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N52 Ardee Bypass

Site Specific Flood Risk Assessment

March 2021

N52A-ROD-EWE-SW_ML-RP-EN-40001

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N52 Ardee Bypass

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N52 Ardee Bypass
Site Specific Flood Risk Assessment

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1. INTRODUCTION

Roughan & O'Donovan Consulting Engineers (ROD) were engaged by Louth County Council (LCC) to develop the N52 Ardee Bypass project through TII Project Management Guidelines Phases 1 – 7.

ROD have prepared this Site Specific Flood Risk Assessment (SSFRA) report to assess the pre and post development flood risk to the site and adjacent lands as a result of the development of the proposed N52 Ardee Bypass.

1.1 Description of Study Area

The proposed scheme involves the development of a bypass to the west of Ardee town centre, commencing from the existing N52 at Mandistown, County Meath and continues into County Louth in a north easterly direction where it ultimately connects to the existing N2 at Glebe, north west of Ardee town.

The proposed bypass route is located on greenfield areas. The scheme will consist of a Type 2 single (7.0m wide) carriageway which measures approximately 4.5km in length. The proposed bypass will cross over River Dee and River Garra where new river bridge structures will be constructed over each river. The extents of the scheme are shown in Figure 1.1 Extent of Proposed N52 Ardee Bypass Route .

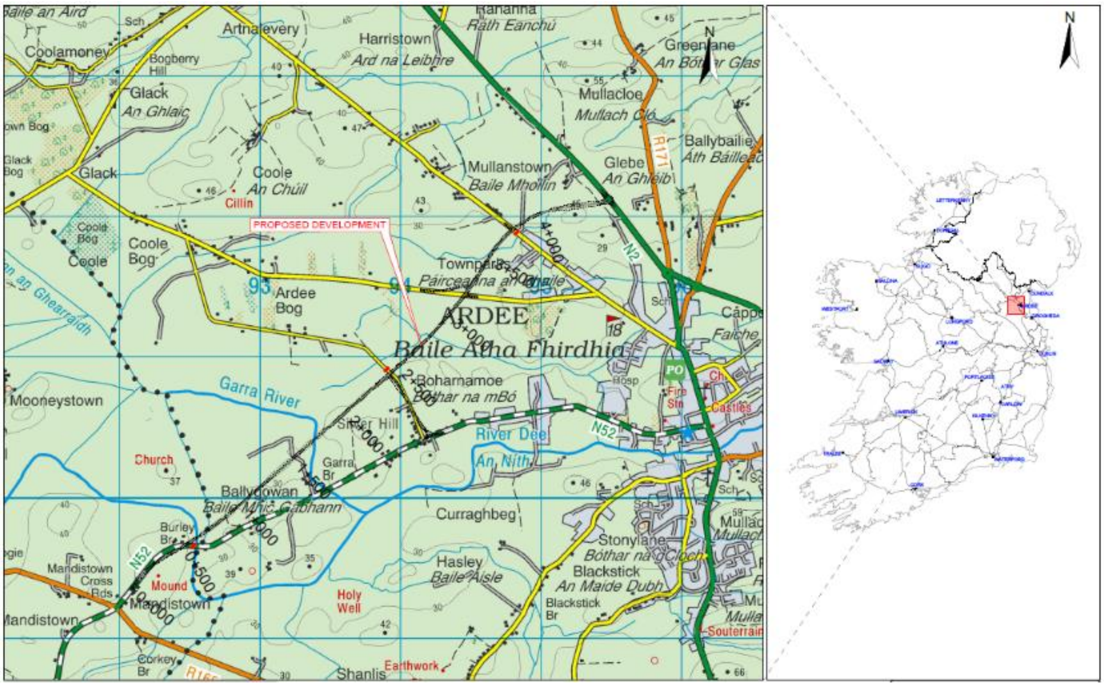


Figure 1.1 Extent of Proposed N52 Ardee Bypass Route

2. METHODOLOGY

2.1 Introduction

This report has been prepared in accordance with 'The Planning System and Flood Risk Management Guidelines for Planning Authorities' herein referred to as 'The Guidelines' as published by the Office of Public Works (OPW) and Department of Environment, Heritage and Local Government (DoEHLG) in 2009.

2.2 Definition of Flood Risk

Flood risk is a combination of the likelihood of a flood event occurring and the potential consequences arising from that flood event and is then normally expressed in terms of the following relationship:

Flood risk = Likelihood of flooding x Consequences of flooding.

To fully assess flood risk an understanding of where the water comes from (i.e. the source), how and where it flows (i.e. the pathways) and the people and assets affected by it (i.e. the receptors) is required. Figure 2.1 below shows a source-pathway-receptor model reproduced from 'The Guidelines'.

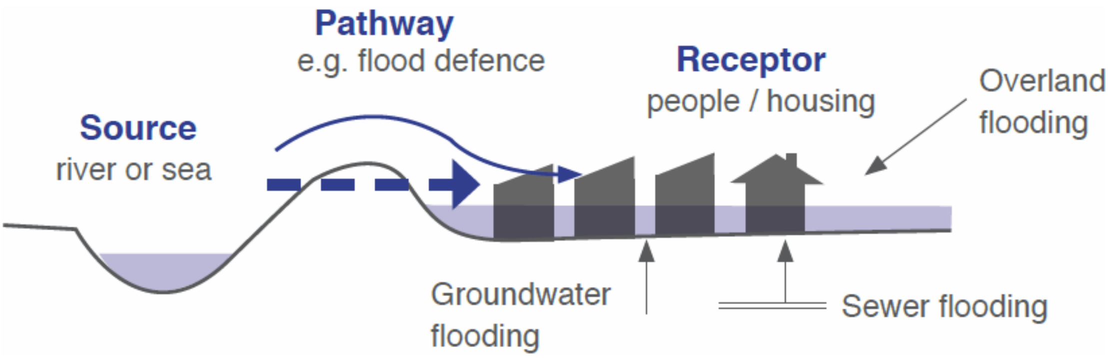


Figure 2.1 Source-Pathway-Receptor Model

The principal sources of flooding are rainfall or higher than normal sea levels. The principal pathways are rivers, drains, sewers, overland flow and river and coastal floodplains. The receptors can include people, their property and the environment. All three elements as well as the vulnerability and exposure of receptors must be examined to determine the potential consequences.

The guidelines set out a staged approach to the assessment of flood risk with each stage carried out only as needed. The stages are listed below:

- Stage I Flood Risk Identification – to identify whether there may be any flooding or surface water management issues.
- Stage II Initial Flood Risk Assessment – To confirm sources of flooding that may affect an area or proposed development, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing indicative flood zone maps.
- Stage III Detailed Flood Risk Assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

2.3 Likelihood of Flooding

The Guidelines define the likelihood of flooding as the percentage probability of a flood of a given magnitude or severity occurring or being exceeded in any given year. It is generally expressed as a return period or annual exceedance probability (AEP). A 1% AEP flood indicates a flood event that will be equalled or exceeded on average once every hundred years and has a return period of 1 in 100 years. Annual Exceedance Probability is the inverse of return period as shown in Table 2.1 below.

Table 2.1 Correlation between return period and AEP

Return Period (years)	Annual Exceedance Probability (%)
1	100
10	10
50	2
100	1
200	0.5
1000	0.1

2.4 Definition of Flood Zones

Flood zones are geographical areas within which the likelihood of flooding is in a particular range and are split into three categories in The Guidelines:

Flood Zone A

Flood Zone A where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding);

Flood Zone B

Flood Zone B where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 or 0.5% or 1 in 200 for coastal flooding);

Flood Zone C

Flood Zone C where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding. Flood Zone C covers all plan areas which are not in zones A or B.

It is important to note that when determining flood zones the presence of flood protection structures should be ignored. This is because areas protected by flood defences still carry a residual risk from overtopping or breach of defences and the fact that there is no guarantee that the defences will be maintained in perpetuity.

2.5 Objectives and Principles of the Planning Guidelines

The principle actions when considering flood risk are set out in the planning guidelines and are summarised below:

- *“Flood hazard and potential risk should be determined at the earliest stage of the planning process...”*
- *“Development should preferentially be located in areas with little or no flood hazard thereby avoiding or minimising the risk....”*

- *"Development should only be permitted in areas at risk of flooding when there are no alternative, reasonable sites available..."*
- *"Where development is necessary in areas at risk of flooding an appropriate land use should be selected"*
- *A precautionary approach should be applied, where necessary, to reflect uncertainties in flooding datasets and risk assessment techniques..."*
- *"Land required for current and future flood management... should be pro-actively identified..."*
- *"Flood risk to, and arising from, new development should be managed through location, layout and design incorporating Sustainable Drainage Systems (SuDS) and compensation for any loss of floodplain..."*
- *Strategic environmental assessment (SEA) of regional planning guidelines, development plans and local area plans should include flood risk as one of the key environmental criteria..."*

2.6 The Sequential Approach and Justification Test

The Guidelines outline the sequential approach that is to be applied to all levels of the planning process. This approach should also be used in the design and layout of a development and the broad philosophy is shown in Figure 2.2 below. In general, development in areas with a high risk of flooding should be avoided as per the sequential approach. However, this is not always possible as many town and city centres are within flood zones and are targeted for development.

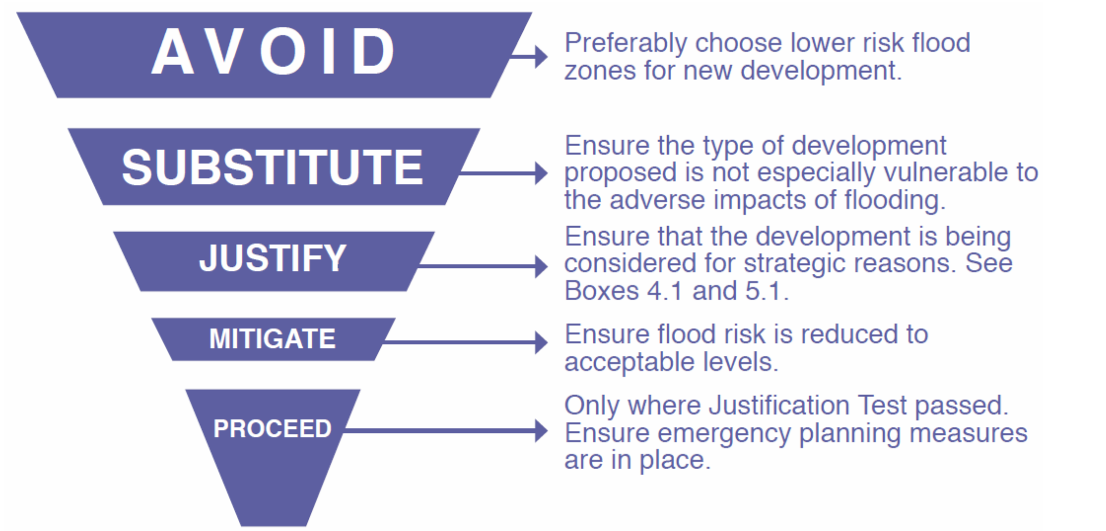


Figure 2.2 Sequential Approach (Source: The Planning System and Flood Risk Management)

The Justification Test has been designed to rigorously assess the appropriateness, or otherwise, of developments that are being considered in areas of moderate or high flood risk. The test comprises the following two processes.

- The first is the Plan-making Justification Test and is used at the plan preparation and adoption stage where it is intended to zone or otherwise designate land which is at moderate or high risk of flooding.
- The second is the Development Management Justification Test and is used at the planning application stage where it is intended to develop land at moderate or high risk of flooding for uses or development vulnerable to flooding that would generally be inappropriate for that land.

Table 2.1 below illustrates the types of development that would be required to meet the Justification Test.

Table 2.2 Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test (Source: The Planning System and Flood Risk Management)

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

3. STAGE 1 – FLOOD RISK IDENTIFICATION

3.1 General

Stage I Flood Risk Identification includes a review of the existing information and the identification of any flooding or surface water management issues in the vicinity of the proposed site that may warrant further investigation.

3.2 Information Sources Consulted

The following information sources were consulted as part of the Stage I Flood Risk Identification:

Table 3.1 Information Sources Consulted

Source	Comments
Neagh Bann Catchment Flood Risk Assessment and Management (CFRAM) Study	OPW mapping examined
Catchment Flood Risk Assessment and Management (CFRAM) Programme Flood Maps	Fluvial, Pluvial, Coastal and Groundwater flooding examined; www.floodinfo.ie
Irish Coastal Protection Strategy Study (ICPSS) maps consulted	Risks associated with coastal flooding and coastal erosion assessed
Previous Flood Risk Assessments (FRA)	DRAFT TOBIN Flood Risk Assessment (FRA) reviewed
Strategic Flood Risk Assessment (SFRA)	DRAFT Louth County Development Plan 2021-2027 consulted
OPW National Flood Hazard Mapping	www.floodmaps.ie
Geological Survey of Ireland (GSI) Maps	GSI Teagasc subsoils map consulted to identify areas of alluvium that may indicate the presence of a watercourse and floodplain
Historical Maps	OSI 6" mapping assessed
Benefiting Lands	These are lands benefitting from an Arterial Drainage Scheme where works were undertaken to improve the drainage of land. Benefitting lands usually represent low lying lands adjacent to watercourses and as such can be prone to flooding; www.floodinfo.ie

3.2.1 Previous Flood Risk Assessments and Predictive Flood Maps

Neagh Bann Catchment Flood Risk Assessment and Management Study

The proposed Ardee Bypass is located within the Neagh Bann Catchment Flood Risk Assessment and Management (CFRAM) study area. The CFRAM programme, which commenced in 2011 and led by the OPW, provides a detailed assessment of flooding in areas at potential significant flood risk, referred to as Areas for Further Assessment or AFAs. These AFAs were identified in the 2012 Preliminary Flood Risk Assessment (PFRA) study. The Ardee community area was identified as an AFA. Catchment wide Flood Risk Management Plans was also developed as part of the programme.

The published Final CFRAM study mapping (15/07/2016) indicates a minor flood extent concentrated within the banks of River Garra distributary west of the Ardee AFA for the 10% (1 in 10 year) Annual Exceedance Probability (AEP) fluvial flood event. This flood extent along River Garra distributary is significantly enlarged throughout Townparks area for the 1% (1 in 100 year) and 0.1% (1 in 1,000 year) AEP fluvial flood extents. The CFRAM mapping does not indicate any coastal, pluvial or groundwater flooding within the site.

The CFRAM Study flood extent maps are reproduced in Appendix B.

Catchment Flood Risk Assessment and Management Programme Flood Maps

As part of the CFRAM Programme, the OPW have developed the Flood Maps of Republic of Ireland ("Flood Maps") on www.floodinfo.ie which mapped out the flood extents, hazard and risk within the country for a range of flood events (from frequent minor flood events up to rare major flood events).

The flood map indicates that the Ardee Bog area is located within the flood extent for the 10% (1 in 10 year) Annual Exceedance Probability (AEP) fluvial flood event. The flood extent is extended to the adjacent lands in the vicinity of the Ardee Bog area for the 1% and the 0.1% AEP Fluvial flood event. There is no evidence of coastal, pluvial or groundwater flooding within or in the vicinity of the site.

The CFRAM flood maps are reproduced in Appendix B

Irish Coastal Protection Strategy Study

The Irish Coastal Protection Strategy Study (ICPSS) Phase 3, undertaken by the OPW, covers the North East coast from Dalkey Island to Omeath and includes the section of coastline nearest to the proposed development study area. The aims of the ICPSS were to establish extreme coastal flood extents, produce coastal flood extent and flood depth maps and assess and quantify the hazard and potential risk associated with coastal erosion.

