RIDA
FLOOD RISK ASSESSMENTS & DRAINAGE STRATEGIES

FLOOD RISK ASSESSMENT

322 Broomloan Road, Glasgow, G51 2JW

Reference: 337 FRA- 001

Mar-22

www.rida-reports.co.uk

Rev 1 Produced by: ARD 01608 510 121 arge@rida-reports.co.uk

FLOOD RISK ASSESSMENTS &
DRAINAGE STRATEGIES

Flood Risk Assessment

322 Broomloan Road, Glasgow, G51 2JW

Reference: 337 FRA- 001

Report Limitations

All comments and proposals contained in this report, including any conclusions, are based on information available to RIDA Reports during investigations. The conclusions drawn by RIDA Reports could therefore differ if the information is found to be inaccurate or misleading. RIDA Reports accepts no liability should this be the case, nor if additional information exists or becomes available with respect to this scheme.

Except as otherwise requested by the client, RIDA Reports is not obliged to and disclaims any obligation to update the report for events taking place after the date on which the assessment was undertaken.

RIDA Reports makes no representation whatsoever concerning the legal significance of its findings or the legal matters referred to in the following report.

All SEPA's mapping data used under special license. Data is current as the data on the correspondence given by SEPA and is subject to change.

The information presented and conclusions drawn are based on statistical data and are for guidance purposes only.

The study provides no guarantee against flooding of the study site or elsewhere, nor of the absolute accuracy of water levels, flow rates and associated probabilities.

This report has been prepared for the sole use of our direct client. No other third parties may rely upon or reproduce the contents of this report without the written permission of RIDA Reports. If any unauthorised third party comes into possession of this report they rely on it at their own risk and the authors do not owe them any Duty of Care or Skill.

Oxford Innospace, Old Music Hall, 106-108 Cowley Road, Oxford, OX4 1JE
England and Wales number 10590566

Introduction 1

Purpose of this report

1.1 RIDA Reports Ltd has been appointed to undertake a Flood risk assessment for a development located at 322 Broomloan Road, located at G51 2JW. This flood risk assessment considers the risks of all types of flooding to the site and sets out measures to minimise flood risk to the site and elsewhere over the lifetime of the development.

Policy Requirements

1.2 The 2021 Scottish Planning Policy (SPP) has been challenged and therefore the SPP published in June 2014 is still relevant to the evaluation of flood risk. The SPP sets out national planning policies which reflect Scottish Government's priorities for operation of the planning system and for the development and use of land.

1.3 The National Planning Framework (NPF) provides a statutory framework for Scotland's long term spatial development and sets out the Scottish Government's spatial development priorities for the next 20 to 30 years. The SPP sets out the policy that will help to deliver the objectives of the NPF.

1.4 In accordance with SPP a development must consider:

•a precautionary approach to flood risk from all sources, including coastal, water course (fluvial), surface water (pluvial), groundwater, reservoirs and drainage systems (sewers and culverts), taking account of the predicted effects of climate change;

• flood avoidance: by safeguarding flood storage and conveying capacity, and locating development away from functional flood plains and medium to high risk areas;

• flood reduction: assessing flood risk and, where appropriate, undertaking natural and structural flood management measures, including flood protection, restoring natural features and characteristics, enhancing flood storage capacity, avoiding the construction of new culverts and opening existing culverts where possible; and

• avoidance of increased surface water flooding through requirements for Sustainable Drainage Systems (SuDS) and minimising the area of impermeable surface.

256. To achieve this, the planning system should prevent development which would have a significant probability of being affected by flooding or would increase the probability of flooding elsewhere.
Piecemeal reduction of the functional floodplain should be avoided given the cumulative effects of reducing storage capacity.

Site Assessment 2

Development Site and Location

2.1 The site is located at Broomloan Road, Glasgow. The nearest post code is G51 2JW. Refer to appendix A for site location plan.

2.2 The site is an industrial estate, and is currently used for the washing and storage of tanks from the distillery industry. Refer to Appendix B for more details.

Development Proposals

2.3 The proposed development includes the installation of 49.9 mega watt battery energy storage facility. Refer to Appendix B for layout of the proposed development.

Site Hydrology and Hydrogeology

Hydrology

2.4 The River Clyde is located approximately 1000 m away from the development.

Site Geology

Bedrock

2.5 The British Geological Society records of the site show that it is located within the Limestone Coal.

Superficial Deposits

2.6 The British Geological Society records show that the superficial deposits are Silt, Sand and Gravel.

Development Planning - River Flooding

3.1 The Scottish Planning Policy (SPP) states that:

Local development plans should use the following flood risk framework to guide development.
This sets out three categories of coastal and watercourse flood risk, together with guidance on surface water flooding, and the appropriate planning approach for each (the annual probabilities referred to in the framework relate to the land at the time a plan is being prepared or a planning application is made):

- ***Little or No Risk*** *– annual probability of coastal or watercourse flooding is less than 0.1% (1:1000 years)*
  o No constraints due to coastal or watercourse flooding.
- ***Low to Medium Risk*** *– annual probability of coastal or watercourse flooding is between 0.1% and 0.5% (1:1000 to 1:200 years)*
  o Suitable for most development. A flood risk assessment may be required at the upper end of the probability range (i.e. close to 0.5%), and for essential infrastructure and the most vulnerable uses. Water resistant materials and construction may be required.
  o Generally not suitable for civil infrastructure. Where civil infrastructure must be located in these areas or is being substantially extended, it should be designed to be capable of remaining operational and accessible during extreme flood events.
- ***Medium to High Risk*** *– annual probability of coastal or watercourse flooding is greater than 0.5% (1:200 years)*
  o May be suitable for:
  ▪ residential, institutional, commercial and industrial development within built-up areas provided flood protection measures to the appropriate standard already exist and are maintained, are under construction, or are a planned measure in a current flood risk management plan;
  ▪ essential infrastructure within built-up areas, designed and constructed to remain operational during floods and not impede water flow;
  ▪ some recreational, sport, amenity and nature conservation uses, provided appropriate evacuation procedures are in place; and
  ▪ job-related accommodation, e.g. for caretakers or operational staff.
  o Generally not suitable for:
  ▪ civil infrastructure and the most vulnerable uses;
  ▪ additional development in undeveloped and sparsely developed areas, unless a location is essential for operational reasons, e.g. for navigation and water-based recreation, agriculture, transport or utilities infrastructure (which should be designed and constructed to be operational during floods and not impede water flow), and an alternative, lower risk location is not available; and
  ▪ new caravan and camping sites.
  o Where built development is permitted, measures to protect against or manage flood risk will be required and any loss of flood storage capacity mitigated to achieve a neutral or better outcome.
  o Water-resistant materials and construction should be used where appropriate. Elevated buildings on structures such as stilts are unlikely to be acceptable.

