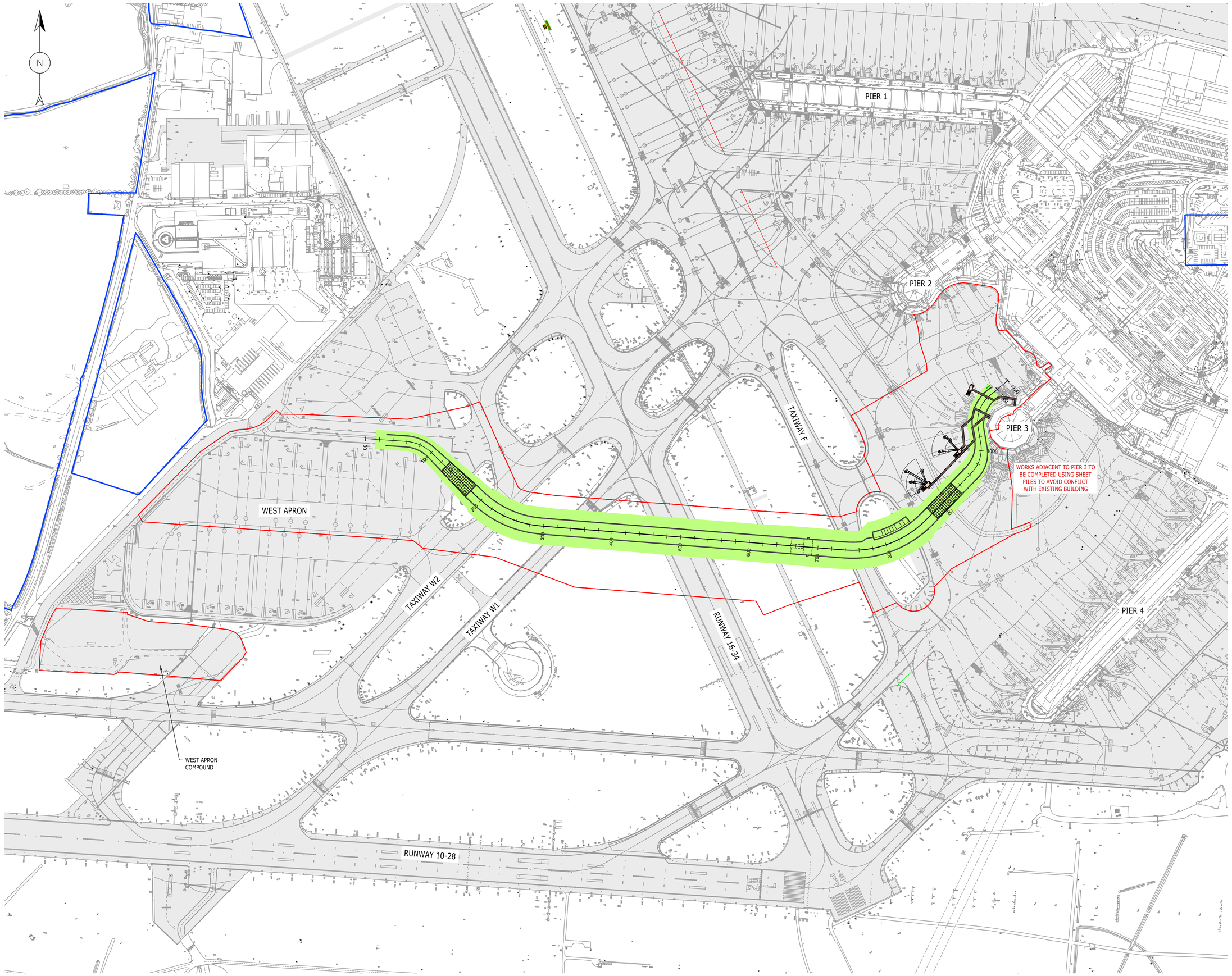
Dublin Airport
WAVU
-

TITLE:

Location Plan

Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
CAS	CAS	MDS	MDS	BN
Date: 20.07.2020		Scale : 1:2500	A1	Stage: -
Drawing No.: 1100040489-RAM-00-DR-ZZ-00001				Rev: 5

APPENDIX B
DEVELOPMENT PROPOSALS AND REDLINE BOUNDARY



Legend

- Planning Application Boundary
- daa Land Ownership
- Proposed Underpass Excavation Extents

Notes

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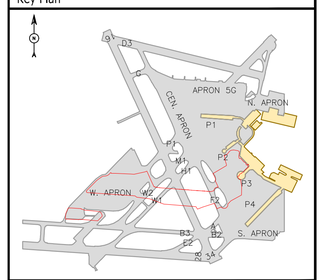
Key Plan



Status

Rev	Description	Issued By	Date
9	Preliminary	SP	27.06.22
8	Preliminary	CAS	16.02.22
7	Preliminary	CAS	03.12.21
6	Preliminary	SP	09.11.21
5	Preliminary	CAS	02.11.21

Client

DublinAirport

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Old Central Terminal Building,
Dublin Airport,
Co. Dublin, Ireland

Consultant

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www.ramboll.com

PROJECT:
Dublin Airport
WAVU
-

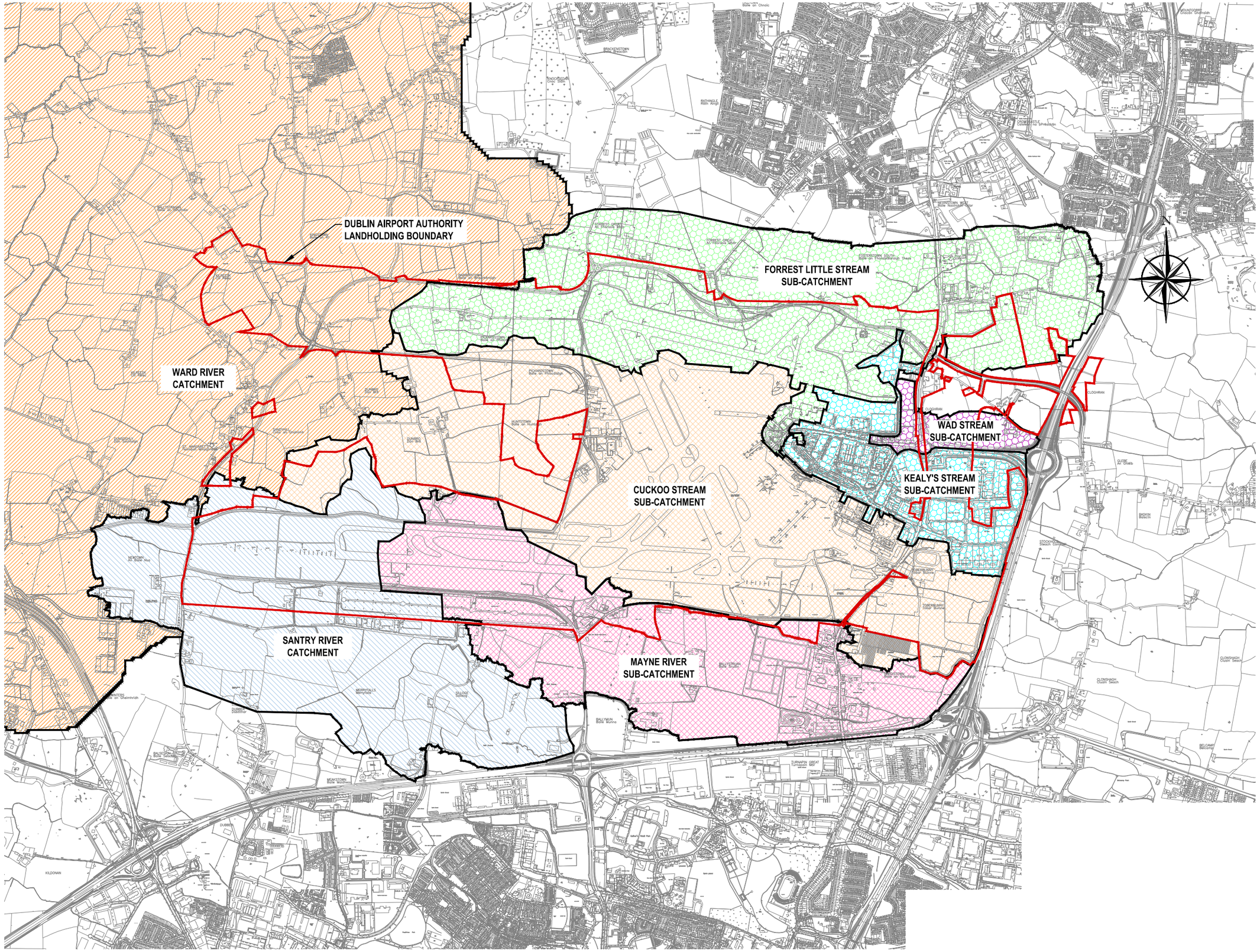
TITLE:
PROPOSED SITE LAYOUT PLAN

Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
CAS	CAS	MDS	MDS	BN

Date: 30.07.2020 | Scale : 1:2500 | A1 | Stage: -

Drawing No.: 1100040489-RAM-00-DR-ZZ-00004 | Rev: 9

APPENDIX C
CATCHMENT PLAN AND SEWER RECORDS



CATCHMENT AREAS - OVERALL MAP

NOT TO SCALE

NOTES

NOTE

SUB CATCHMENT BOUDARIES SHOWN ON THIS MAP ARE BASED ON EXISTING DRAINAGE PATTERNS WITHIN THE AIRPORT LANDHOLDING WEST OF THE M1 ONLY.

LEGEND

DAA LAND BOUNDARY

WARD RIVER CATCHMENT

WARD RIVER CATCHMENT (PART)

SLUICE RIVER CATCHMENT

FORREST LITTLE STREAM SUB-CATCHMENT

WAD STREAM SUB-CATCHMENT

KEALY'S STREAM SUB-CATCHMENT

MAYNE RIVER CATCHMENT

CUCKOO STREAM SUB-CATCHMENT

MAYNE RIVER CATCHMENT

SANRTY RIVER CATCHMENT

SANTRY RIVER CATCHMENT

REV	DATE	DESCRIPTION	D	C	A
A	09.04.20	WARD CATCHMENT ADDED	DS	LMcG	GR

PRELIMINARY

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E dublin@nodwyer.com
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CLIENT: daa