The subject site is at a sufficient elevation above sea level that it is not subject to coastal flooding and was not represented in ICPSS flood maps

DRAFT TOBIN N52 Ardee Bypass Flood Risk Assessment Study (2019)

In February 2019 Tobin were commissioned by Louth County Council to carry out a Flood Risk Assessment for the N52 Ardee Bypass Project.

The report identifies flood risk within the Ardee Bog area. A combined 1D-2D hydraulic model was developed using HEC-RAS to determine the fluvial flood extents of Dee and Garra rivers based on the 1%AEP Mid-Range Future Scenario (MRFS) flow event. It is predicted from the results of the hydraulic model that the proposed bypass road will not be liable to flooding as the finished road level will be above the 1%AEP MRFS flow event. However, significant flooding is indicated directly adjacent to the proposed road.

Strategic Flood Risk Assessment, DRAFT Louth County Development Plan 2021 - 2027

The Strategic Flood Risk Assessment (SFRA) has been produced to support the Draft Louth County Development Plan 2021 – 2027 to allow planning decisions to be made on sites at risk of flooding. The flood mappings produced as part of the CFRAM programme was used in the preparation of the SFRA, therefore, no additional information regarding flooding at the site is contained within the SFRA. Coastal, pluvial and groundwater flooding were not examined as part of the SFRA.

OPW Flood Records

The OPW National Flood Hazard Mapping Web Site, www.floodmaps.ie, was examined to identify any recorded flood events within the vicinity of the proposed Ardee Bypass.

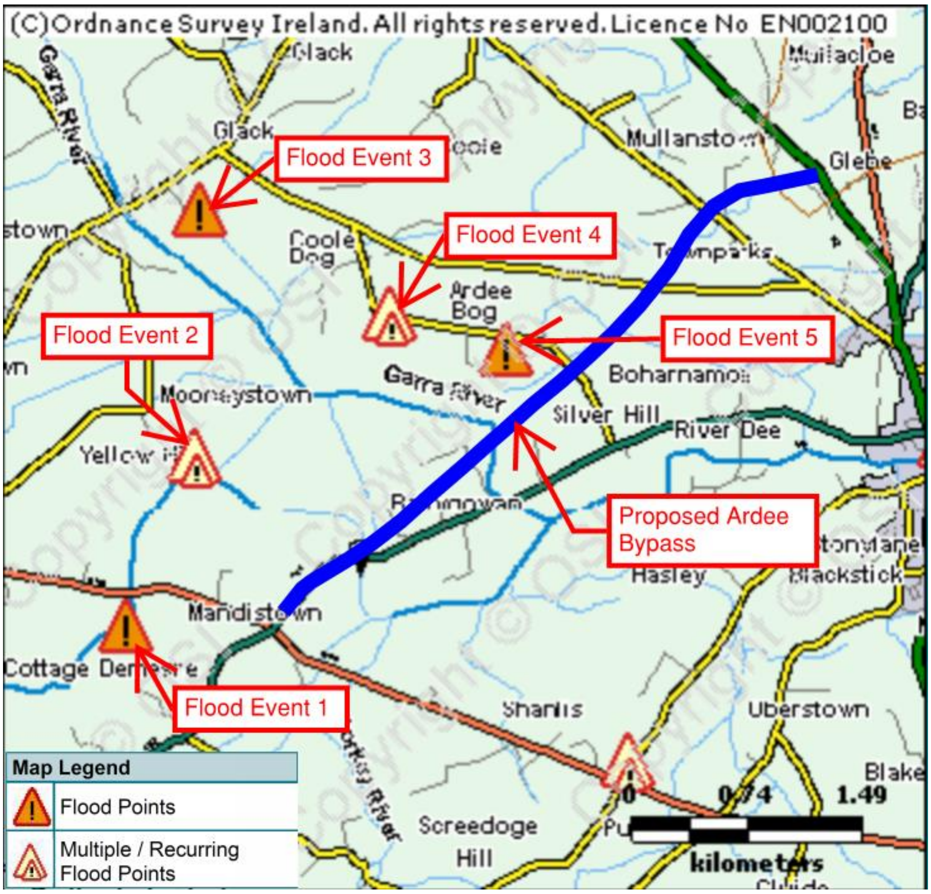


Figure 3.1 **Recorded Flood Events in the vicinity of the proposed Ardee Bypass (map underlay source: OPW National Flood Hazard Mapping Web Site)**

Flood events have been recorded as follows:

- **Flood Event 1:** Flooding in Mandistown area, November 2009 – Flooding occurred in the Mandistown area after a period of prolonged rainfall.
- **Flood Event 2:** Recurring flooding in Corstown Area reported on March 2005 as part of OPW Flood Hazard Mapping Programme – Kells Area Engineer identified the Corstown area as prone to flooding, noting the area as “flood plain of River Dee which overflows its banks every year after heavy rain. Extensive flooding occurred 1 year in the late 1990’s. CR 150 is liable to flood”.
- **Flood Event 3:** Flooding reported in Ardee Bog, Coole, Glack, Corrstown and Mandistown, November 2009 – Large section of these area were affected by flooding during the month of November 2009 (after a period of prolonged rainfall).
- **Flood Event 4:** Recurring flooding in Coole/Stormanstown Area reported on October 2005 as part of OPW Flood Hazard Mapping Programme – North Ardee Engineer identified the Coole/ Stormanstown area as prone to flooding,

noting the area as "Road and land flooded. Road covered most winter and is close to impassable. River Dee Burst its banks in November 2000".

- **Flood Event 5:** Flooding in Ardee Bog area, August 2008 – Flooding occurred in Ardee Bog Area after very heavy and prolonged rainfall in the Dee Catchment. The record states the Ardee Bog Area remained "waterlogged for a prolonged period".

3.2.2 Other Sources

The following sources were also examined to identify areas that may be liable to flooding:

Table 3.2 Other Sources

GSI Maps	GSI Teagasc subsoils map shows the majority of the land through which the proposed bypass passes (mainly the Ardee Bog area, Townparks and Coole) is underlain by peat. This in combination with the presence of lacustrine sediments around the periphery of the bog suggest the site was the location of a post glacial lake before bog formation began. The subsoils map shows Mullanstown to be underlain by sandstone & shale till while Mandistown is underlain by limestone till. *Refer to Appendix B for GSI maps.*
Historical Maps	Areas adjacent to River Garra and River Dee have been identified to be "Liable to Flood" and "Flooded in Winter". *Refer to Appendix B for Historical Maps.*
Benefiting Lands	The Ardee Bog was identified to be a benefitting land as part the Glyde and Dee Arterial Drainage Scheme which was undertaken between 1950 and 1957.

3.3 Source – Pathway – Receptor Model

The following source-pathway-receptor model (Table 3.3 below) has been developed using the information examined in the Stage I Flood Risk Identification to categorise the sources of flooding, where it flows to (pathway) and the people and infrastructure affected by it (receptors). The likelihood and consequences of each type of flooding have also been assessed to determine the risk.

Table 3.3 Source-Pathway-Receptor Model

Source	Pathway	Receptor	Likelihood	Consequence	Risk
Fluvial flooding	Overbank flow from the Garra and Dee Rivers	N52 Ardee Bypass	*High*	*High*	*High*
Pluvial flooding	Extreme rainfall events and inadequate surface water drainage	N52 Ardee Bypass	*Low* Proposed SW drainage system proposed designed for 1% AEP rainfall event	*Medium*	*Low*

Source	Pathway	Receptor	Likelihood	Consequence	Risk
Surface Water Flooding	Extreme rainfall events and inadequate surface water drainage	N52 Ardee Bypass	*Low* Proposed SW drainage system proposed designed for 1% AEP rainfall event	*Medium*	*Low*
Coastal flooding	Extreme tides, storm surges or wave overtopping	N52 Ardee Bypass	*Low* Subject site is ~13km from the coast and is >20m above sea level	*High*	*Low*
Ground-water Flooding	Rising groundwater levels	N52 Ardee Bypass	*Low* (No reports or geological indicators)	*Medium*	*Low*

3.4 Stage 1 Flood Risk Identification Conclusions

3.4.1 Fluvial Flooding

A number of sources of information including the flood maps, CFRAM maps and previous Flood Risk Assessments carried out at the site indicate that the site is at risk of fluvial flooding. Therefore, a Stage 2 – Initial Fluvial Flood Risk Assessment is required for the proposed development.

3.4.2 Coastal Flooding

Coastal flooding was not identified as a source of flooding affecting the site in any of the sources of information consulted including historic records and CFRAM study maps. The subject site is ~13km from the coast and is >20m above sea level. Therefore, the risk of coastal flooding at the site is classified as low and no further assessment is required.

3.4.3 Pluvial Flooding

Pluvial flooding results from heavy rainfall that exceeds ground infiltration capacity or more commonly in Ireland where the ground is already saturated from previous rainfall events. This causes ponding and flooding at localised depressions. Pluvial flooding is commonly a result of changes to the natural flow regime such as the implementation of hard surfacing and improper drainage design. The sources consulted such as the CFRAM mappings and Floodmaps.ie show no indication that the proposed Ardee Bypass is subject to pluvial derived flooding. Pluvial flooding will be considered in the design of drainage systems as part of proposed development. Therefore, the risk of pluvial flooding is classified as low and no further assessment is required.

3.4.4 Surface Water Flooding

Surface water flooding occurs when the local drainage system cannot convey stormwater flows from extreme rainfall events. The rainwater does not drain away through the normal drainage pathways or infiltrate into the ground but instead ponds on or flows over the ground instead. Surface water flooding is unpredictable as it depends on a number of factors including ground levels, rainfall and the local drainage network. The drainage network for any development on the route will incorporate Sustainable Drainage Systems (SuDS) for the purpose for managing surface water in terms of both flow and quality. Therefore, the risk of surface water flooding is classified as low and no further assessment is required.

3.4.5 Groundwater Flooding

Ground water flooding is a result of upwelling in occurrences where the water table or confined aquifers rises above the ground surface. This tends to occur after long periods of sustained rainfall and/or very high tides. High volumes of rainfall and subsequent infiltration to ground will result in a rising of the water table. Groundwater flooding tends to occur in low-lying areas, where with additional groundwater flowing towards these areas, the water table can rise to the surface causing groundwater flooding. The sources consulted such as the Floodmaps.ie and GSI records show no indication that N52 Ardee Bypass route is subject to Groundwater derived flooding. Therefore, the risk of groundwater flooding is classified as low and no further assessment is required.

4. STAGE 2 – INITIAL FLOOD RISK ASSESSMENT

4.1 General

The Stage 2 Initial Flood Risk Assessment will confirm the of sources of flooding that may affect the proposed development site, appraise the adequacy of existing information and scope the requirements of the Stage 3 Detailed Flood Risk Assessment.

4.2 Sources of Flooding

Fluvial Flood Risk

The CFRAM Study mapping and Flood Maps indicates that portions of the proposed Ardee Bypass are located within the 10% (1 in 10 year) AEP fluvial flood event especially in Ardee Bog area. The CFRAM study flood mapping also indicates that there is significant flood event variation where the extents of the 1% and 0.1% AEP fluvial flood events are further extended into the adjacent areas of the Ardee Bog. This is likely due to the topography of the area being generally flat and located adjacent to the Dee and Garra Rivers which creates broad floodplain. This is supported by the GSI records of peat deposits which coincide with the OPW predicted flood extents. Historical map also identifies the same area as liable to flooding.

The proposed route of the bypass is situated on lands that are currently liable to flooding, however the bypass is proposed to be constructed on embankments to ensure the finished road levels are above the flood levels. As such, the proposed Ardee Bypass is considered to require a stage 3 detailed flood risk assessment with respect to flooding derived from fluvial sources to determine flood levels, flood extents and the impact of the proposed development compared to the current flood regime.

4.3 Conclusion of Stage 2 Initial Flood Risk Assessment

The available sources consulted above indicate that the location of the proposed N52 Ardee Bypass crosses areas of land currently liable to flood. As per the OPW Guidelines, a Stage 3 detailed flood risk assessment is required to be undertaken to confirm flood risk (water levels, flood extents, impact of the proposed development) to the proposed development and determine potential flood mitigation measures.

5. STAGE 3 – DETAILED FLOOD RISK ASSESSMENT

5.1 Introduction

Stages 1 and 2 of the flood risk assessment for the proposed development site have indicated that the development lands are subject to flooding in high probability exceedance events from fluvial sources. A hydraulic model has been prepared to ascertain the effects of extreme fluvial flood events. This section outlines the hydrological and hydraulic analysis carried out for the watercourses within the subject area.

5.2 Hydrological Analysis

5.2.1 Joint Probability Analysis

The critical flood event is considered to be on the River Dee which controls drainage and subsequent flooding within its tributaries and Ardee bog. Guidance from the Flood Studies Update Work Package 3.4 (Guidance for River Basin Modelling) indicates parameters from which to determine the dependency between the Dee and its tributaries. When compared to the River Dee catchment, all tributaries were found to be:

- Within 0.3 in terms of Baseflow Index (BFI);
- Within 0.07 in terms of Flood Attenuation from Reservoirs and Lakes (FARL);
- Centroids of the catchments were within 25km.
- Catchment areas of the tributaries were less than a factor of 2.7 compared to the River Dee.

As per table C-1 of FSU work package 3.4:

- A 1%AEP event on the River Dee will correspond with approximately to a 5%AEP event on the other tributaries.
- A 0.1%AEP event on the River Dee will correspond with approximately to a 1%AEP event on the other tributaries.

5.2.2 Fluvial Flow Estimation

Extreme Value Analysis

AMAX flow data was obtained for the Burley Bridge gauging station for 35 years from 1975 – 2010. In correspondence with the OPW they have indicated that more current data may not be reliable due to vegetation encroachment in the channel and excess siltation. Table 5.1 lists the station reference and location.

Table 5.1 OPW Hydrometric Station

Station No.	River	Station Name	Easting	Northing
06025	Dee	Burley	292562.00	289631.00

An extreme value analysis was undertaken for the available data. The calculations are given in Appendix C and the results are summarised in the Table 5.2 below. The highest Amax flow estimated at the Burley gauging station was 23.57m^3/s in 2000.

Table 5.2 Extreme Value Analysis - Gumbel

Annual Exceedance Probability	Estimated flow (m^3/s)
50%AEP (Qmed)	18.06
5%AEP	23.84
1%AEP	27.45
0.1%AEP	32.57

Ungauged Flow estimation

Flow estimation was undertaken at 7no. locations on the Rivers Dee, Garra and their tributaries as shown in Figure 5.1 below.