Development Planning - Surface Water Flooding

3.2 • *Infrastructure and buildings should generally be designed to be free from surface water flooding in rainfall events where the annual probability of occurrence is greater than 0.5% (1:200 years).*

• *Surface water drainage measures should have a neutral or better effect on the risk of flooding both on and off the site, taking account of rain falling on the site and run-off from adjacent areas.*

SEPA Technical Flood Risk Guidance

3.3 The SEPA 'Technical Flood Risk Guidance for Stakeholders' is a technical guidance document which outlines the hydrological and hydraulic modelling methodologies applicable to the sites and indicates the minimum requirements of a Flood Risk Assessment.

SEPA Policy 41 sets out roles and responsibilities of SEPA and Planning Authorities.

SEPA Technical Flood Risk Guidance

3.4 *The purpose of this guidance is to:*
- aid understanding of the relative vulnerability to flooding of different land uses;
- assist in the interpretation of SEPA's Flood Risk Planning Guidance, which is based upon the risk framework in the Scottish Government's Scottish Planning Policy 2014 (SPP).

1.2 SEPA has created this guidance to assist in our assessment of the vulnerability to flooding of different types of land use. Table 1 classifies the relative vulnerability of land uses, grouping them into five categories from Most Vulnerable through to Water Compatible Uses.

1.3 Table 2 of this document then provides a very brief outline of the likely SEPA planning response for each set of land uses relative to the category of flood risk, and based upon the risk framework in SPP. For a more detailed understanding of SEPA's likely planning response to proposals through both the Development Planning and Development Management process, this document must be read in conjunction with our Flood Risk Planning Guidance.

1.4 SEPA will use this guidance in the assessment of sites for both Development Planning and Development Management purposes.

Legislation Requirements 3

Flood Risk Management (Scotland) Act 2009

3.5 The Flood Risk Management (Scotland) Act provides the local authority with general powers to manage flood risk in its area and to carry out flood protection work. The Act provides the local authority with general powers to manage flood risk in its area and to carry out flood protection work within or outwith its area. Further, a local authority may carry out flood protection work jointly with another local authority under the Local Government (Scotland) Act 1973.

Controlled Activities Regulations (CAR)

3.6 *Section 20 of the Water Environment and Water Services Act (Scotland) 2003 (WEWS) gave Ministers powers to introduce regulatory controls over activities in order to protect and improve the water environment.*

The Regulations are built upon a requirement for controlled activities to be authorised.
The controlled activities are defined within WEWS but are modified by CAR to include the following activities:
• abstractions from surface and groundwater;
• impoundments of rivers, lochs, wetlands and transitional waters;
• groundwater recharge;
• engineering in rivers, lochs and wetlands;
• engineering activities in the vicinity of rivers, lochs and wetland which are likely
to have a significant adverse impact upon the water environment;
• activities liable to cause pollution;
• direct or indirect discharge of List I substances to groundwater;
• any other activities which directly or indirectly is liable to cause a significant adverse impact upon the water environment.

SEPA Flood Risk Standing Advice

3.7 *This is standing advice from the Scottish Environment Protection Agency (SEPA) on flood risk. Although this advice is principally aimed at planning authorities, developers will also find it useful. All other standing advice can be found in our 'Standing Advice for Development Management Consultations'.*

This document provides advice on a number of categories of development. Planning Authorities should not consult us on proposals for these types of development, but instead follow the advice provided. In some cases, local authority flood risk management staff may require some aspect of flood risk to be investigated in a Flood Risk Assessment (FRA). Provided that our standing advice is followed, SEPA should not be consulted.

Flooding from river and sea

4.1 The SEPA flood maps were reviewed as part of this assessment. The proposed development is not affected by river flooding. Therefore the climate change allowances are not relevant for this site. See appendix C

Surface water (overland flows) flood risk

4.2 The SEPA maps show that the site is partially affected by surface water flooding. The flooding is likely to be located at the entrance of the site. Reviewing the map, it shows that this is localised flooding due to the levels within the land. The flood risk from surface water is medium. This means that each year this area has a 0.5% (1 in 200 storm) chance of flooding. The residual risk of localised ponding remains likely. See appendix C for details.

Flooding from drainage systems in adjacent areas

4.3 A request for information has been submitted to the local council in regards to flooding from adjacent systems.

Future Floods

4.4 The future flood maps states that the site is not within risk of future flooding.

Groundwater flood risk

4.5 There is potential for groundwater flooding above ground level within the development. Groundwater levels would tend to vary seasonally and are influenced by ground and meteorological conditions and proximity to water features. The groundwater flooding risk for this site is considered to be high. Refer to appendix C for record drawings.

Flood Risk Management 5

5.1 The Flood hazard assessment has demonstrated that the site is:

- At no risk of river flooding
- At Medium risk of surface flooding
- At high risk of groundwater flooding

5.2 Under the SPP, it is necessary to demonstrate that, for any new development on the site, it is possible to provide an adequate level of flood protection for personnel working or living at the development and no increase on flooding on areas outside of the development.

Flood Protection

5.3 There are no changes to the levels of the site. The risk of flooding from surface water is likely to be due to undulations within the site that has been picked up by the LIDAR data. This is because the site has a good fall across and water is unlikely to pond deep. It is assumed that this ponding will be in the region of 150mm.

5.4 It is proposed that the equipment stored on site should be installed at a minimum of 150mm above the ground level to allow for protection from ground water flooding and to provide water paths around the site.