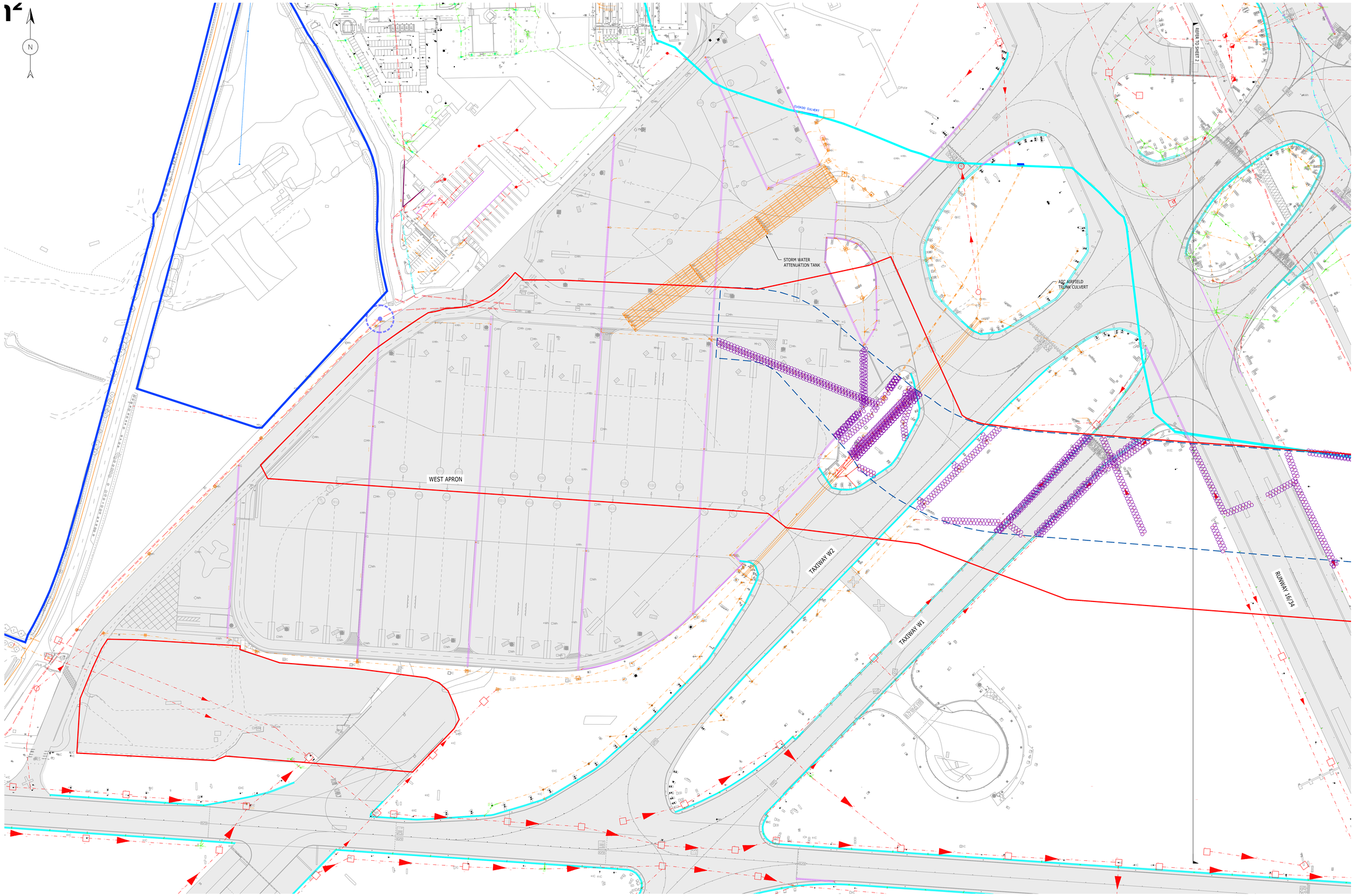
PROJECT: DUBLIN AIRPORT DRAINAGE MASTER PLAN

TITLE: CATCHMENT AREAS OVERALL MAP

SCALES	DRAWN	CHECKED	APPROVED
NOT TO SCALE	K. Lim	O. O'Brien	G. Reilly
	DATE 03.03.2020	DATE 03.03.2020	DATE 03.03.2020

DRAWING No. 20771-38-DC-005

REV A



Legend

- Existing service to be removed
- Existing service to be diverted
- Existing service to be temporary diverted/replaced
- Existing service to be protected
- Extent of underpass works
- Planning Application Boundary
- daa Land Ownership

Notes

1. Do not scale from this drawing.
2. All dimensions are in millimetres UNO.
3. All levels are in metres above ordance datum UNO.
4. This drawing is to be read in conjunction with all the relevant drawings and specifications.
5. Do not use this drawing for construction purposes.
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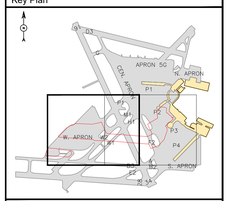
7. Ramboll accepts not responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without Ramboll's express written consent.
8. Existing services from daa records.
9. Background mapping is from 'General Plan Horizontal Geometry' received from daa June 2020, Irish grid reference O160433.