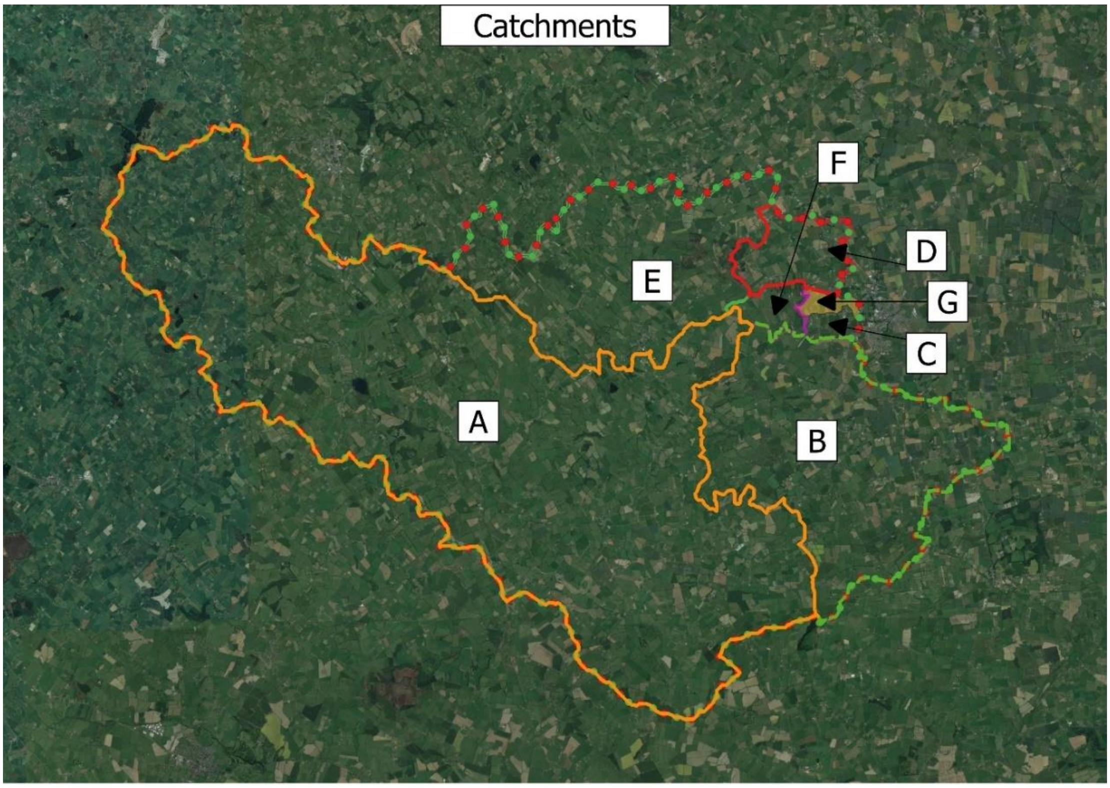


Figure 5.1 Subject Catchments for Hydrological Assessment

The peak fluvial flows for the 1% AEP and 0.1% AEP events were estimated for the for each catchment using a series of industry standard flow estimation methods including:

- Flood Studies Report;
- Flood Studies Report 3 variable
- Flood Studies Supplementary Reports No. 6 and;
- Institute of Hydrology Report 124.
- OPW FSU Portal

The OPW FSU estimated Qmed flow for the river Dee at Burely bridge is very similar (within 4% difference) to the Extreme Value Analysis estimate presented in Section 5.2.2 above. This is contrasted against the other methodologies with Qmed estimates ranging from 4-5 times the Extreme Value Analysis derived Qmed.

The Burley Bridge Gauge Data is therefore supportive of the FSU generated flows. The FSU derived flows have been used as the design flows as part of the hydraulic assessment. FSU flood estimation reports detailing peak flow estimation and hydrograph generation for catchments A-G are presented in Appendix D.

In addition to the current climate scenario, flows were estimated for the Mid-Range Future Scenario (MRFS) climate change scenarios as stated in the OPW's 2019 Climate Change Sectoral Adaptation Plan.

Summary of ROD Hydrological Assessment

The River Dee (Catchment A) and the River Garra (Catchment E) together comprise over 80% of flow into the subject area. Design flows for the River Dee and River Garra are stated in Table 5.3 below, all other model inputs are presented in Appendix D.

Table 5.3 Design Flows for Catchments for the River Dee and Garra.

Annual Exceedance Probability	River Dee Main Inflow – Catchment A (m^3/s)	River Garra Main Inflow – Catchment E (m^3/s)
50%AEP (Qmed)	18.66	4.11
5%AEP	28.73	7.1
1%AEP	34.89	8.99
0.1%AEP	43.85	11.62

The design flow plus climate change allowances are shown in Table 5.4 below.

Table 5.4 Design Flows for Catchments for the River Dee and Garra plus MRFS Climate change factor.

Annual Exceedance Probability	River Dee Main Inflow – Catchment A (m^3/s)	River Garra Main Inflow – Catchment E (m^3/s)
50%AEP	22.392	4.932
5%AEP	34.476	8.52
1%AEP	41.868	10.788
0.1%AEP	52.62	13.944

5.3 Hydraulic Model

A 1D-2D hydraulic model of the subject lands was developed using the Flood Modeller software v4.5. A digital terrain model (DTM) of the subject lands was created using LiDAR data with points at 10m centres. The DTM was linked to the 1D model using a series of link lines that allow water to pass from the 1D domain to the 2D domain when the water level in the channel exceeds the bank levels. The DTM used in the hydraulic model is shown in Figure 5.2 below.

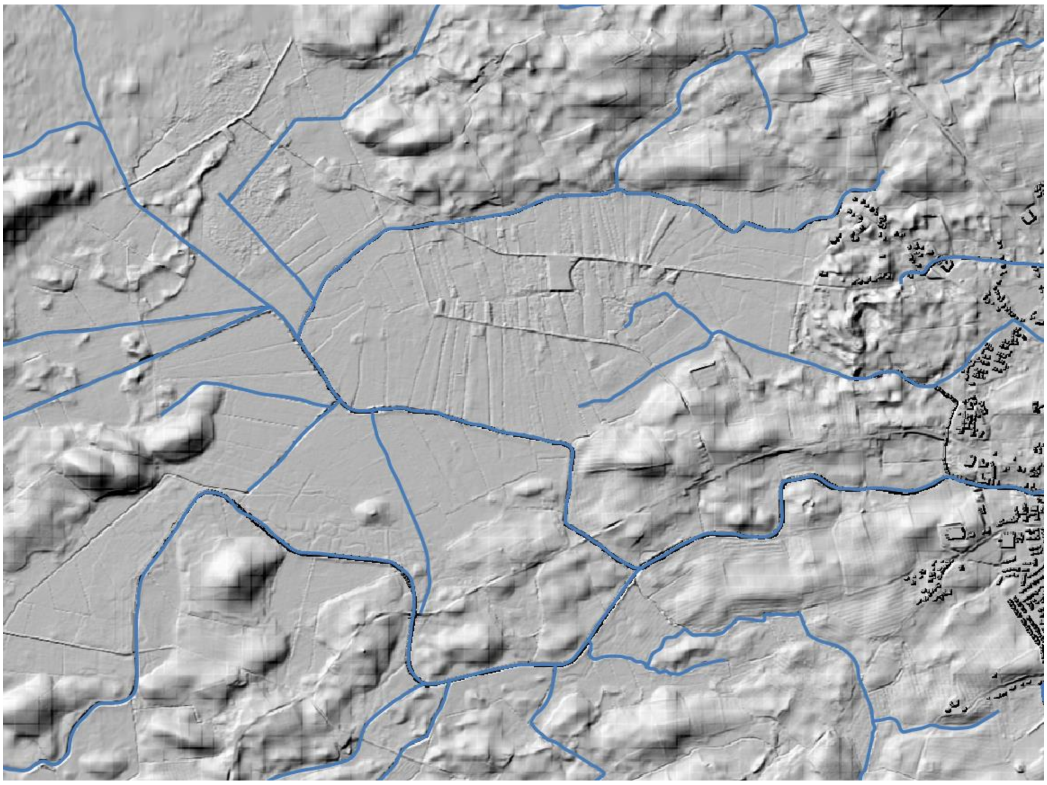


Figure 5.2 LiDAR Derived Digital Terrain Model

A site visit was conducted on the 20th August 2020. Significant features within the channels and in the floodplains were recorded. The site visit aided in determining the manning's roughness values attributable to the reach. A roughness grid was applied in the model to represent the effects of different surfaces on overland flow. Manning's N values ranged from 0.035 for Agricultural lands to 0.06 to simulate dense vegetation.

5.4 Hydraulic Modelling Scenarios

Variations of this hydraulic model were constructed to simulate the existing site conditions and post-development characteristics for 1%AEP and 0.1%AEP events in the current and MRFS climate scenarios. These are discussed below:

Scenario 1 – Existing Environment

Scenario 1 simulates the existing environment within the subject area. The hydraulic model was run for the 1% AEP and 0.1% AEP fluvial events with current climate conditions and MRFS climate change conditions.

In the current climate scenario the lands directly adjacent to the River Garra flood first with floodwaters spreading outwards throughout the low lying historic bog. Immediately north of Burley bridge the River Dee burst its banks and flows north towards the River Garra. Flood waters are constrained to the south by the natural rise running from east to west. Existing bridges on the River Dee and River Garra appear to be sufficiently sized for extreme flows while some minor culverts on the tributary of the River Garra were seen to act as flow constraints. The bog drains slowly through the River Garra over a 2 to 3 day period. The model indicates that a large portion of the subject area including lands within the footprint of the proposed road are within Flood Zone A. Scenario 1 flood extents are shown in *Appendix E.*
In the MRFS climate change scenario the flood sources, pathways and receptors are very similar to those seen in the current climate scenario. Flooding increases to the

west of the River Garra and also encroaches further into Ardee Bog between Silverhill road and Townparks road. Scenario 2 flood extents are shown in *Appendix E.*

Scenario 2 – Post Development

Scenario 2 simulates the effect of the proposed development within the subject lands with proposed flood mitigation measures. The hydraulic model was run for the 1%AEP and 0.1%AEP fluvial events with current climate conditions and MRFS climate change conditions. Scenario 2 flood extents are shown in *Appendix E.* Flood mitigation elements are outlined below:

- The proposed route traverses' areas indicated as liable to flood in extreme events. Conveyance within the floodplain will be maintained by the provision of adequately sized watercourse crossings and flood conveyance culverts to ensure that the road embankment does not act as a barrier to the flood waters.
- The road embankment from ground level to the 1%AEP flood level will be constructed of coarse graded granular fill (Class 6A) that has a void ratio of 30%, to allow storage of flood waters within the embankment. As per the precautionary the proposed road embankment has been modelled impermeable.
- To account for residual flood risk, at its lowest point the minimum carriageway level will be 25.776mOD. This is 0.586m above the predicted 0.1%AEP flood level at this point.

Water Level Results

Table 5.5 and Table 5.6 detail the calculated extreme water levels and the difference between pre and post-development scenarios at key locations exported from the hydraulic model.

Table 5.5 Water levels Summary

	Climate	Current Scenario (CS)				Mid-Range Future Scenario (MRFS)			
	Development	Pre		Post		Pre		Post	
	AEP	1%	0.1%	1%	0.1%	1%	0.1%	1%	0.1%
Node Label	Description	mOD							
0607M00 185D	Burley Bridge – N52 (River Dee)	25.118	25.181	25.128	25.191	25.166	25.24	25.176	25.25
MCA1-15	Proposed River Dee Bridge	25.149	25.204	25.15	25.208	25.193	25.258	25.195	25.262
0602M02 265DS	Existing River Garra Bridge (N52)	24.694	24.888	24.694	24.883	24.854	25.049	24.85	25.039
MO1J-1	Proposed Garra Bridge	24.757	24.983	24.757	24.983	24.943	25.182	24.944	25.184
0602M02 579	Existing SilverHill Rd Garra Culvert	24.752	24.98	24.757	24.989	24.921	25.183	24.929	25.194

Table 5.6 Difference between Pre and Post Development Scenario

Climate Scenario	CS		MRFS	
AEP	1%	0.1%	1%	0.1%
	mOD			
Greatest Increase	0.011	0.011	0.012	0.014
Greatest Decrease	-0.012	-0.013	-0.011	-0.022
Median Change	0.001	-0.001	-0.001	0.002

The flood levels shown in the tables above indicate that the proposed development will have minimal impact on the existing flood regime. The low-lying nature of Ardee Bog and the surrounding lands ensure that any displacement of flood waters by the proposed development is dispersed across a very wide area and the effect on water level is barely perceptible. The hydraulic model estimates the greatest increase in flood levels in the 0.1%AEP +MRFS climate change scenario to be 14mm with the median change across all modelled reaches being 2mm. As can been seen in the post development flood extent drawings (Appendix E), flood conveyance culverts at appropriate locations maintain flow paths through the proposed road embankment.

5.5 Hydraulic Modelling Summary

The findings from the hydraulic analysis indicate that the area surrounding the Ardee bog is very low lying with a highly complex drainage network. Extreme fluvial events result in considerable flooding in lands north of the existing N52. Flood waters are attenuated for multiple days within the natural floodplain of the River Garra/Ardee bog before receding to the river Garra. Existing bridges on the River Dee and River Garra appear to be sufficiently sized for extreme flows. The model indicates that a large portion of the subject area including lands within the footprint of the proposed road are within Flood Zone A.

There is an increasing likelihood that Ireland’s climate will be similar to that depicted in the MRFS climate change scenario by the year 2100. Therefore, ROD has considered the MRFS parameters as part of this development. The proposed road is at a sufficient level as to not flood within the 0.1%AEP + climate change flood event. The proposed crossings have been appropriately sized and have a negligible impact on flooding. Existing flow paths are maintained post development. The incorporation of standard mitigation measures results in negligible affect on the existing flood regime overall.

Although great care and modern widely-accepted methods have been used in the preparation and interpretation of the hydraulic model, there is inevitably a range of inherent uncertainties and assumptions made during the estimation of design flows and the construction of flood models. The inherent uncertainty necessitates a precautionary approach when interpreting the flood extent and flood depth mapping.

6. APPLICATION OF THE SEQUENTIAL APPROACH

The following describes the application of the sequential approach as set out in The Guidelines with the regard to the proposed development.

6.1 Summary of the Need for the Proposed Development

The traffic volumes currently experienced cause significant congestion in the centre of Ardee. This leads to a reduction in operational capacity of the N2 and N52, reduced operating speeds, increased journey times and reduced journey time reliability.

The sub-standard nature of the N52 within the study area is also highlighted as being deficient, with the cross-section below that of a Type 3 Single Carriageway. This reduced cross-section, with the current traffic volumes already impacts on the average journey times and this is expected to deteriorate further as traffic volumes increase.

The sub-standard nature of the N52 is further highlighted in the accident statistics, which show that the collision rate for this section of the N52 is 0.392 collisions per million vehicle kilometres, which is approximately 84% higher than the national average. This is also reflected in the TII collision rates, which highlights that most sections of the N52 have had a collision rate of twice above average and that the N2 through the centre of Ardee is consistently ranked as twice above average collision rate.

During the 9 year period between 2008 to 2016, there have been 37 collisions, which has resulted in 1 fatality, 5 serious injuries and 44 minor injuries. 37.8% of these collisions have involved vulnerable road users, with the fatality also the result of a collision with a pedestrian.

The high collision rate reflected in accident statistics, in combination with the congestion experienced in the urban centre of Ardee on the N52 and N2 and sub-standard nature of the existing N52 alignment, highlight the need to updated to the existing N52 to improve the safety of the network and ease the congestion in the centre of Ardee.

The proposed development is considered to be strategic infrastructure and as per The Guidelines is a High Vulnerable Development.

6.2 Summary of Options Appraisal

The following summarises the options appraisal undertaken for the proposed scheme. For further information refer to the scheme Options Selection Report (document no: N52A-ROD-EGN-RO_AE-RP-EN-20002).

The Options Selection process was undertaken in two stages in accordance with the Transport Infrastructure Ireland (TII) Project Management Guidelines (PE-PMG-02041 of September 2017) and the TII Project Appraisal Guidelines for National Roads Unit 4.0 – Consideration of Alternatives and Options (PE-PAG-02013 of October 2016) as follows:
Stage 1: Develop a number of feasible route options (typically 6 or more and including ‘Do-Nothing’ and ‘Do-Minimum’ alternatives) and carry out a Preliminary Options Assessment using a Framework Matrix (comprising the assessment criteria of Engineering, Environment and Economy). This will result in the number of route options being refined to a maximum of 3 – 5.