5.5 It is proposed that a series of gullies are installed in this area to allow for water to drain away faster. The flooding is unlikely to stop access to the site.

Off-site Impacts 6

6.1 The SPP specifically stipulates that consideration should be given to potential off-site flood impacts of any proposed development. These off-site impacts are in relation to:

- Flood flow conveyance, storage and climate change

- Surface water management (See Drainage Impact Assessment Section 7)

Flood Flow conveyance and storage

6.2 Due to the size of the development and its location within the surface water flood risk area, flood compensation for this development is not required.

Surface Water Management

7.1 The current surface water drainage system consists of a piped system discharging directly to the sewer. See appendix C for details.

7.2 The proposed development does not increase the amount of impermeable areas neither changes the current hydraulic conditions and loads into the surface water system. Therefore it is considered that the current surface water is adequate to the change of use of the site.

7.3 With no increase in the rate of surface water discharge from the site, compared to the site in its current configuration, the proposed development would have no adverse impact on surface water flood risk at the site or surrounding area.

Residual Risk 8

8.1 This flood risk assessment has identified the potential flooding mechanisms that could affect the site. This assessment has concluded that the development site requires additional flood risk mitigation strategies so all the flood risk can addressed.

Site access and public safety

8.2 This assessment has demonstrated that the proposed development will have no adverse impact on flood risk in the area surrounding the site. Available evidence indicates that the development would result in no change in surface water generation. There is therefore no basis to indicate that, with respect to flood risk, the proposed development would have adverse impact on public safety.

Flood Warning and evacuation

8.3 Occupants of the site will be able to evacuate it. This is because of the nature of the flooding and its potential depth.

Conclusions 9

9.1 It is concluded that subject to the proposed mitigation measures, the site can be developed in accordance with the provisions of the SPP and the requirements of the local planning authority and the SEPA.

9.2 This report demonstrates that the proposal will be safe, in terms of flood risk, for its design life and will not increase the flood risk elsewhere.

Appendix A

DRAWING NOTES USE FIGURED DIMENSIONS ONLY

All dimensions, layouts and details to be carefully checked on site prior to ordering materials or commencing construction. MMA to be notified in writing of any found discrepancies.

Any variations to work shown on the drawing shall not be carried out without prior permission from MMA or relevant Engineer.

Drawings to be read in conjunction with all relevant MMA Drawings, Schedules, Specifications and relevant Engineer's Drawings.

LEGEND

- application boundary
- applicant's property
- 20m

Site Location Plan

Scale 1:1250

Scale 1:1250 Metres

10 0 50 100 125

REV:	DESCRIPTION:	BY:	DATE:

STATUS: PLANNING

MMA Macaulay Miller Architecture
www.mma.eco

MMA North, 36 King Harald Street, Lerwick, ZE1 0EQ
MMA South, 20-23 Woodside Place, Glasgow, G3 7QL
email: mail@mma.eco

CLIENT: Lifetime Property Limited

PROJECT: Battery Storage at

322 Broomloan
Glasgow, G51 2JW
Glasgow City Council

DRAWING: Site Location Plan

SCALE @ A3:	DATE:	DRAWN:	CHECKED:
As noted	20/10/2021	CMM	
PROJECT NO:	SERIES:	DRAWING NO:	REV:
21101	(PP)	A001	

Appendix B

DRAWING NOTES USE FIGURED DIMENSIONS ONLY

All dimensions, layouts and details to be carefully checked on site prior to ordering materials or commencing construction. MMA to be notified in writing of any found discrepancies.

Any variations to work shown on the drawing shall not be carried out without prior permission from MMA or relevant Engineer.

Drawings to be read in conjunction with all relevant MMA Drawings, Schedules, Specifications and relevant Engineer's Drawings.

LEGEND

- application boundary
- applicant's property
- 20m

37

31

Works

27

23

306

308

Current yard is asphalt hardstanding

Works

312

Depot

322

Tanks

338

Existing access

Site Plan Existing

Scale 1:200

Scale 1:500 Metres 0 0 25 50

REV: | DESCRIPTION: | BY: | DATE:

STATUS: PLANNING

MMA Macaulay Miller Architecture www.mma.eco

MMA North, 36 King Harald Street, Lerwick, ZE1 0EQ
MMA South, 20-23 Woodside Place, Glasgow, G3 7QL
e:mail: mail@mma.eco

CLIENT: Lifetime Property Limited

PROJECT: Battery Storage at

322 Broomloan
Glasgow, G51 2JW
Glasgow City Council

DRAWING: Site Plan
As Existing

SCALE @ A0:	DATE:	DRAWN:	CHECKED:
As noted	20/10/2021	CMM	
PROJECT NO:	SERIES:	DRAWING NO:	REV:
21101	(PP)	A102	

Security Columns

40ft Battery Containers

Transformers

Convertor Stations

HGV turning head

Small Transformers

Sub-station

6m access track

2.4m Metal Palisade Security Fence and Gate

Parking

Works

Depot

Tanks

37

31

27

23

286

306

308

312

322

338

Site Plan Proposed
Scale 1:200

Scale 1:500
Metres
5 0 25 50

REV:	DESCRIPTION:	BY:	DATE:

STATUS: PLANNING

MMA Macaulay Miller Architecture
www.mma.eco

MMA North, 36 King Harald Street, Lerwick, ZE1 0EQ
MMA South, 20-23 Woodside Place, Glasgow, G3 7QL
email: mail@mma.eco