Key Plan



Status

4	Preliminary	CAS	16.02.22
3	Preliminary	CAS	03.12.21
2	Preliminary	CAS	04.12.20
1	Preliminary	BP	25.09.20
0	Preliminary	CAS	07.08.20

Client

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www.ramboll.com

PROJECT:
Dublin Airport
WAVU
-

TITLE:
UNDERGROUND SERVICES
SHEET 1
-

Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
CAS	CAS	MDS	MDS	BN

Date: 21.07.2020 Scale : 1:1000 A0 Stage: -

Drawing No.: 1100040489-RAM-00-DR-ZZ-00005 Rev: 4

LEGEND - EXISTING SERVICES

POTABLE WATER NETWORK AS-BUILT
POTABLE WATER NETWORK SURVEYED
POTABLE WATER NETWORK HISTORICAL
DEDICATED FIRE NETWORK AS_BUILT
DEDICATED FIRE NETWORK SURVEYED
FINGAL CC WATER NETWORK
POTABLE FIRE HYDRANTS
DEDICATED FIRE HYDRANTS
DRY RISER SHOWN THUS :
BLANKED END SHOWN THUS :
VALVE SHOWN THUS :
ABANDONED WATER NETWORK

SURFACE WATER DRAINS SURVEYED
SURFACE WATER DRAINS AS-BUILT
SURFACE WATER DRAINS HISTORICAL
CATCHMENT BOUNDARIES
DAA INTERCEPTORS
NON DAA INTERCEPTORS
ATTENUATION TANKS / AREAS
SLOT DRAIN / ACO DRAIN
DISHED CHANNEL
KERB DRAIN
LAND DRAIN
GULLY
STREAMS

Foul Sewer As-Built
Foul Sewer Surveyed
Foul Sewer Historical
Foul Sewer Pumped
Foul Sewer Redundant
Ejector Station
Comms Ducts As-Builts
Comms Ducts Surveyed
Comms Ducts Historical

Gas Main - As-Built
Gas Main - Surveyed
Gas Main - Historical
Gas Main - Redundant
Gas Valve
Gas Installation
Flow Ret & Heating - Historical

ESB 110KV NETWORK
ESB 38KV NETWORK
DAA 10KV NETWORK
ESB 10KV NETWORK
ESB 2/10KV UNSURVEYED
ESB OVERHEAD 8KV OR HIGHER
ESB OVERHEAD MV
ESB OVERHEAD LV
MVSB XX
KNOWN JOINT LOCATIONS
HISTORICAL JOINT LOCATIONS

DAA MV SUBSTATION NO.