Stage 2: After Stage 1, carry out a Project Appraisal of these routes using the Project Appraisal Matrix (comprising the 6 Common Appraisal Criteria of Safety, Environment (including hydrology), Economy, Integration, Accessibility & Social Inclusion and Physical Activity). These are set out in the Department of Transport, Tourism and Sport Guidelines on a Common Appraisal Framework for Transport Projects & Programmes and enable the selection of a Preferred Route Corridor. As part of the options appraisal the historic flooding within the study area was identified as a constraint and considered. Nonetheless, the proposed option was identified as being the most advantageous compared to other options across multiple criteria and the most advantageous overall.

As described above the proposed development proved most advantageous despite the acknowledgement of potential flood risk on site. As strategic infrastructure the proposed development cannot be substituted. Therefore, as per the sequential approach the proposed development requires a justification test.

6.3 Justification Test

The flood risk assessment carried out for the purposes of the proposed development determined that the subject site is within lands at risk of flooding.. In this context, the proposed development satisfies the Justification Test as outlined below:

6.1 The subject lands have been zoned or otherwise designated for the use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.

The proposed development is either specifically identified within the following European, national, regional and local planning and development policies, or supports the objectives contained within these policies. These include:

European Policy Context

- Trans-European Transport Network (TEN-T)
- EU Cycling Strategy (2017)

National Policy Context

- National Planning Framework to 2040
- National Development Plan 2018 – 2027
- Smarter Travel – A Sustainable Transport Future
- Investing in Our Transport Future – Strategic Investment Framework for Land Transport (2015)
- Road Safety Authority Road Safety Strategy 2013 – 2020
- National Secondary Roads Needs Study – East (2011)
- Climate Action Plan 2019

Regional Policy Context

- Eastern & Midland Regional Spatial and Economic Strategy 2019 – 2031

Local Policy Context

- Louth County Development Plan 2015 – 2021
- Ardee Local Area Plan 2010 – 2016

The full review of European, national, regional and local planning policy documents is presented in detail in Section 3 of the 2021 N52 Ardee Bypass EIA Screening Report.

6.2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:

6.2.1. The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;

The hydraulic model produced as part of this assessment indicates that the proposed development will have a negligible impact on flooding within the immediate vicinity of the subject lands. The greatest increase in flood levels in the 0.1%AEP +climate change model was estimated to be 14mm with the median change being 2mm.

6.2.2 The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;

The proposed development features standard flood mitigation measures as outlined in section 5.4. The hydraulic assessment undertaken as part of this FRA indicates that the implementation of such measures will maintain the existing flood regime within the vicinity of the scheme.

6.2.3 The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access;

- The proposed development has been designed with regard to flood resilient construction measures and materials. To account for residual flood risk, the minimum carriageway level of the proposed road will be 25.776mOD. This is 0.586m above the 0.1%AEP flood level at this location.

6.2.4 The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

As discussed above, multiple European, national, regional and local planning policy documents outline need to improve this section of the N52 National Secondary Road in order improve accessibility and connectivity to the north-west, improve road safety and to promote sustainable economic development in the region.

6.4 Sequential Approach Conclusions

The proposed development has been determined to have satisfied all requirements of the justification test and as such the sequential approach overall. This includes the identification of flood risk management measures to be implemented as part of the scheme.

7. FLOOD RISK ASSESSMENT CONCLUSIONS

This SSFRA has considered the local hydrological conditions pertaining to the N52 Ardee bypass development site and found that the site is subject to flooding in 1%AEP and 0.1%AEP fluvial events. The findings of this SSFRA indicate that flood risk to the site can be managed with negligible effect on flood risk elsewhere. The proposed development satisfies the requirements of the Justification Test (as described in the OPW's "The Planning System and Flood Risk Management Guidelines for Planning Authorities") and is therefore deemed appropriate for the site.

APPENDIX A
GLOSSARY OF TERMS

GLOSSARY OF TERMS

Catchment: The area that is drained by a river or artificial drainage system.

Catchment Flood Risk Assessment and Management Studies (CFRAMS): A catchment-based study involving an assessment of the risk of flooding in a catchment and the development of a strategy for managing that risk in order to reduce adverse effects on people, property and the environment. CFRAMS precede the preparation of Flood Risk Management Plans (see entry for FRMP).

Climate change: Long-term variations in global temperature and weather patterns, which occur both naturally and as a result of human activity, primarily through greenhouse gas emissions.

Core of an urban settlement: The core area of a city, town or village which acts as a centre for a broad range of employment, retail, community, residential and transport functions.

Detailed flood risk assessment: A methodology to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of flood hazard and potential risk to an existing or proposed development, of its potential impact on flood elsewhere and of the effectiveness of any proposed measures.

Estuarial (or tidal) flooding: Flooding from an estuary, where water level may be influenced by both river flows and tidal conditions, with the latter usually being dominant.

Flooding (or inundation): Flooding is the overflowing of water onto land that is normally dry. It may be caused by overtopping or breach of banks or defences, inadequate or slow drainage of rainfall, underlying groundwater levels or blocked drains and sewers. It presents a risk only when people, human assets and ecosystems are present in the areas that flood.

Flood Relief Schemes (FRS): A scheme designed to reduce the risk of flooding at a specific location.

Flood Defence: A man-made structure (e.g. embankment, bund, sluice gate, reservoir or barrier) designed to prevent flooding of areas adjacent to the defence.

Flood Risk Assessment (FRA): FRA can be undertaken at any scale from the national down to the individual site and comprises 3 stages: Flood risk identification, initial flood risk assessment and detailed flood risk assessment.

Flood Risk Identification: A desk- based study to identify whether there may be any flooding or surface water management issues related to a plan area or proposed development site that may warrant further investigation.

Flood Hazard: The features of flooding which have harmful impacts on people, property or the environment (such as the depth of water, speed of flow, rate of onset, duration, water quality, etc.).

Floodplain: A flood plain is any low-lying area of land next to a river or stream, which is susceptible to partial or complete inundation by water during a flood event.

Flood Risk: An expression of the combination of the flood probability, or likelihood and the magnitude of the potential consequences of the flood event.

Flood Storage: The temporary storage of excess run-off, or river flow in ponds, basins, reservoirs or on the flood plain.

Flood Zones: A geographic area for which the probability of flooding from rivers, estuaries or the sea is within a particular range.

Fluvial flooding: Flooding from a river or other watercourse.

Groundwater flooding: Flooding caused by groundwater escaping from the ground when the water table rises to or above ground level.

Initial flood risk assessment: A qualitative or semi-quantitative study to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information, to provide a qualitative appraisal of the risk of flooding to development, including the scope of possible mitigation measures, and the potential impact of development on flooding elsewhere, and to determine the need for further detailed assessment.

Freeboard: Factor of safety applied for water surfaces. Defines the distance between normal water level and the top of a structure, such as a dam, that impounds or restrains water.

Justification Test: An assessment of whether a development proposal within an area at risk of flooding meets specific criteria for proper planning and sustainable development and demonstrates that it will not be subject to unacceptable risk nor increase flood risk elsewhere. The justification test should be applied only where development is within flood risk areas that would be defined as inappropriate under the screening test of the sequential risk-based approach adopted by this guidance.

Likelihood (probability) of flooding: A general concept relating to the chance of an event occurring. Likelihood is generally expressed as a probability or a frequency of a flood of a given magnitude or severity occurring or being exceeded in any given year. It is based on the average frequency estimated, measured or extrapolated from records over a large number of years and is usually expressed as the chance of a particular flood level being exceeded in any one year. For example, a 1-in-100 or 1%AEP flood is that which would, on average, be expected to occur once in 100 years, though it could happen at any time.

Ordnance Datum (or OD) Malin: is a vertical datum used by an ordnance survey as the basis for deriving altitudes on maps. A spot height may be expressed as AOD for “above ordnance datum”. Usually mean sea level (MSL) is used for the datum. In the Republic of Ireland, OD for the Ordnance Survey of Ireland is Malin Ordnance Datum: the MSL at Portmoor Pier, Malin Head, County Donegal, between 1960 and 1969. Prior to 1970, Poolbeg Ordnance Datum was used: the low water of spring tide at Poolbeg lighthouse, Dublin, on 8 April 1837. Poolbeg OD was about 2.7 metres lower than Malin OD.

Management Train/Treatment Train: the sequence of drainage components that collect, convey, store and treat runoff as it drains through the site.

Mitigation: The term is used to describe an action that helps to lessen the impacts of a process or development on the receiving environment. It is used most often in association with measures that would seek to reduce negative impacts of a process or development.

Pathways: These provide the connection between a particular source (e.g. high river or tide level) and the receptor that may be harmed (e.g. property). In flood risk management, pathways are often ‘blocked’ by barriers, such as flood defence structures, or otherwise modified to reduce the incidence of flooding.

Pluvial flooding: Usually associated with convective summer thunderstorms or high intensity rainfall cells within longer duration events, pluvial flooding is a result of rainfall-generated overland flows which arise before run-off enters any watercourse or sewer. The intensity of rainfall can be such that the run-off totally overwhelms surface water and underground drainage systems.

Regional Planning Guidelines (RPG): These provide the regional context and priorities for applying national planning strategy to each NUTS III region and encourage greater co-ordination of planning policies at the city/county level. RPGs are an important part of the flood policy hierarchy as they can assist in co-ordinating flood risk management policies at the regional level.

Resilience: Sometimes known as “wet-proofing”, resilience relates to how a building is constructed in such a way that, although flood water may enter the building, its impact is minimised, structural integrity is maintained, and repair, drying and cleaning and subsequent reoccupation are facilitated.

Receptors: Things that may be harmed by flooding (e.g. people, houses, buildings or the environment).

Residual risk: The risk which remains after all risk avoidance, substitution and mitigation measures have been implemented, on the basis that such measures can only reduce risk, not eliminate it.

Sequential Approach: The sequential approach is a risk-based method to guide development away from areas that have been identified through a flood risk assessment as being at risk from flooding. Sequential approaches are already established and working effectively in the plan-making and development management processes.

Sustainable Drainage System (SuDS): Drainage systems that are considered to be environmentally beneficial, causing minimal or no long-term detrimental impact.

Site-specific Flood Risk Assessment: An examination of the risks from all sources of flooding of the risks to and potentially arising from development on a specific site, including an examination of the effectiveness and impacts of any control or mitigation measures to be incorporated in that development.

Source: Refers to a source of hazard (e.g. the sea, heavy rainfall).

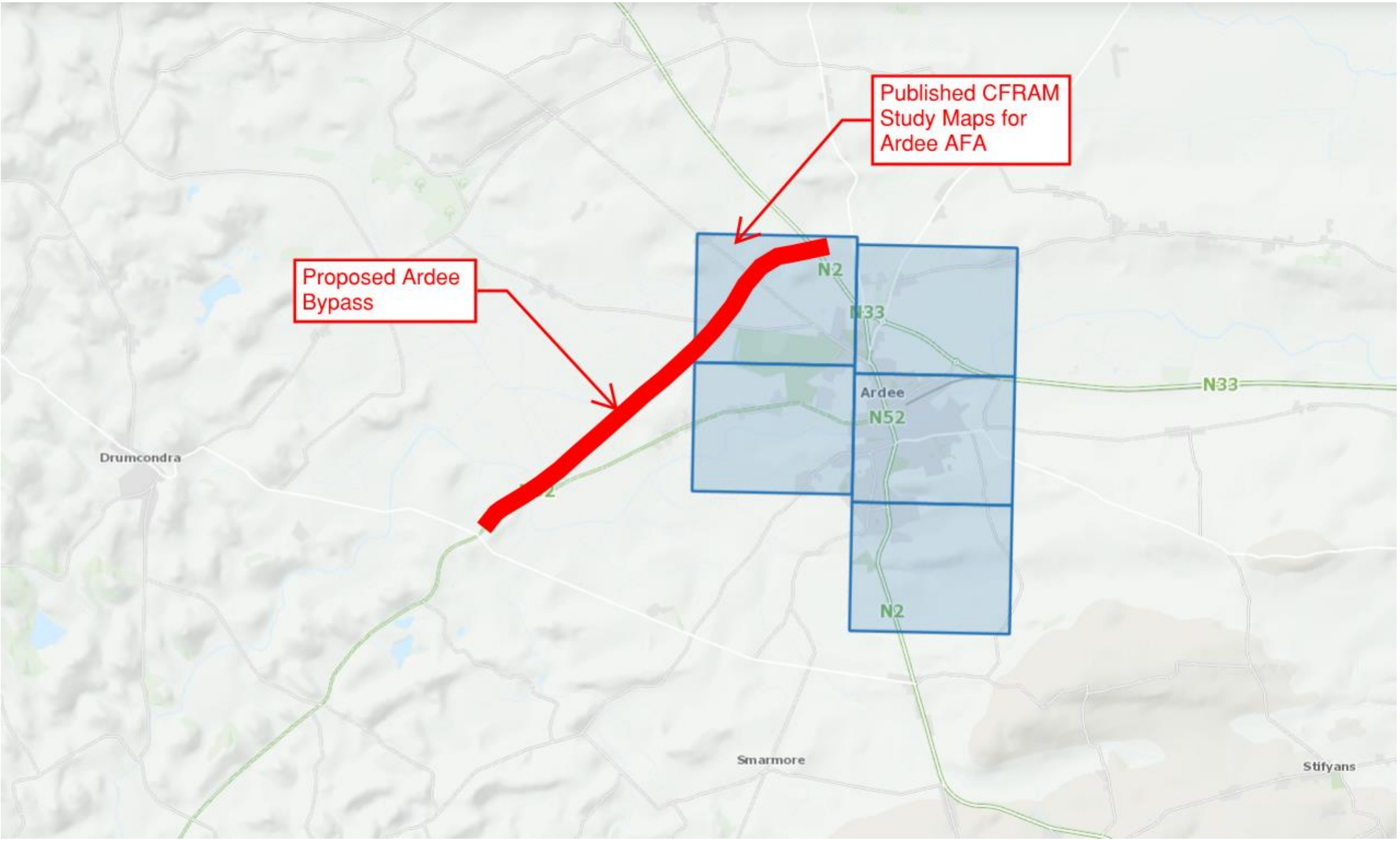
Strategic Flood Risk Assessment: The assessment of flood risk on a wide geographical area against which to assess development proposed in an area (Region, County, Town).

Vulnerability: The resilience of a particular group of people or types of property or habitats, ecosystems or species to flood risk, and their ability to respond to a hazardous condition and the damage or degree of impact they are likely to suffer in the event of a flood. For example, elderly people may be more likely to suffer injury, and be less able to evacuate, in the event of a rapid flood than younger people.