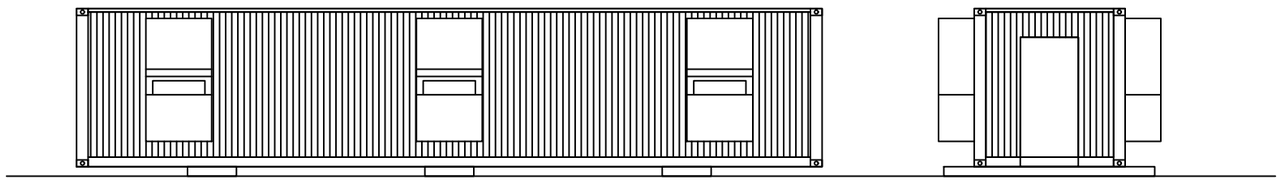
CLIENT: Lifetime Property Limited

PROJECT: Battery Storage at
322 Broomloan
Glasgow, G51 2JW
Glasgow City Council

DRAWING: Site Plan
As Proposed

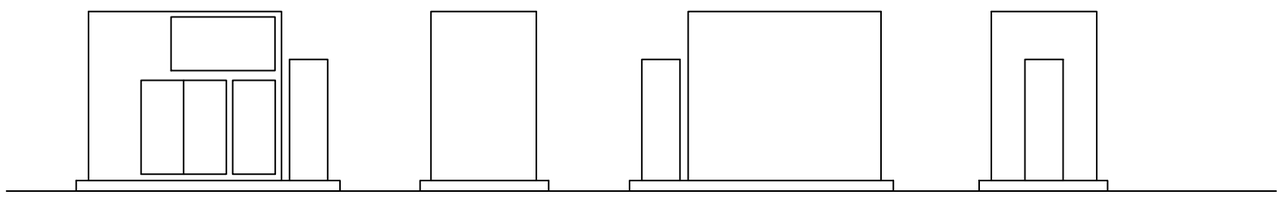
SCALE @ A0:	DATE:	DRAWN:	CHECKED:
As noted	20/10/2021	CMM	

PROJECT NO:	SERIES:	DRAWING NO:	REV:
21101	(PP)	A103	



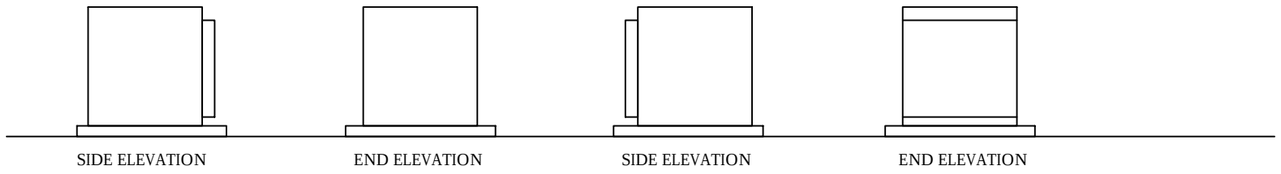
SIDE ELEVATION END ELEVATION

BATTERY CONTAINER & HVAC SYSTEM
@ 1:100



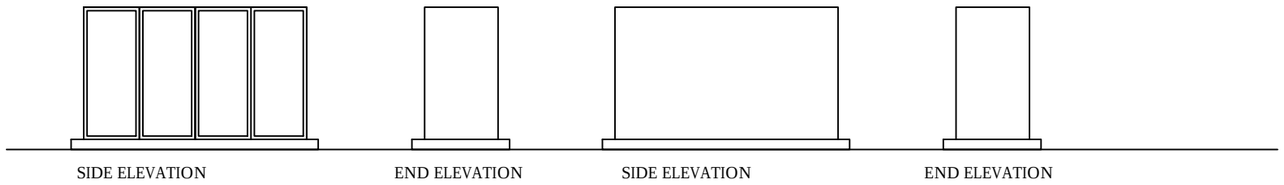
SIDE ELEVATION END ELEVATION SIDE ELEVATION END ELEVATION

POWER CONVERSION SYSTEM
@ 1:100



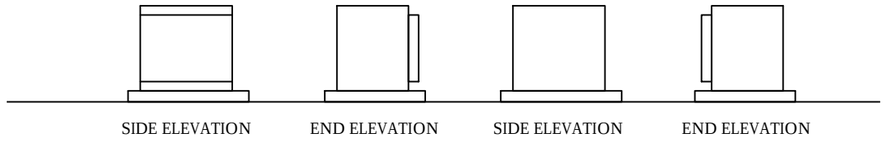
SIDE ELEVATION END ELEVATION SIDE ELEVATION END ELEVATION

TRANSFORMER
@ 1:100



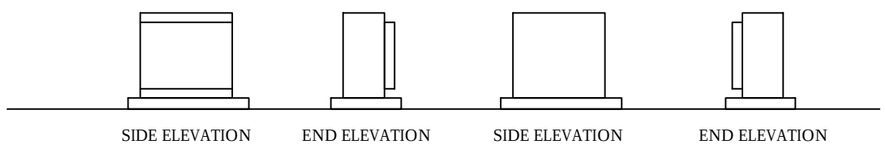
SIDE ELEVATION END ELEVATION SIDE ELEVATION END ELEVATION

UNIT A
@ 1:100



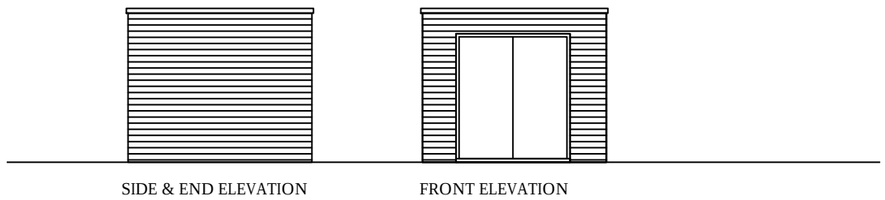
SIDE ELEVATION END ELEVATION SIDE ELEVATION END ELEVATION

SMALL TRANSFORMER 1
@ 1:100



SIDE ELEVATION END ELEVATION SIDE ELEVATION END ELEVATION

SMALL TRANSFORMER 2
@ 1:100



SIDE & END ELEVATION FRONT ELEVATION

SUB-STATION
@ 1:100

Scale 1:100 Metres

1 0 5 10

REV:	DESCRIPTION:	BY:	DATE:

STATUS: PLANNING

MMA Macaulay Miller Architecture
www.mma.eco

MMA North, 36 King Harald Street, Lerwick, ZE1 0EQ
MMA South, 20-23 Woodside Place, Glasgow, G3 7QL
email: mail@mma.eco