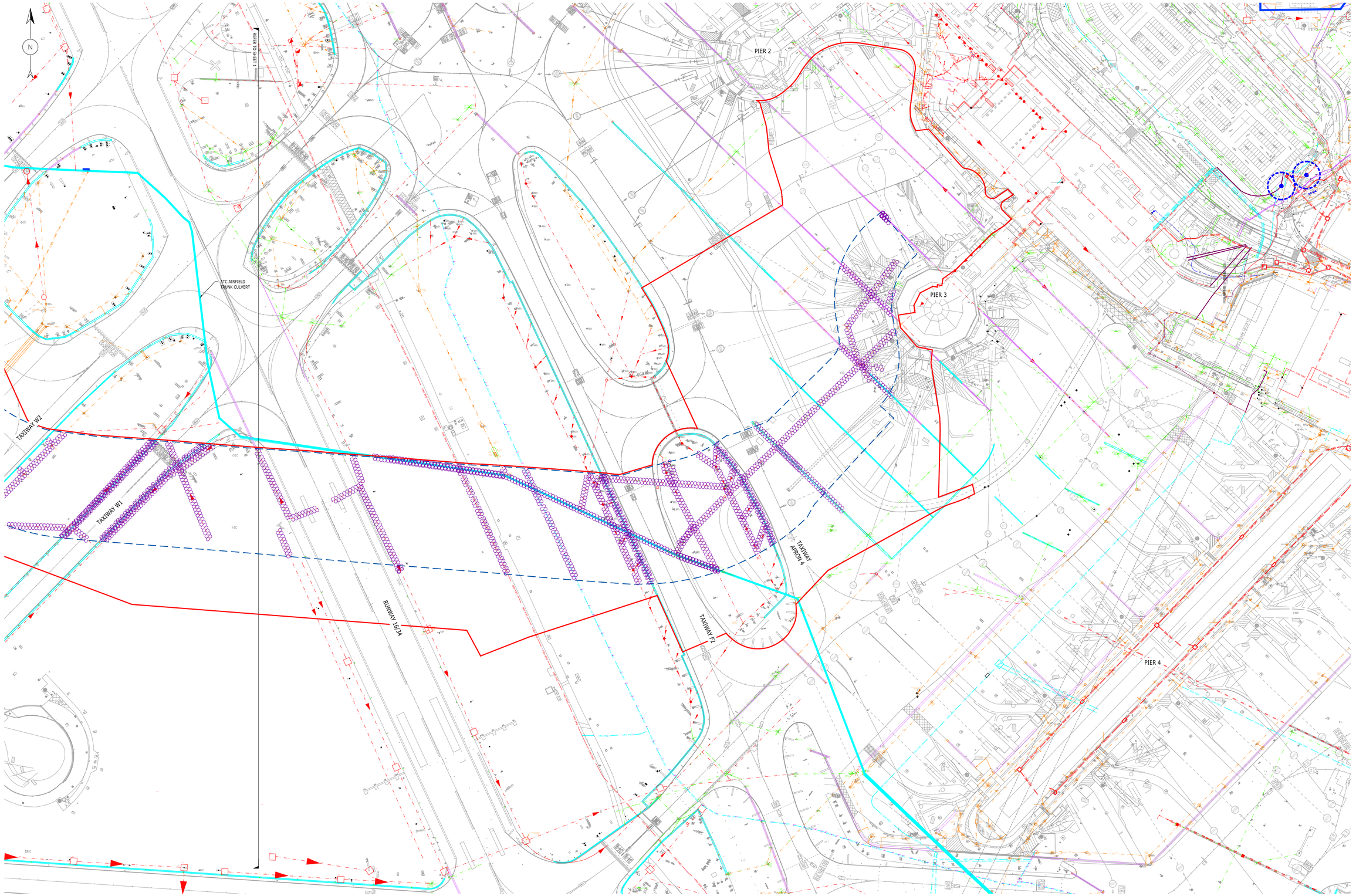
LV Ducting As-Built
LV Sawcut As-Built
LV Manhole As-Built
LV Ducting Surveyed
LV Sawcut Surveyed
LV Manhole Surveyed
LV Ducting Historical
LV Sawcut Historical
LV Manhole Historical
LV Ducting T2 Unverified

Airfield Signage Surveyed
Airfield Signage As-Built
High Mast Light
LV Ducting As-Built 5G Draft
LV Sawcut As-Built 5G Draft
LV Manhole As-Built 5G Draft

Public lighting As-Built
Public lighting Surveyed
Public lighting Historical
Public lighting Redundant

Traffic Ducts As-Built
Traffic Ducts Surveyed
Traffic Ducts Historical
Traffic Ducts Redundant

Fuelmain As-Built
Fuelmain Surveyed
Fuelmain Historical
Diesel Tanks
Potassium Acetate Tanks



Legend

- Existing service to be removed
- Existing service to be diverted
- Existing service to be temporary diverted/replaced
- Existing service to be protected
- Extent of underpass works
- Planning Application Boundary
- daa Land Ownership

Notes

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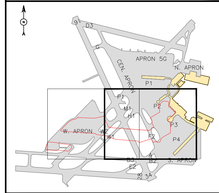
8. Existing services from daa records.
9. Background mapping is from 'General Plan Horizontal Geometry' received from daa June 2020, Irish grid reference O160433.