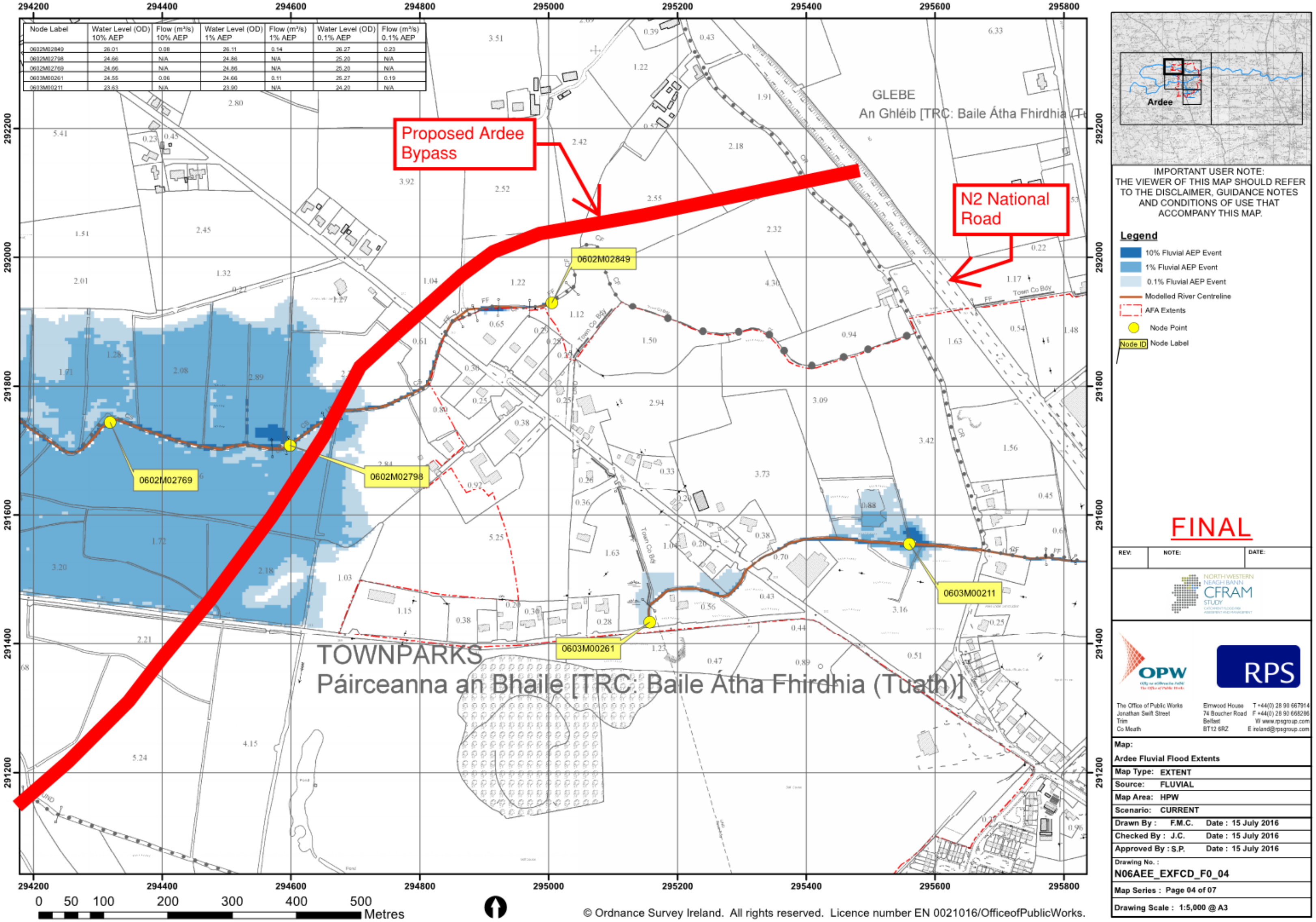
Source: *The definitions above are sourced from the DoEHLG Guidelines for Planning Authorities on ‘The Planning System and Flood Risk Management, 2009’ and Ciria 753 “the SuDS Manual*

APPENDIX B
FLOOD SOURCES

CFRAM Study Mapping

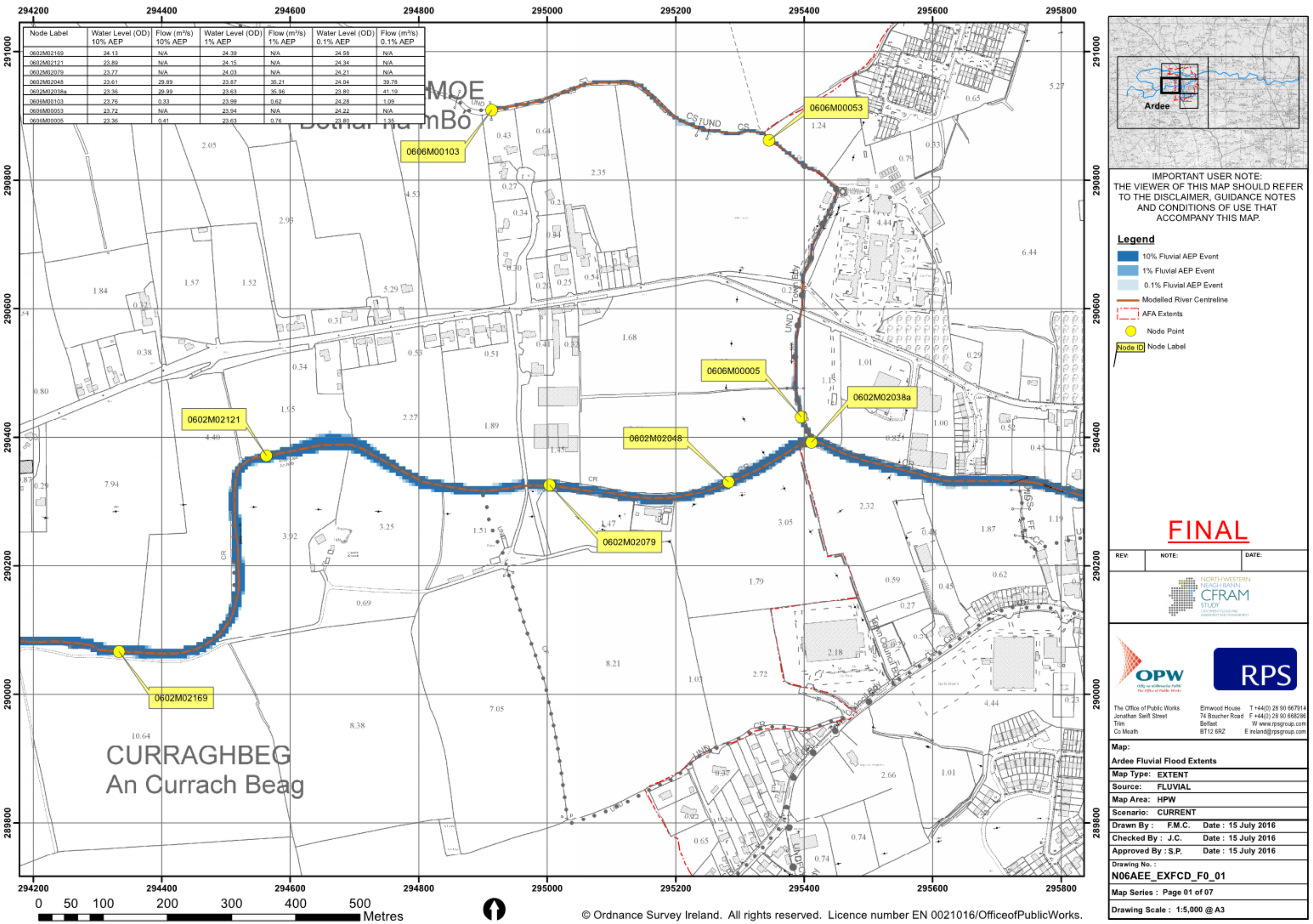


CFRAM Study Mapping



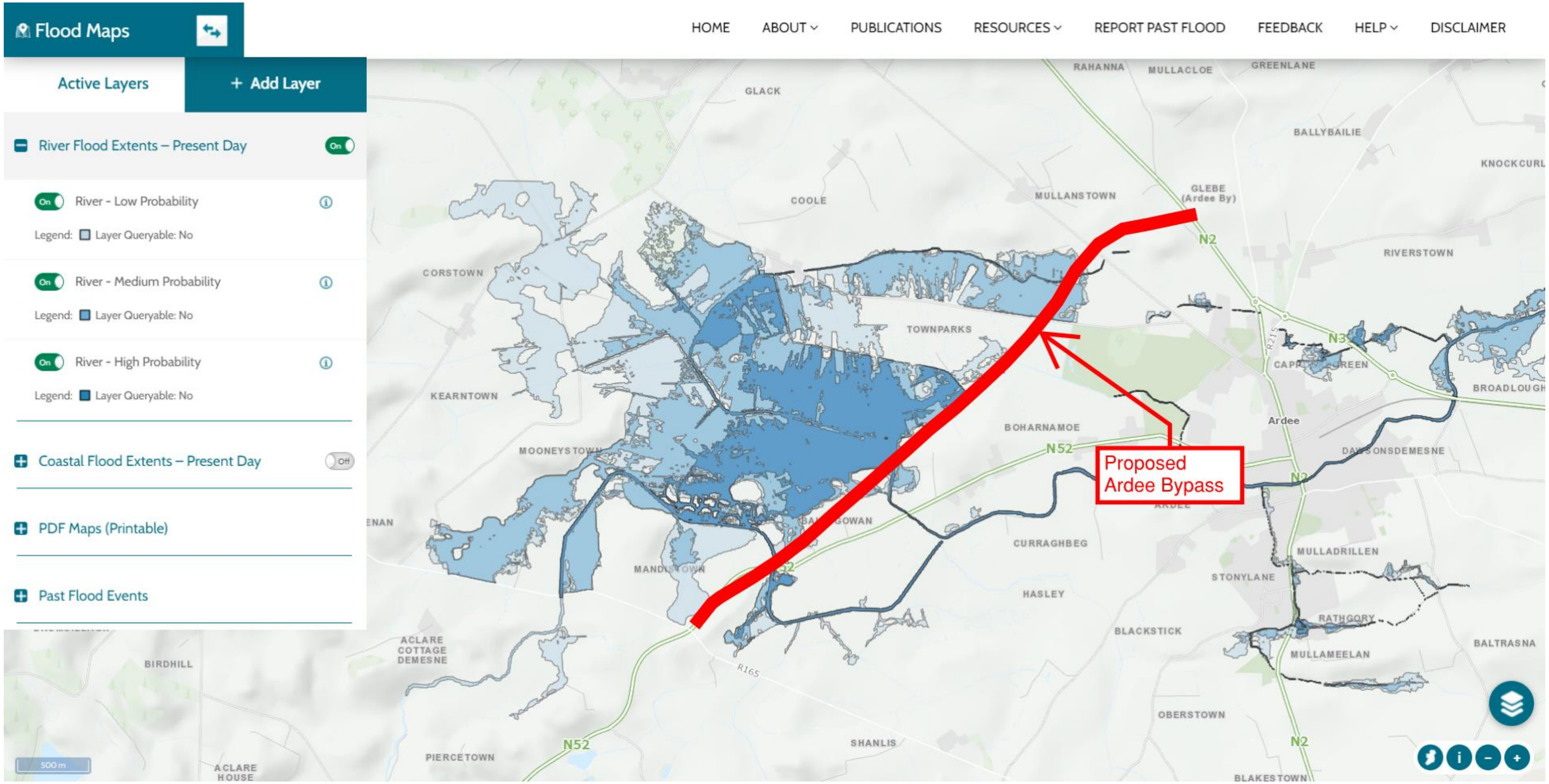
Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
0602M02849	26.01	0.08	26.11	0.14	26.27	0.23
0602M02798	24.66	N/A	24.86	N/A	25.20	N/A
0602M02769	24.66	N/A	24.86	N/A	25.20	N/A
0603M00261	24.55	0.06	24.66	0.11	25.27	0.19
0603M00211	23.63	N/A	23.90	N/A	24.20	N/A

CFRAM Study Mapping



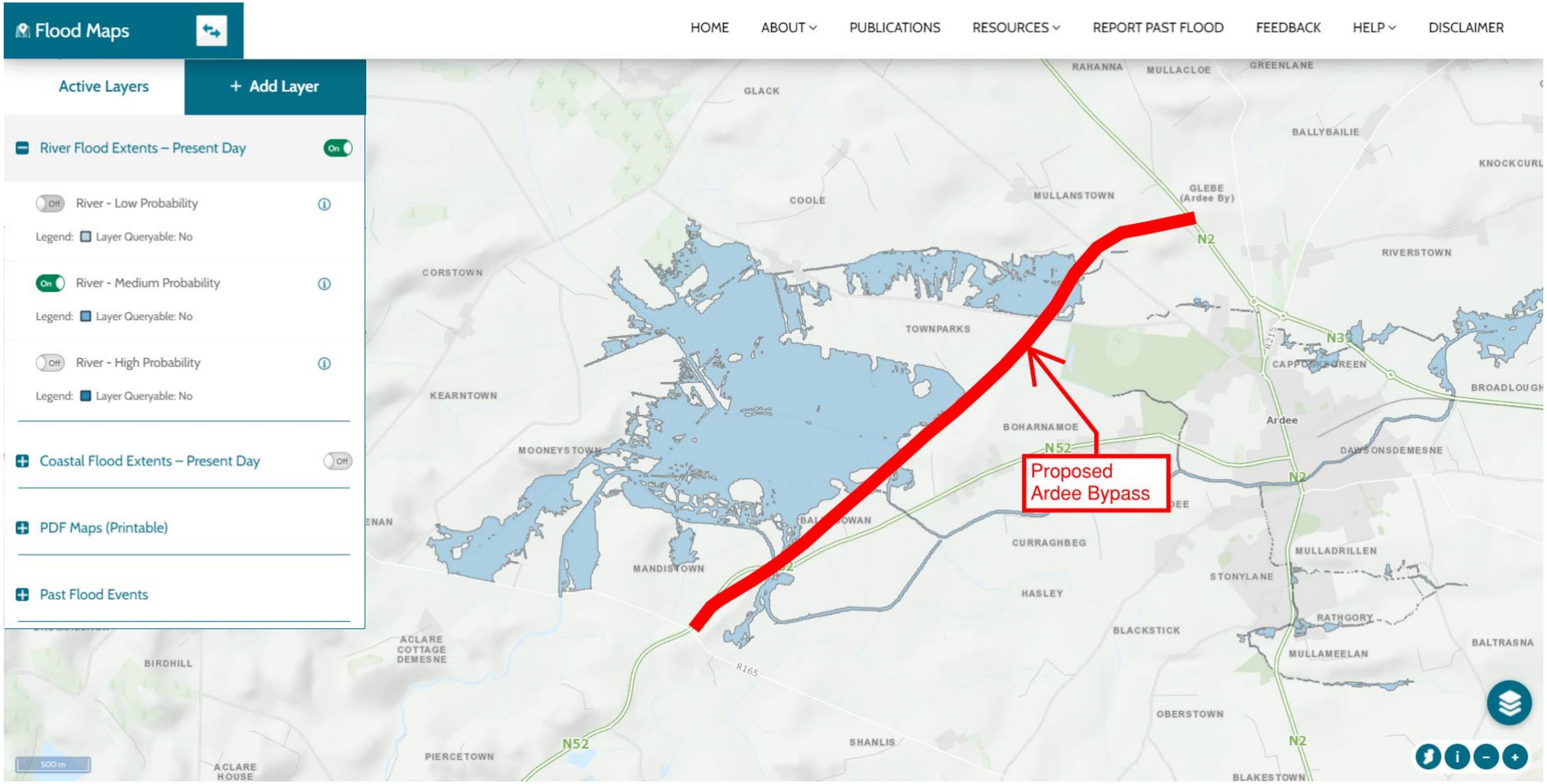
Node Label	Water Level (OD) 10% AEP	Flow (m^3/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m^3/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m^3/s) 0.1% AEP
0602M02169	24.13	N/A	24.39	N/A	24.58	N/A
0602M02121	23.89	N/A	24.15	N/A	24.34	N/A
0602M02079	23.77	N/A	24.03	N/A	24.21	N/A
0602M02048	23.61	29.89	23.87	35.21	24.04	39.78
0602M02038a	23.36	29.99	23.63	35.96	23.80	41.19
0606M00103	23.76	0.33	23.99	0.62	24.28	1.09
0606M00053	23.72	N/A	23.94	N/A	24.22	N/A
0606M00005	23.36	0.41	23.63	0.76	23.80	1.35

CFRAM Programme Flood Maps – Fluvial Flood Extent (10%, 1% and 0.1% AEP Events)