CLIENT: Lifetime Property Limited

PROJECT: Battery Storage at

322 Broomloan
Glasgow, G51 2JW
Glasgow City Council

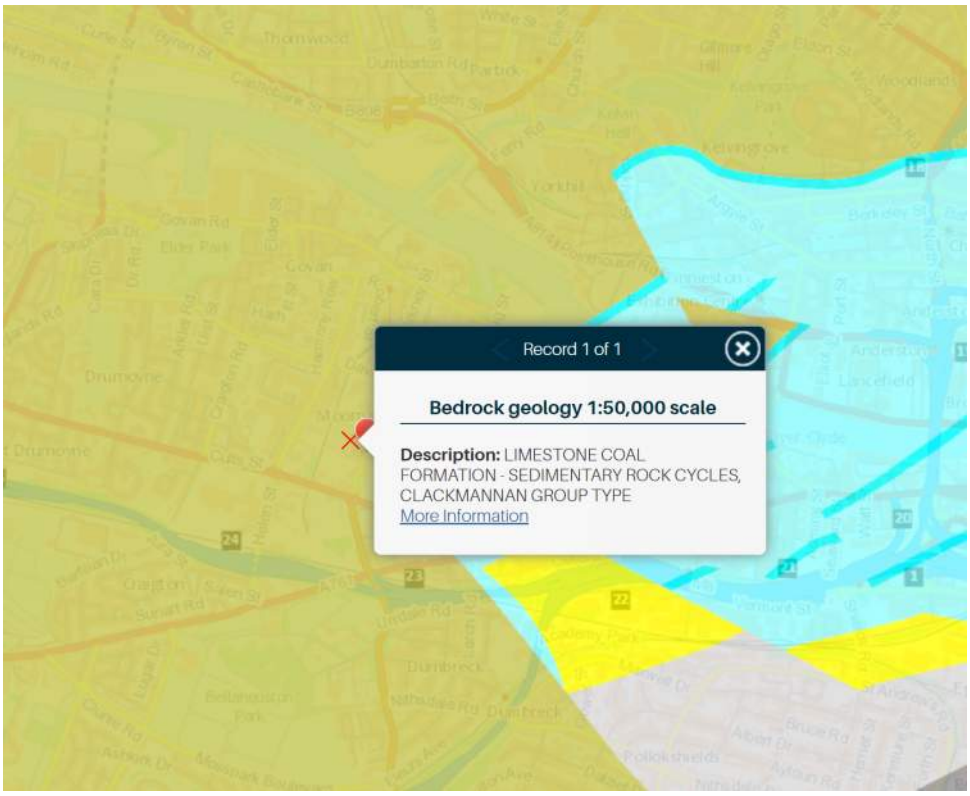
DRAWING: Unit Elevations

SCALE @ A3:	DATE:	DRAWN:	CHECKED:
1:100	20/10/2021	CMM	
PROJECT NO:	SERIES:	DRAWING NO:	REV:
21101	(PP)	A201	

Appendix C

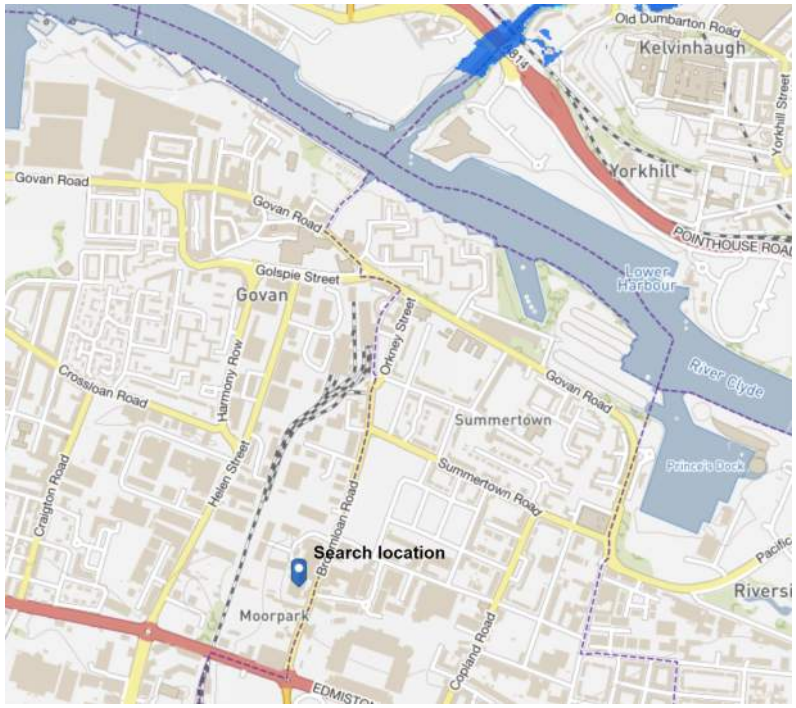
SITE GEOLOGY

GEOINDEX ONSHORE GEOLOGY - BEDROCK - LIMESTONE COAL



GEOINDEX ONSHORE GEOLOGY - SUPERFICIAL DEPOSITS - GRAVEL SAND AND SILT

SEPA Flood Maps — Basic Map Viewer — RIVER FLOOD MAP



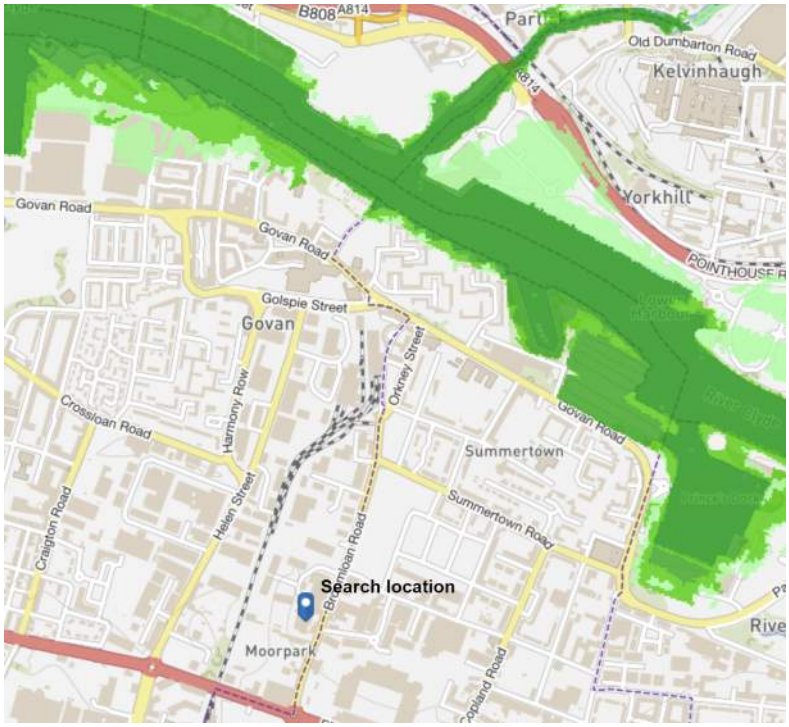
River Flooding

High Likelihood
Each year this area has a 10% chance of flooding.