Key Plan



Status

5	Preliminary	SP	27.06.22
4	Preliminary	CAS	16.02.22
3	Preliminary	CAS	03.12.21
2	Preliminary	CAS	04.12.20
1	Preliminary	SP	25.09.20

Client

DublinAirport

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Consultant

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PROJECT:
Dublin Airport
WAVU
-

TITLE:
UNDERGROUND SERVICES
SHEET 2
-

Drawn By:		Checked By:		Approved:
CAD	Designer	Discip. Lead	Design Lead	Design Manager
CAS	CAS	MDS	MDS	BN

Date: 31.07.2020 Scale : 1:1000 A0 Stage: -

Drawing No.: 1100040489-RAM-00-DR-ZZ-00006 Rev: 5

LEGEND - EXISTING SERVICES

POTABLE WATER NETWORK AS-BUILT
POTABLE WATER NETWORK SURVEYED
POTABLE WATER NETWORK HISTORICAL
DEDICATED FIRE NETWORK AS_BUILT
DEDICATED FIRE NETWORK SURVEYED
FINGAL CC WATER NETWORK
POTABLE FIRE HYDRANTS
DEDICATED FIRE HYDRANTS
DRY RISER SHOWN THUS :
BLANKED END SHOWN THUS :
VALVE SHOWN THUS :
ABANDONED WATER NETWORK

SURFACE WATER DRAINS SURVEYED
SURFACE WATER DRAINS AS-BUILT
SURFACE WATER DRAINS HISTORICAL
CATCHMENT BOUNDARIES
DAA INTERCEPTORS
NON DAA INTERCEPTORS
ATTENUATION TANKS / AREAS
SLOT DRAIN / ACO DRAIN
DISHED CHANNEL
KERB DRAIN
LAND DRAIN
GULLY
STREAMS

Foul Sewer As-Built
Foul Sewer Surveyed
Foul Sewer Historical
Foul Sewer Pumped
Foul Sewer Redundant
Ejector Station
Comms Ducts As-Builts
Comms Ducts Surveyed
Comms Ducts Historical

Gas Main - As-Built
Gas Main - Surveyed
Gas Main - Historical
Gas Main - Redundant
Gas Valve
Gas Installation
Flow Rot & Heating - Historical

ESB 110KV NETWORK
ESB 38KV NETWORK
DAA 10KV NETWORK
ESB 10KV NETWORK
ESB 2/10KV UNSURVEYED
ESB OVERHEAD 8KV OR HIGHER
ESB OVERHEAD MV
ESB OVERHEAD LV
MVSB XX
KNOWN JOINT LOCATIONS
HISTORICAL JOINT LOCATIONS
DAA MV SUBSTATION NO.

LV Ducting As-Built
LV Sawcut As-Built
LV Manhole As-Built
LV Ducting Surveyed
LV Sawcut Surveyed
LV Manhole Surveyed
LV Ducting Historical
LV Sawcut Historical
LV Manhole Historical
LV Ducting T2 Unverified

Airfield Signage Surveyed
Airfield Signage As-Built
High Mast Light
LV Ducting As-Built SG Draft
LV Sawcut As-Built SG Draft
LV Manhole As-Built SG Draft

Public lighting As-Built
Public lighting Surveyed
Public lighting Historical
Public lighting Redundant

Traffic Ducts As-Built
Traffic Ducts Surveyed
Traffic Ducts Historical
Traffic Ducts Redundant