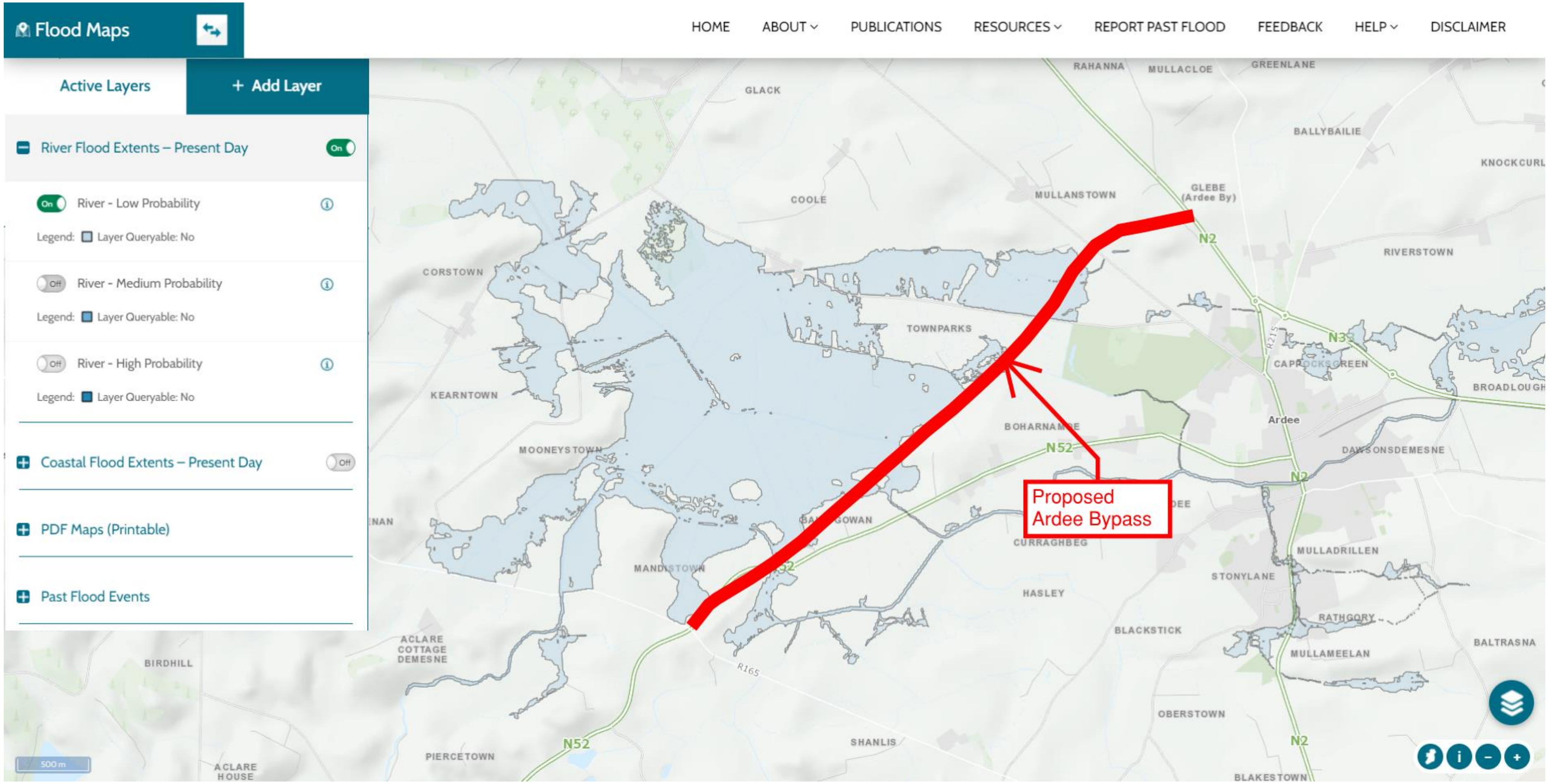


CFRAM Programme Flood Maps – Fluvial Flood Extent (10% AEP Event)

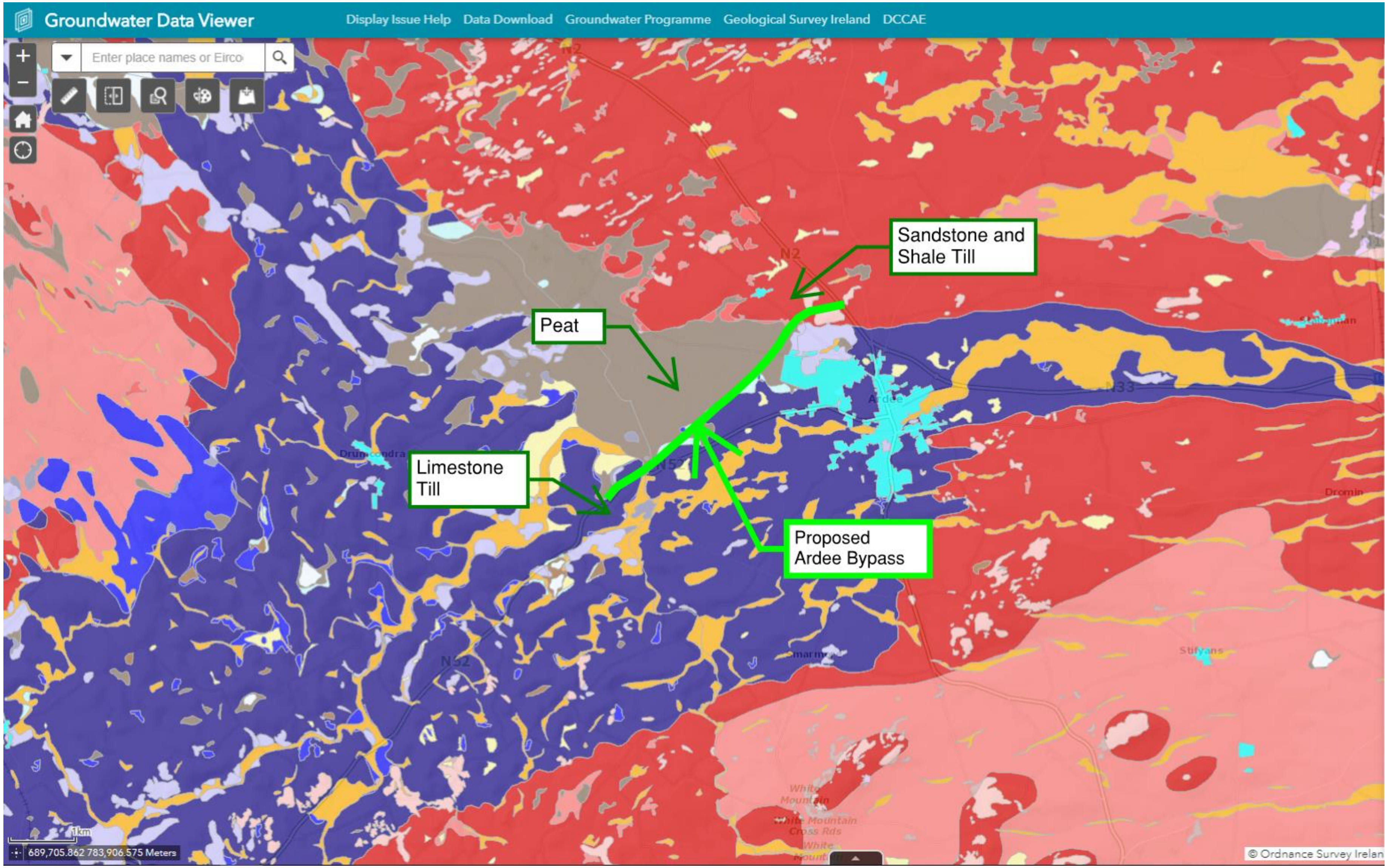
CFRAM Programme Flood Maps – Fluvial Flood Extent (1% AEP Event)



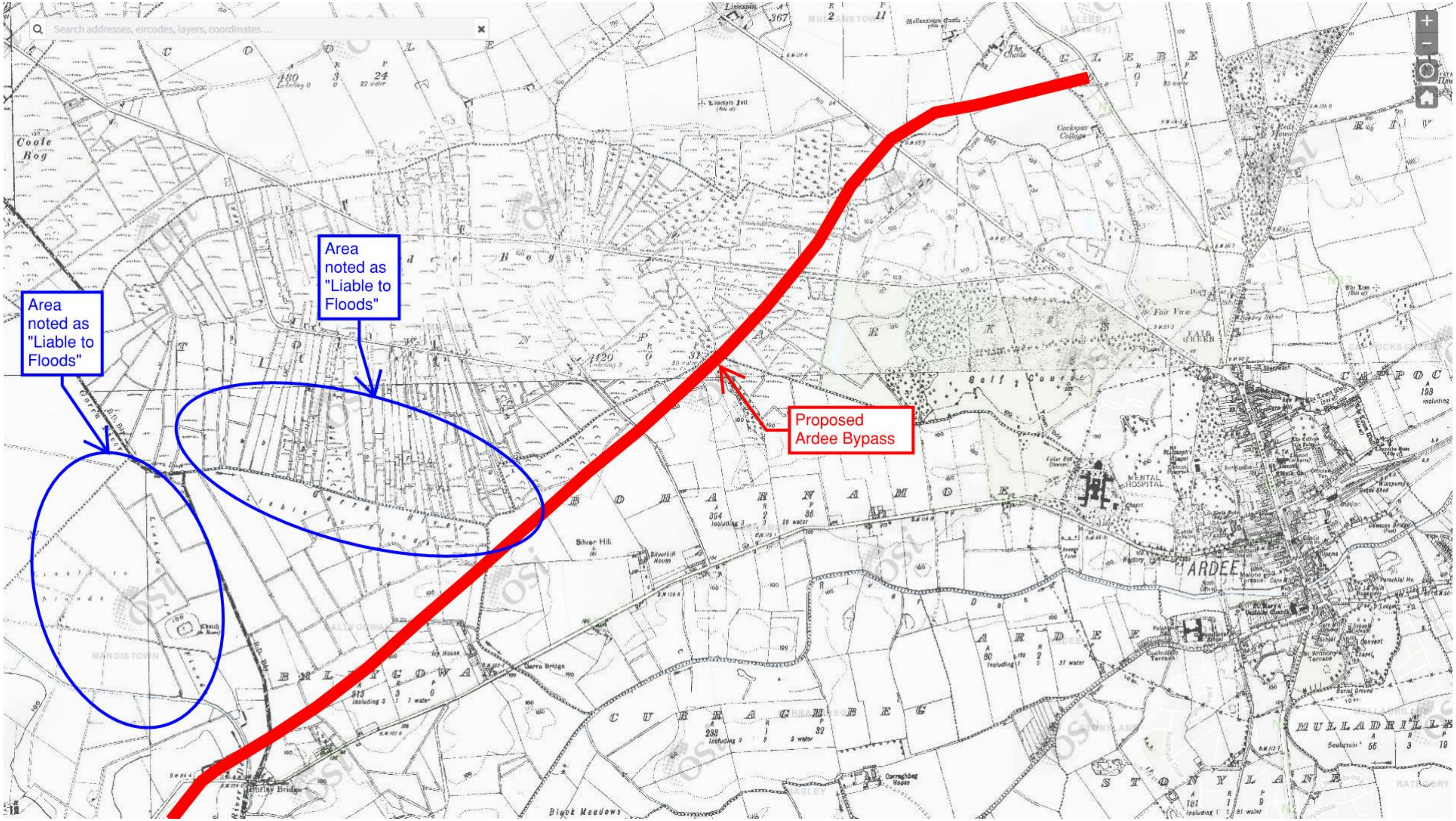
CFRAM Programme Flood Maps – Fluvial Flood Extent (0.1% AEP Event)