Medium Likelihood
Each year this area has a 0.5% chance of flooding.

Low Likelihood
Each year this area has a 0.1% chance of flooding.

SEPA Flood Maps — Basic Map Viewer — COASTAL FLOODING



Coastal Flooding

High Likelihood
Each year this area has a 10% chance of flooding.

Medium Likelihood
Each year this area has a 0.5% chance of flooding.

Low Likelihood
Each year this area has a 0.1% chance of flooding.

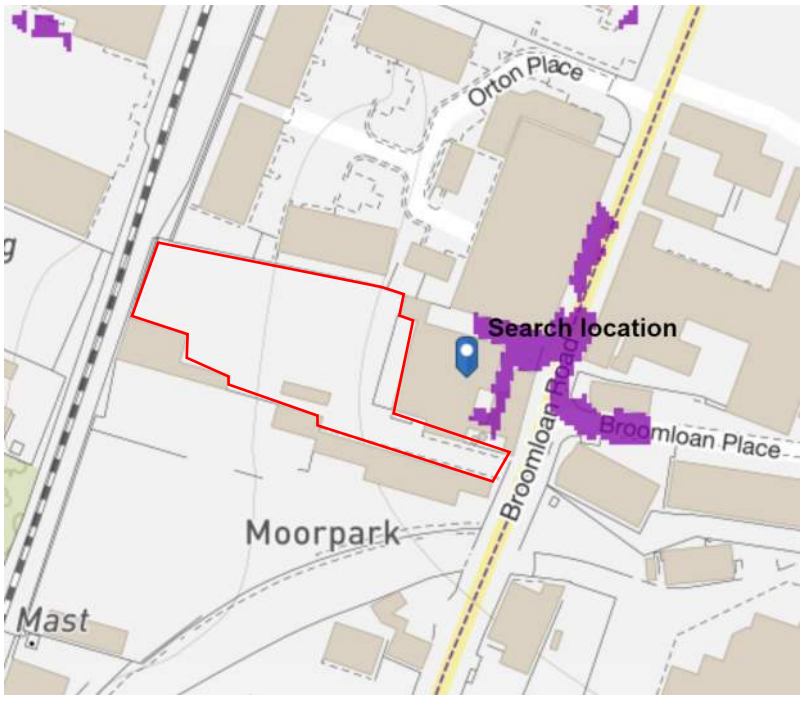
SEPA Flood Maps Basic Map Viewer **SURFACE WATER FLOOD MAP**

High Likelihood
Each year this area has a 10% chance of flooding.

Medium Likelihood
Each year this area has a 0.5% chance of flooding.

Low Likelihood
Each year this area has a 0.1% chance of flooding.

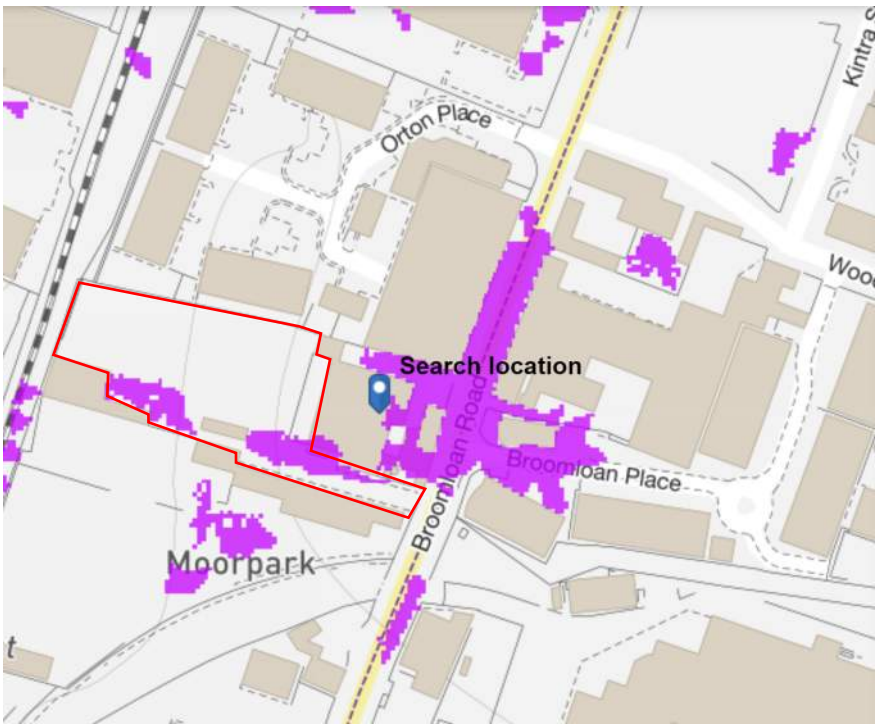
SEPA Flood Maps Basic Map Viewer **SURFACE WATER HIGH RISK**



High Likelihood
Each year this area has a 10% chance of flooding.