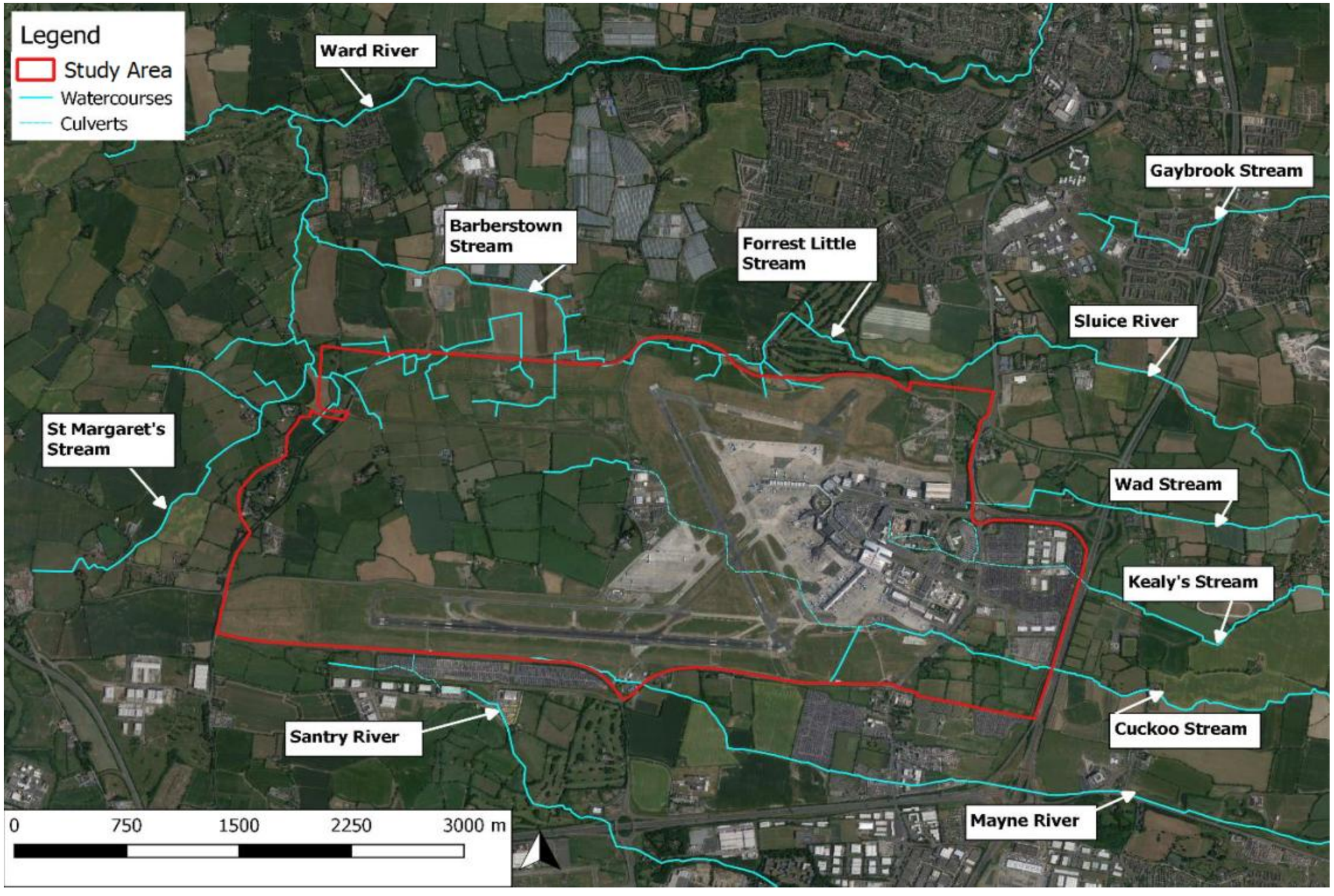
Fuelman As-Built
Fuelman Surveyed
Fuelman Historical
Diesel Tanks
Potassium Acetate Tanks

APPENDIX D
FLOOD MAPPING

Dublin Airport Hydrology / Watercourses Plan – Taken from DRAFT DUBLIN AIRPORT LOCAL AREA PLAN - Strategic Flood Risk Assessment and Surface Water Management Plan (2019)

Produced for: Fingal County Council

Produced by: JBA Consulting Ltd



Dublin Airport SFRA
Pluvial Flooding

Fluvial Flood Zones within Airport LAP – Taken from DRAFT DUBLIN AIRPORT LOCAL AREA PLAN - Strategic Flood Risk Assessment and Surface Water Management Plan (2019)

Produced for: Fingal County Council
Produced by: JBA Consulting Ltd