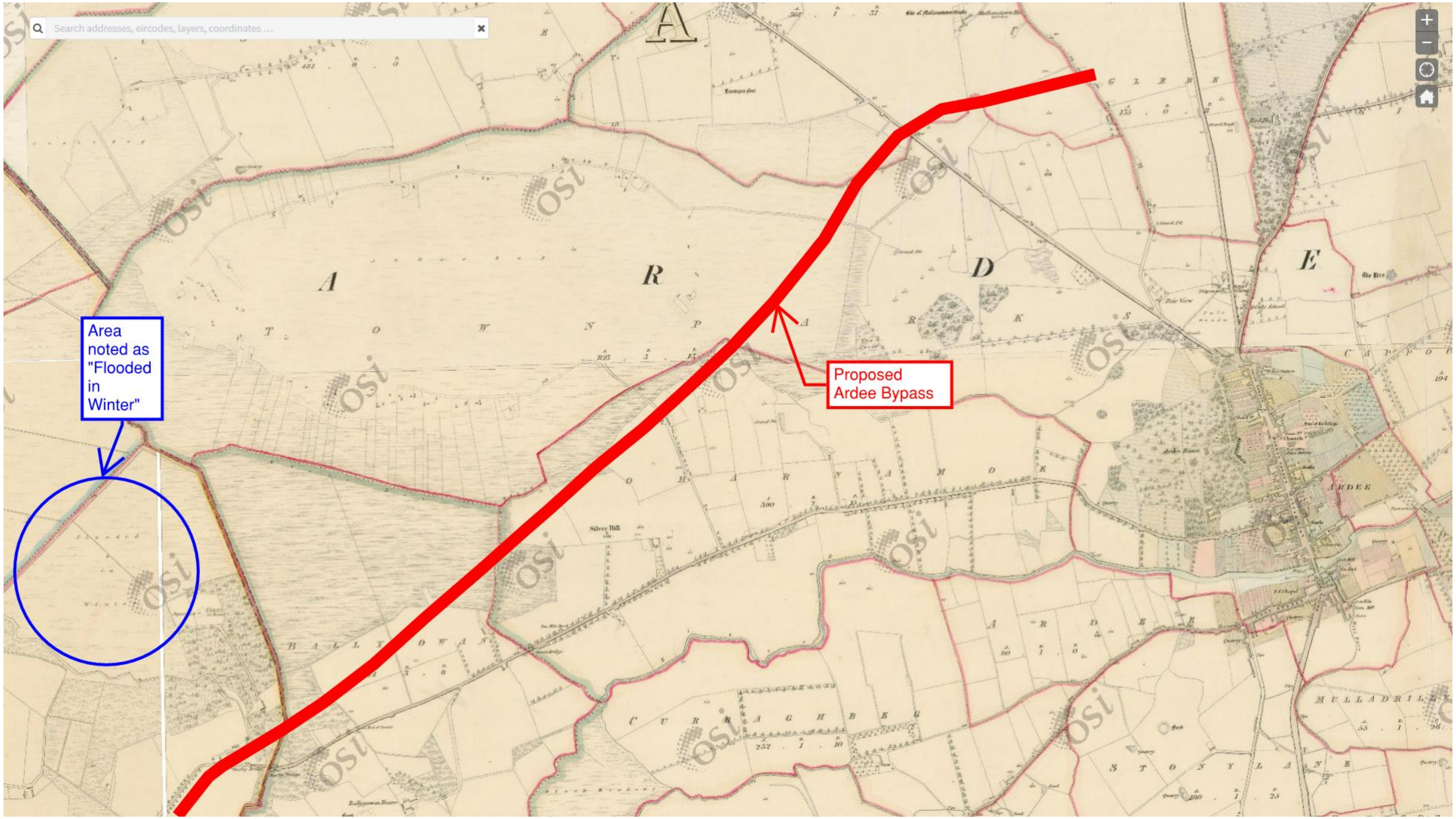
GSI Soil Mapping



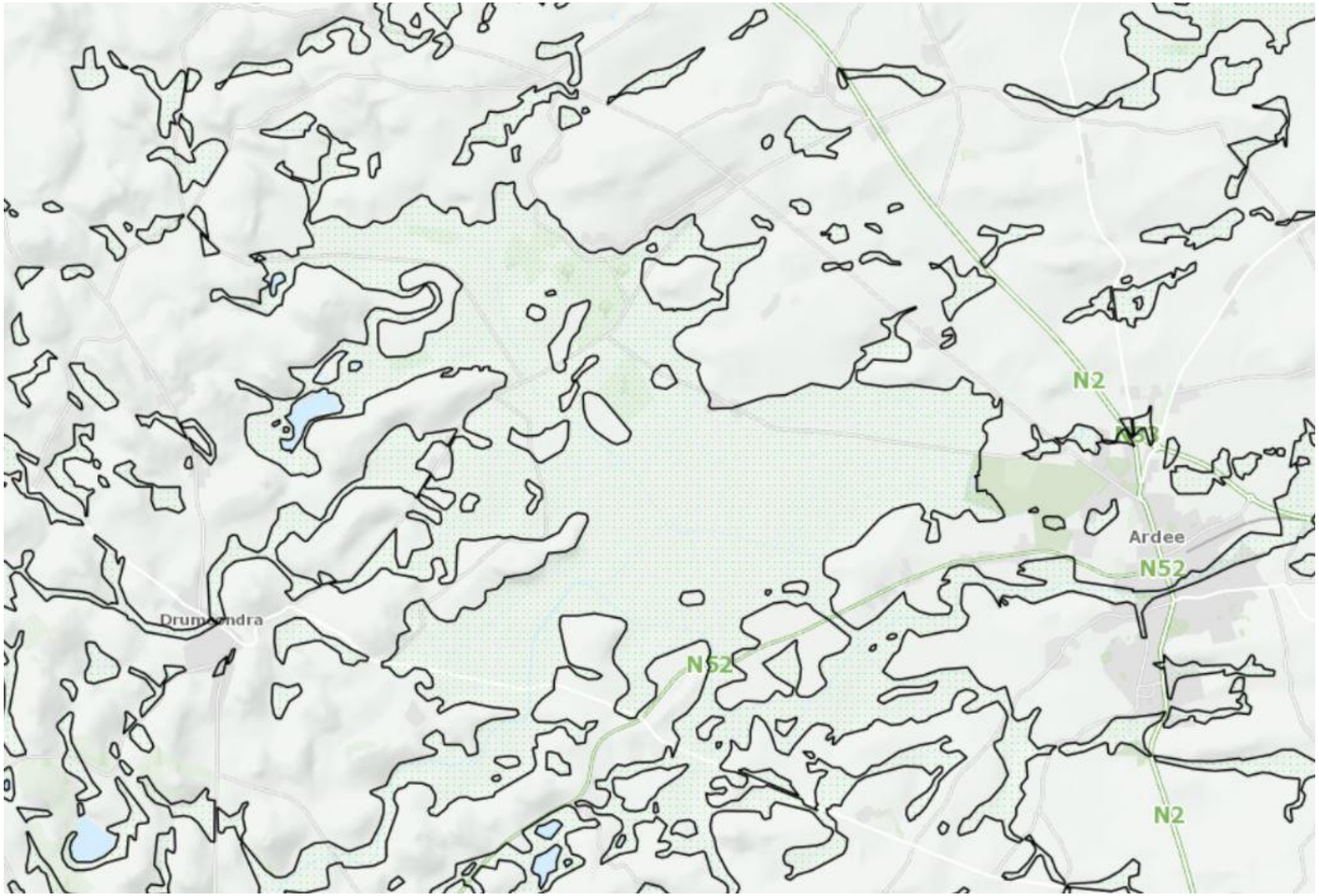
Historic 6 Inch Cassini Mapping



Historic 6 Inch Coloured Mapping



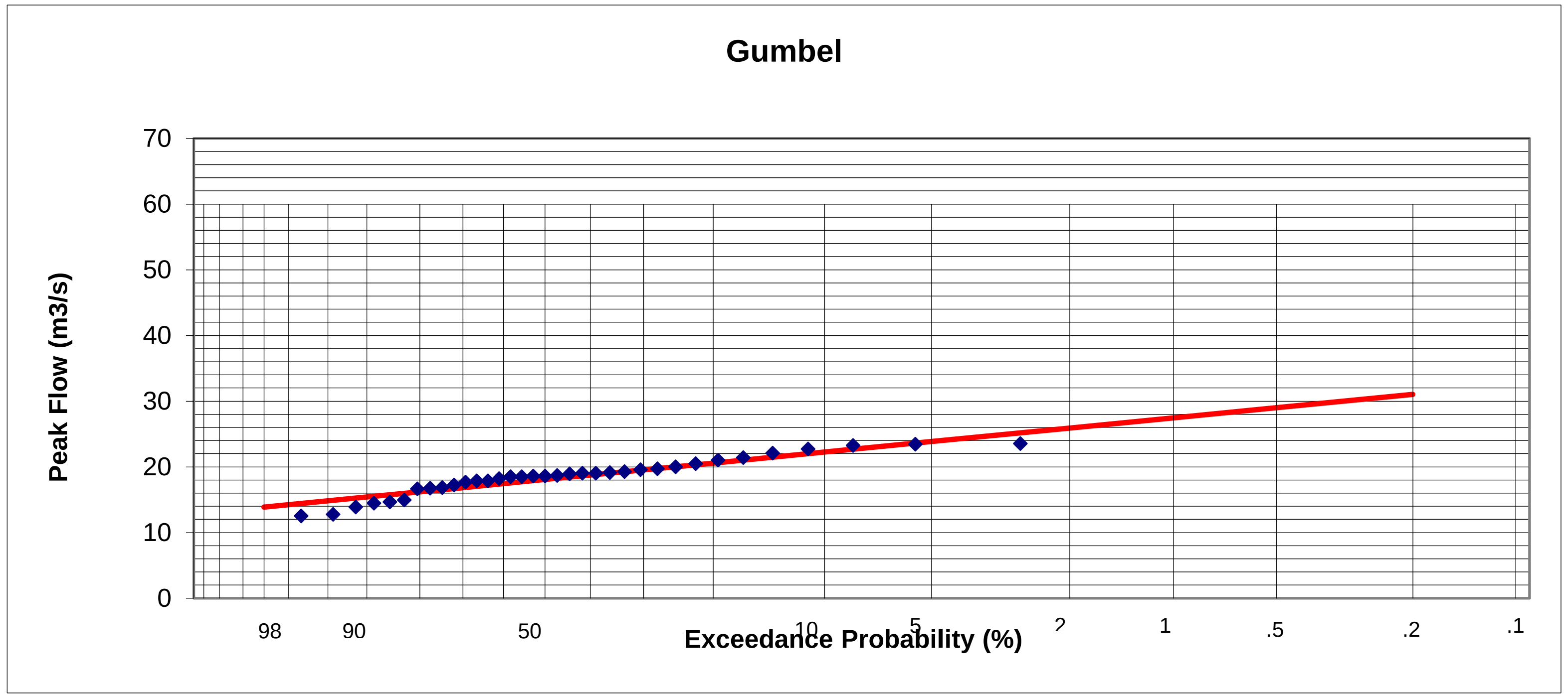
OPW Benefiting Lands Mapping



APPENDIX C
BURLEY BRIDGE EXTREME VALUE ANALYSIS

Q	Rank	pp	z	Q
23.57	1	0.02778	3.56947	23.57
23.46	2	0.05556	2.86193	23.46
23.27	3	0.08333	2.44172	23.27
22.76	4	0.11111	2.13891	22.76
22.12	5	0.13889	1.90025	22.12
21.44	6	0.16667	1.70198	21.44
21.04	7	0.19444	1.53144	21.04
20.49	8	0.22222	1.38105	20.49
20.04	9	0.25000	1.24590	20.04
19.72	10	0.27778	1.12263	19.72
19.61	11	0.30556	1.00884	19.61
19.28	12	0.33333	0.90272	19.28
19.17	13	0.36111	0.80291	19.17
19.06	14	0.38889	0.70831	19.06
19.06	15	0.41667	0.61805	19.06
18.96	16	0.44444	0.53139	18.96
18.74	17	0.47222	0.44773	18.74
18.64	18	0.50000	0.36651	18.64
18.64	19	0.52778	0.28727	18.64
18.53	20	0.55556	0.20957	18.53
18.53	21	0.58333	0.13300	18.53
18.21	22	0.61111	0.05714	18.21
17.9	23	0.63889	-0.01840	17.9
17.9	24	0.66667	-0.09405	17.9
17.69	25	0.69444	-0.17027	17.69
17.27	26	0.72222	-0.24759	17.27
16.86	27	0.75000	-0.32663	16.86
16.76	28	0.77778	-0.40818	16.76
16.66	29	0.80556	-0.49324	16.66
14.97	30	0.83333	-0.58320	14.97
14.68	31	0.86111	-0.68010	14.68
14.48	32	0.88889	-0.78720	14.48
13.91	33	0.91667	-0.91024	13.91
12.8	34	0.94444	-1.06139	12.8
12.53	35	0.97222	-1.27635	12.53

N= 35
Q_{bar}= 18.54
S= 2.84



NOTE: For information on the Gumbel distribution, see Bulletin # 17B, pages 14-4 through 14-5

M= 17.25602 location statistic
B= 2.21704 scale statistic

p	T	K	z	X
0.99	1.01	-1.52718	-1.52718	13.870
0.90	1.11	-0.83403	-0.83403	15.407
0.70	1.43	-0.18563	-0.18563	16.844
0.50	2	0.36651	0.36651	18.069
0.20	5	1.49994	1.49994	20.581
0.10	10	2.25037	2.25037	22.245
0.05	20	2.97020	2.97020	23.841
0.02	50	3.90194	3.90194	25.907
0.01	100	4.60015	4.60015	27.455
0.005	200	5.29581	5.29581	28.997
0.002	500	6.21361	6.21361	31.032
0.001	1000	6.90726	6.90726	32.570

$M = Q_{bar} - 0.45005S$ (14-5)

$B = .7797S$ (14-6)

$Q = M + B(-\ln(\ln P))$ (14-7)

M = mode
B = slope
Q = Discharge
Q_{bar} = mean
P = exceedance probability
S = standard deviation

APPENDIX D
FSU FLOOD ESTIMATION REPORT

Flood Estimation Report #11385 (19.153 N52 Ardee Catchment A)

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Subject site

Attributes

Name	Unit	Value
Coordinate [X]		-735088.044699954
Coordinate [Y]		7142040.66696257
Distance	km	134.000216763245
Station Number		06_970_10
Location		
Water Body		
Catchment		
Hydrometric Area		
Organisation		
FSU Rating Classification		
Drainage works	year	
Contributing Catchment Area	km^2	175.143
Center Northing	m	287060
Center Easting	m	282580
Northing	m	289980
Easting	m	291958
A-Max series gap in years	year	
A-Max series number of years	year	
A-Max series number of usable years	year	
A-Max series end year	year	
A-Max series start year	year	
FARL		0.956
ALLUV		0.0428
PEAT		0.0001
FOREST		0.0279
PASTURE		0.9874
S1085	m/km	3.52068
MSL	km	37.802
DRAIND	km/km^2	0.995
ALTBAR		96.5
NETLEN	km	174.321
T4		
T3		

SAAPE	mm	503.28
T2		
ARTDRAIN2		0.8282
ARTDRAIN		0.1418
TAYSLO		0.258342
STMFRQ		124
BFISOIL		0.615222686
SAAR	mm	908.76
RWSEG_CD		06_970
TOP_RWSEG		
Bankfull		
HGF	m^3/s	
MAF	m^3/s	
FAI		0.1259
FLATWET		0.6
URBEXT		0.0022
HGF/QMED		
centroidx3857		-750224.899327487
centroidy3857		7137549.35060522
x3857		-735088.044699954
y3857		7142040.66696257

Pivotal site

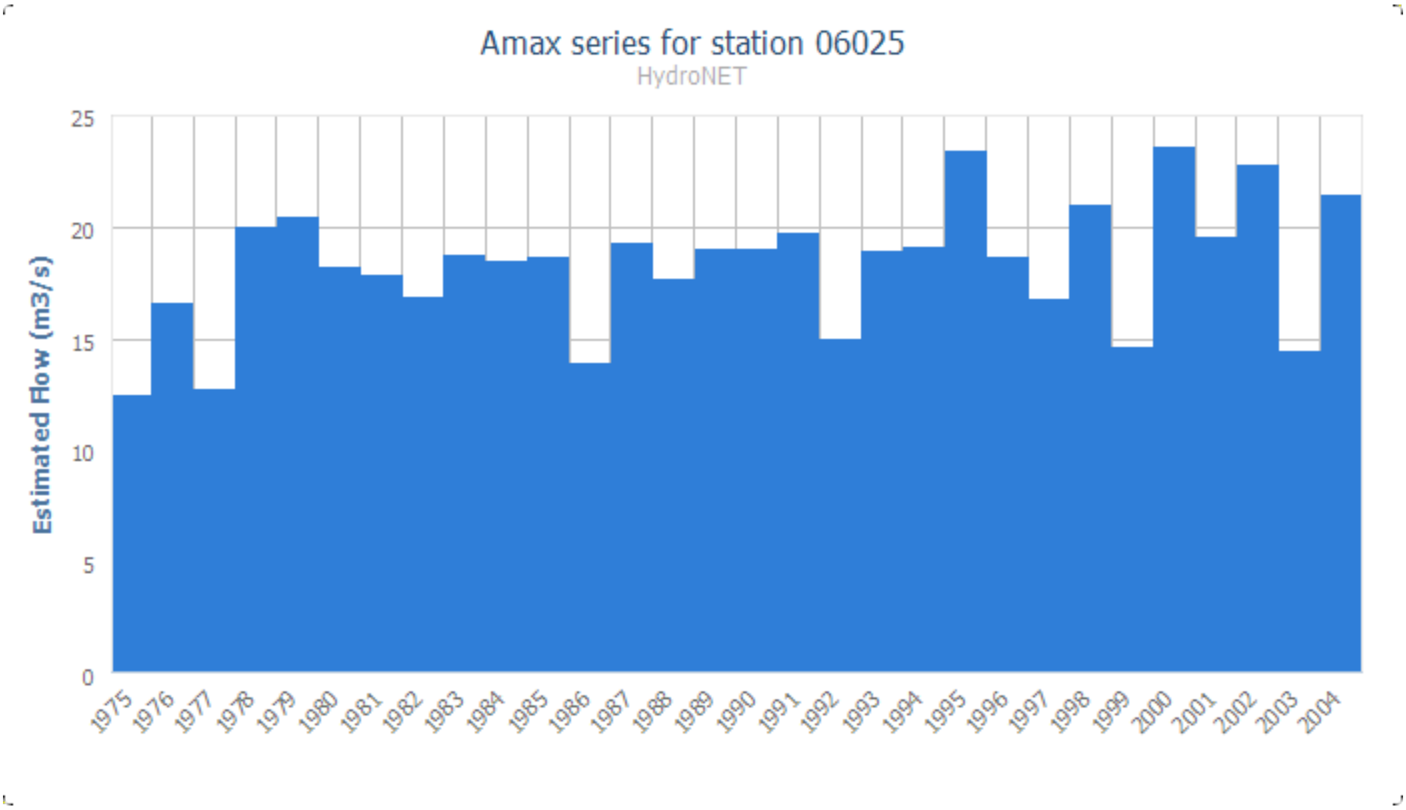
Attributes

Name	Unit	Value
Coordinate [X]		-734078.386803591
Coordinate [Y]		7141428.93086189
Station Number		06025
Location		BURLEY
Water Body		DEE
Catchment		Glyde & Dee
Hydrometric Area		6
Organisation		OPW
FSU Rating Classification		A1
Drainage works	year	1950-57
Contributing Catchment Area	km^2	175.9788
Center Northing	m	287060
Center Easting	m	282580
Northing	m	289631
Easting	m	292562
A-Max series gap in years	year	0
A-Max series number of years	year	30
A-Max series number of usable years	year	30
A-Max series end year	year	2004
A-Max series start year	year	1975
FARL		0.956
ALLUV		0.0428
PEAT		0.0001
FOREST		0.0278
PASTURE		0
S1085	m/km	3.45541
MSL	km	38.625
DRAIND	km/km^2	0.997
ALTBAR		0
NETLEN	km	175.534
T4		0.18514059303461
T3		-0.070647479780504
SAAPE	mm	503.33
T2		0.088084547648673
ARTDRAIN2		0.8298
ARTDRAIN		0.1435
TAYSLO		0.234649
STMFRQ		124
BFISOIL		0.615
SAAR	mm	908.31
RWSEG_CD		06_970
TOP_RWSEG		06_804
Bankfull		3.59 from survey
HGF	m^3/s	26
MAF	m^3/s	18
FAI		0.13
FLATWET		0.6
URBEXT		0.0022
HGF/QMED		1.3911182450508
x3857		-734078.386803591
y3857		7141428.93086189

centroidx3857		-750152.401101113
centroidy3857		7137568.00764289
Distance	km	0.0748603892723733