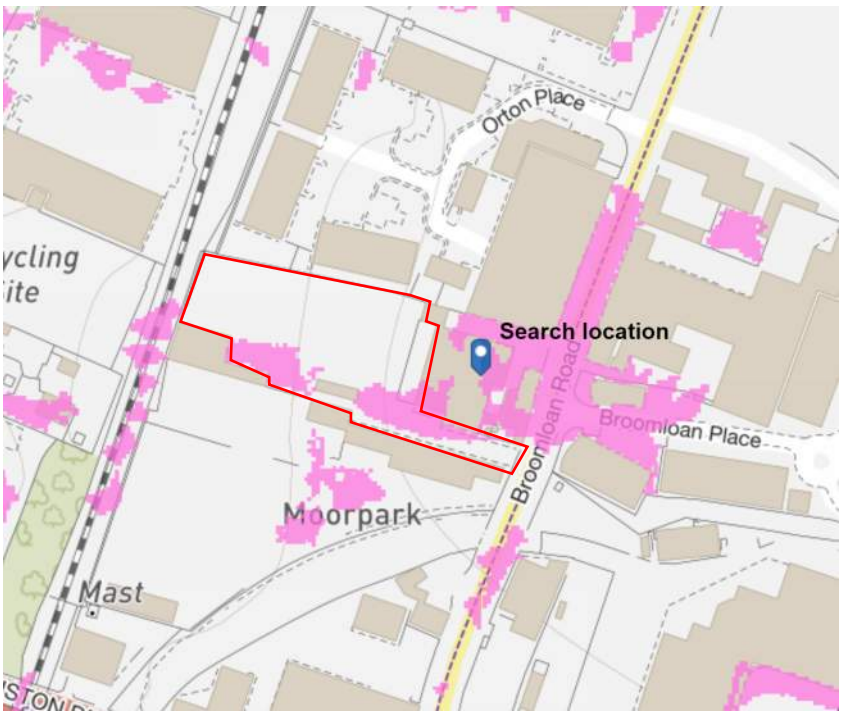
SITE SURFACE WATER FLOOD RISK

SEPA Flood Maps — Basic Map Viewer — SURFACE WATER MEDIUM RISK



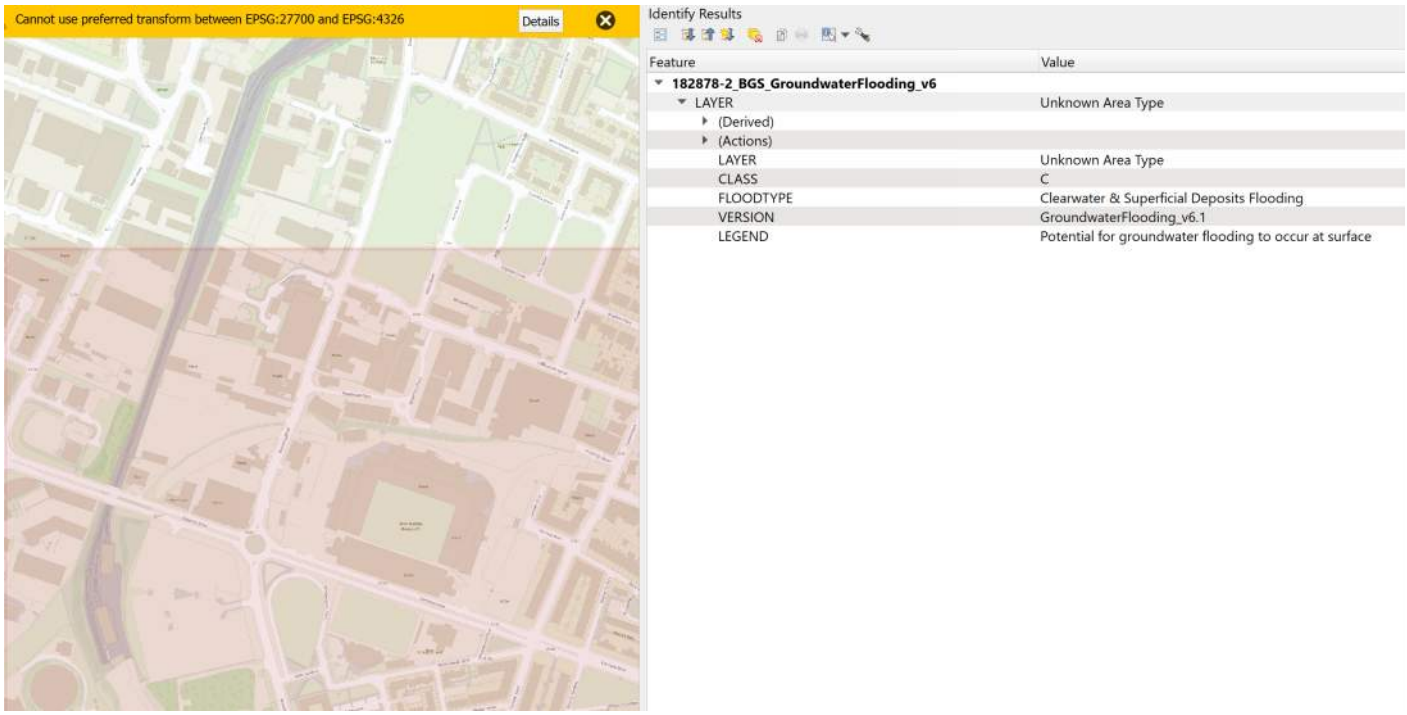
Medium Likelihood
Each year this area has a 0.5% chance of flooding.

SEPA Flood Maps — Basic Map Viewer — SURFACE WATER LOW RISK

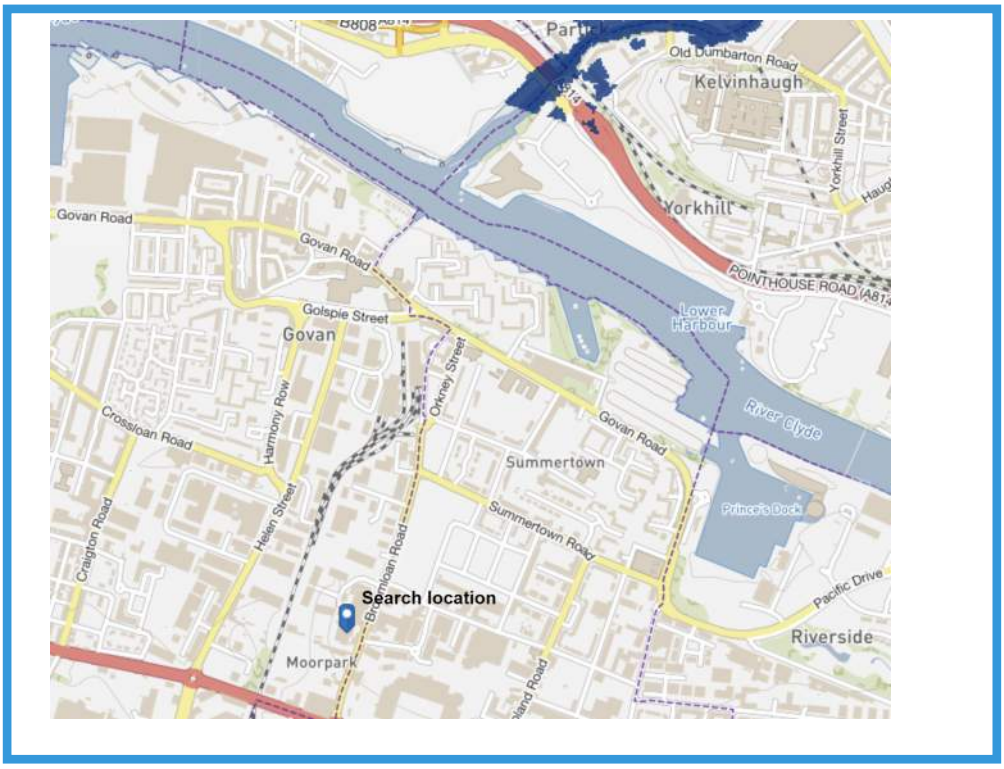


Low Likelihood
Each year this area has a 0.1% chance of flooding.

GROUNDWATER FLOODING



SEPA Flood Maps Basic Map Viewer **FUTURE FLOOD MAPS**



SEPA Flood Maps

Basic Map Viewer **FUTURE FLOOD MAPS**

Future Flood Maps

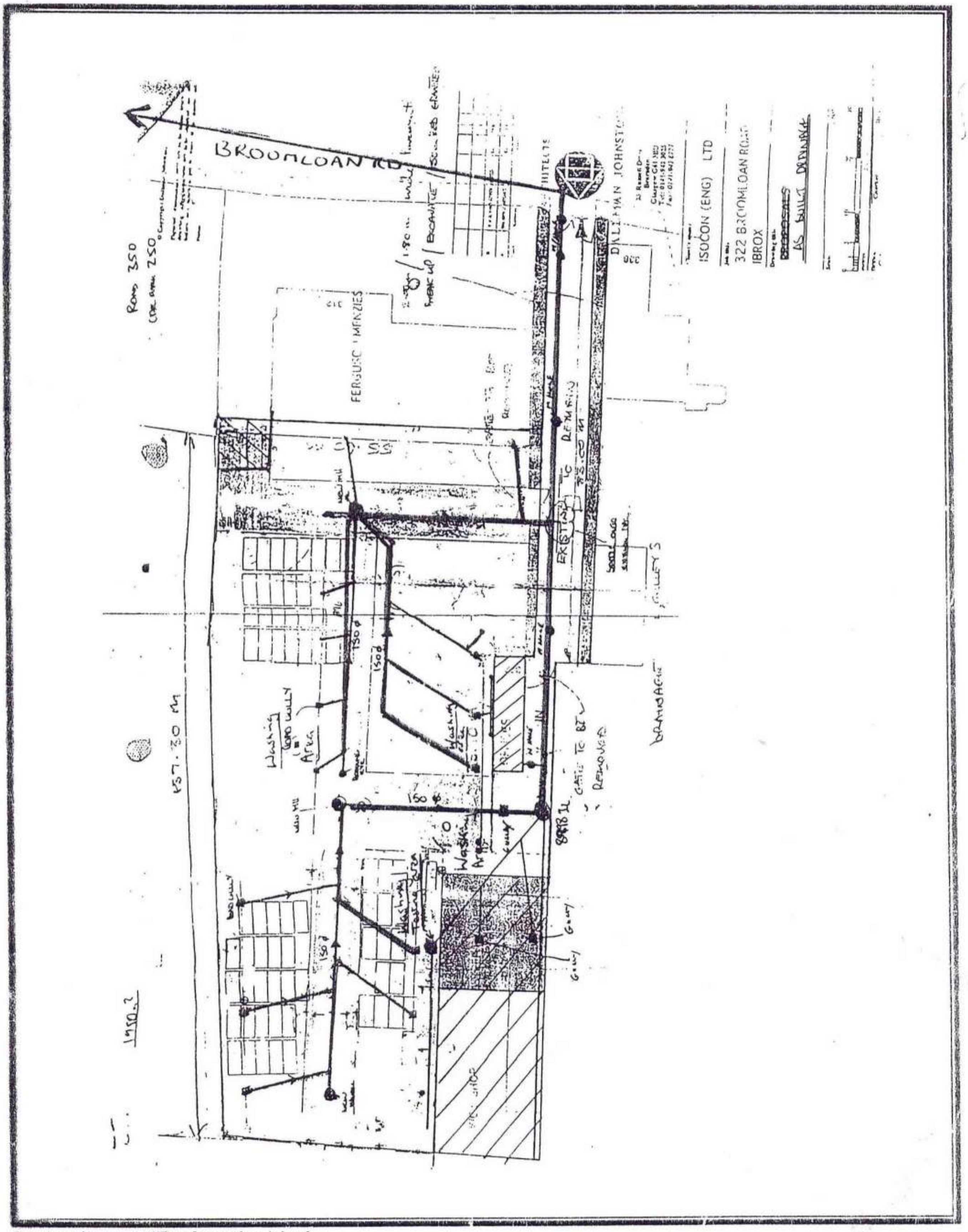
Coastal Medium Likelihood

By the 2080s, each year this area may have a 0.5% chance of flooding.

Future scenario data not available.

Reference Number: G/97/1332.C

Trade Effluent Drain Location Plan



Trader: Isocon (Engineering) Ltd
322 Broomloan Road
GLASGOW
G51 2JQ

Trade Effluent Drain shown thus:
Foul Sewer shown thus: ———