Map

Amax Series Chart



QMED Estimates

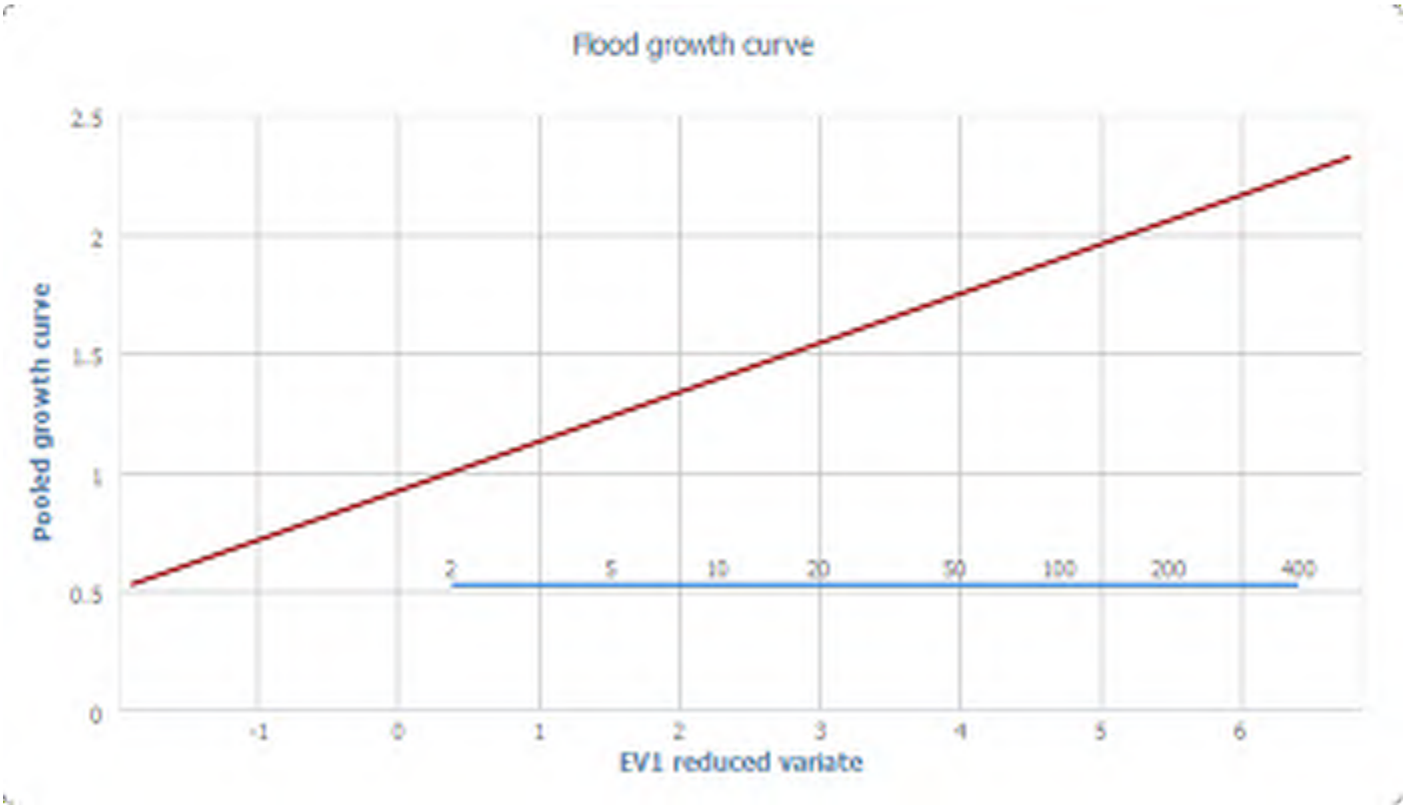
Subject rural QMED	26.1
Subject urban QMED	26.19
Pivotal gauged QMED	18.69
Pivotal adjustment factor QMED	0.71
Subject adjusted QMED	**18.66**

Pooling Group

Station	Amax years
06025 BURLEY	30
16001 ATHLUMMON	33
24002 GRAYS BR.	32
06026 ACLINT	46
06014 TALLANSTOWN	30
16004 THURLES	48
25016 RAHAN	48
25023 MILLTOWN	33
25022 SYNGEFIELD	22
06013 CHARLEVILLE	30

07006 FYANSTOWN	19
07001 TREMBLESTOWN	18
14013 BALLINACARRIG	49
36018 ASHFIELD	50

Selected Flood Growth Curve



Pooled growth curve	EV1 reduced variate
0.53	-1.91
0.56	-1.75
0.58	-1.66
0.6	-1.59
0.61	-1.54
0.61	-1.5
0.62	-1.46
0.63	-1.43
0.64	-1.4
0.64	-1.37
0.65	-1.34
0.65	-1.32
0.66	-1.3
0.66	-1.28
0.66	-1.26
0.67	-1.24
0.67	-1.22
0.68	-1.2
0.68	-1.18
0.68	-1.17
0.69	-1.15
0.69	-1.14
0.69	-1.12
0.7	-1.11
0.7	-1.1
0.7	-1.08
0.7	-1.07
0.71	-1.06
0.71	-1.04

0.71	-1.03
0.71	-1.02
0.72	-1.01
0.72	-1
0.72	-0.98
0.72	-0.97
0.73	-0.96
0.73	-0.95
0.73	-0.94
0.73	-0.93
0.73	-0.92
0.74	-0.91
0.74	-0.9
0.74	-0.89
0.74	-0.88
0.74	-0.87
0.75	-0.86
0.75	-0.85
0.75	-0.85
0.75	-0.84
0.75	-0.83
0.76	-0.82
0.76	-0.81
0.76	-0.8
0.76	-0.79
0.76	-0.78
0.76	-0.78
0.77	-0.77
0.77	-0.76
0.77	-0.75
0.77	-0.74
0.77	-0.74
0.77	-0.73
0.78	-0.72
0.78	-0.71
0.78	-0.7
0.78	-0.7
0.78	-0.69
0.78	-0.68
0.78	-0.67
0.79	-0.67
0.79	-0.66
0.79	-0.65
0.79	-0.65
0.79	-0.64
0.79	-0.63
0.8	-0.62
0.8	-0.62
0.8	-0.61
0.8	-0.6
0.8	-0.6
0.8	-0.59
0.8	-0.58
0.81	-0.57
0.81	-0.57
0.81	-0.56
0.81	-0.55

0.81	-0.55
0.81	-0.54
0.81	-0.53
0.82	-0.53
0.82	-0.52
0.82	-0.51
0.82	-0.51
0.82	-0.5
0.82	-0.5
0.82	-0.49
0.82	-0.48
0.83	-0.48
0.83	-0.47
0.83	-0.46
0.83	-0.46
0.83	-0.45
0.83	-0.44
0.83	-0.44
0.83	-0.43
0.84	-0.43
0.84	-0.42
0.84	-0.41
0.84	-0.41
0.84	-0.4
0.84	-0.4
0.84	-0.39
0.85	-0.38
0.85	-0.38
0.85	-0.37
0.85	-0.37
0.85	-0.36
0.85	-0.35
0.85	-0.35
0.85	-0.34
0.86	-0.34
0.86	-0.33
0.86	-0.32
0.86	-0.32
0.86	-0.31
0.86	-0.31
0.86	-0.3
0.86	-0.29
0.86	-0.29
0.87	-0.28
0.87	-0.28
0.87	-0.27
0.87	-0.27
0.87	-0.26
0.87	-0.25
0.87	-0.25
0.87	-0.24
0.88	-0.24
0.88	-0.23
0.88	-0.22
0.88	-0.22
0.88	-0.21
0.88	-0.21

0.88	-0.2
0.88	-0.2
0.88	-0.19
0.89	-0.18
0.89	-0.18
0.89	-0.17
0.89	-0.17
0.89	-0.16
0.89	-0.16
0.89	-0.15
0.89	-0.15
0.9	-0.14
0.9	-0.13
0.9	-0.13
0.9	-0.12
0.9	-0.12
0.9	-0.11
0.9	-0.11
0.9	-0.1
0.9	-0.09
0.91	-0.09
0.91	-0.08
0.91	-0.08
0.91	-0.07
0.91	-0.07
0.91	-0.06
0.91	-0.06
0.91	-0.05
0.92	-0.04
0.92	-0.04
0.92	-0.03
0.92	-0.03
0.92	-0.02
0.92	-0.02
0.92	-0.01
0.92	-0.01
0.92	0
0.93	0.01
0.93	0.01
0.93	0.02
0.93	0.02
0.93	0.03
0.93	0.03
0.93	0.04
0.93	0.04
0.93	0.05
0.94	0.06
0.94	0.06
0.94	0.07
0.94	0.07
0.94	0.08
0.94	0.08
0.94	0.09
0.94	0.09
0.95	0.1
0.95	0.11
0.95	0.11

0.95	0.12
0.95	0.12
0.95	0.13
0.95	0.13
0.95	0.14
0.95	0.15
0.96	0.15
0.96	0.16
0.96	0.16
0.96	0.17
0.96	0.17
0.96	0.18
0.96	0.18
0.96	0.19
0.96	0.2
0.97	0.2
0.97	0.21
0.97	0.21
0.97	0.22
0.97	0.22
0.97	0.23
0.97	0.24
0.97	0.24
0.98	0.25
0.98	0.25
0.98	0.26
0.98	0.26
0.98	0.27
0.98	0.28
0.98	0.28
0.98	0.29
0.98	0.29
0.99	0.3
0.99	0.31
0.99	0.31
0.99	0.32
0.99	0.32
0.99	0.33
0.99	0.33
0.99	0.34
1	0.35
1	0.35
1	0.36
1	0.36
1	0.37
1	0.38
1	0.38
1	0.39
1.01	0.39
1.01	0.4
1.01	0.41
1.01	0.41
1.01	0.42
1.01	0.42
1.01	0.43
1.01	0.44
1.02	0.44

1.02	0.45
1.02	0.45
1.02	0.46
1.02	0.47
1.02	0.47
1.02	0.48
1.02	0.48
1.03	0.49
1.03	0.5
1.03	0.5
1.03	0.51
1.03	0.52
1.03	0.52
1.03	0.53
1.03	0.53
1.04	0.54
1.04	0.55
1.04	0.55
1.04	0.56
1.04	0.57
1.04	0.57
1.04	0.58
1.05	0.58
1.05	0.59
1.05	0.6
1.05	0.6
1.05	0.61
1.05	0.62
1.05	0.62
1.05	0.63
1.06	0.64
1.06	0.64
1.06	0.65
1.06	0.66
1.06	0.66
1.06	0.67
1.06	0.68
1.07	0.68
1.07	0.69
1.07	0.7
1.07	0.7
1.07	0.71
1.07	0.72
1.07	0.72
1.08	0.73
1.08	0.74
1.08	0.74
1.08	0.75
1.08	0.76
1.08	0.77
1.08	0.77
1.09	0.78
1.09	0.79
1.09	0.79
1.09	0.8
1.09	0.81
1.09	0.82

1.09	0.82
1.1	0.83
1.1	0.84
1.1	0.84
1.1	0.85
1.1	0.86
1.1	0.87
1.1	0.87
1.11	0.88
1.11	0.89
1.11	0.9
1.11	0.9
1.11	0.91
1.11	0.92
1.12	0.93
1.12	0.93
1.12	0.94
1.12	0.95
1.12	0.96
1.12	0.97
1.13	0.97
1.13	0.98
1.13	0.99
1.13	1
1.13	1.01
1.13	1.01
1.14	1.02
1.14	1.03
1.14	1.04
1.14	1.05
1.14	1.05
1.14	1.06
1.15	1.07
1.15	1.08
1.15	1.09
1.15	1.1
1.15	1.11
1.15	1.11
1.16	1.12
1.16	1.13
1.16	1.14
1.16	1.15
1.16	1.16
1.17	1.17
1.17	1.18
1.17	1.19
1.17	1.19
1.17	1.2
1.17	1.21
1.18	1.22
1.18	1.23
1.18	1.24
1.18	1.25
1.18	1.26
1.19	1.27
1.19	1.28
1.19	1.29

1.19	1.3
1.19	1.31
1.2	1.32
1.2	1.33
1.2	1.34
1.2	1.35
1.21	1.36
1.21	1.37
1.21	1.38
1.21	1.39
1.21	1.4
1.22	1.41
1.22	1.42
1.22	1.43
1.22	1.44
1.22	1.46
1.23	1.47
1.23	1.48
1.23	1.49
1.23	1.5
1.24	1.51
1.24	1.52
1.24	1.54
1.24	1.55
1.25	1.56
1.25	1.57
1.25	1.58
1.25	1.6
1.26	1.61
1.26	1.62
1.26	1.63
1.26	1.65
1.27	1.66
1.27	1.67
1.27	1.69
1.28	1.7
1.28	1.71
1.28	1.73
1.28	1.74
1.29	1.75
1.29	1.77
1.29	1.78
1.3	1.8
1.3	1.81
1.3	1.83
1.3	1.84
1.31	1.86
1.31	1.87
1.31	1.89
1.32	1.9
1.32	1.92
1.32	1.94
1.33	1.95
1.33	1.97
1.33	1.99
1.34	2
1.34	2.02

1.35	2.04
1.35	2.06
1.35	2.08
1.36	2.09
1.36	2.11
1.36	2.13
1.37	2.15
1.37	2.17
1.38	2.19
1.38	2.21
1.39	2.23
1.39	2.26
1.39	2.28
1.4	2.3
1.4	2.32
1.41	2.35
1.41	2.37
1.42	2.39
1.42	2.42
1.43	2.44
1.43	2.47
1.44	2.5
1.45	2.52
1.45	2.55
1.46	2.58
1.46	2.61
1.47	2.64
1.48	2.67
1.48	2.71
1.49	2.74
1.5	2.77
1.5	2.81
1.51	2.85
1.52	2.88
1.53	2.92
1.54	2.96
1.55	3.01
1.55	3.05
1.56	3.1
1.57	3.15
1.58	3.2
1.6	3.25
1.61	3.31
1.62	3.37
1.63	3.43
1.65	3.5
1.66	3.57
1.68	3.65
1.7	3.73
1.71	3.82
1.73	3.92
1.76	4.03
1.78	4.16
1.81	4.3
1.85	4.47
1.89	4.67
1.94	4.92

2.01	5.25
2.11	5.74
2.32	6.77

Adopted Growth Factors

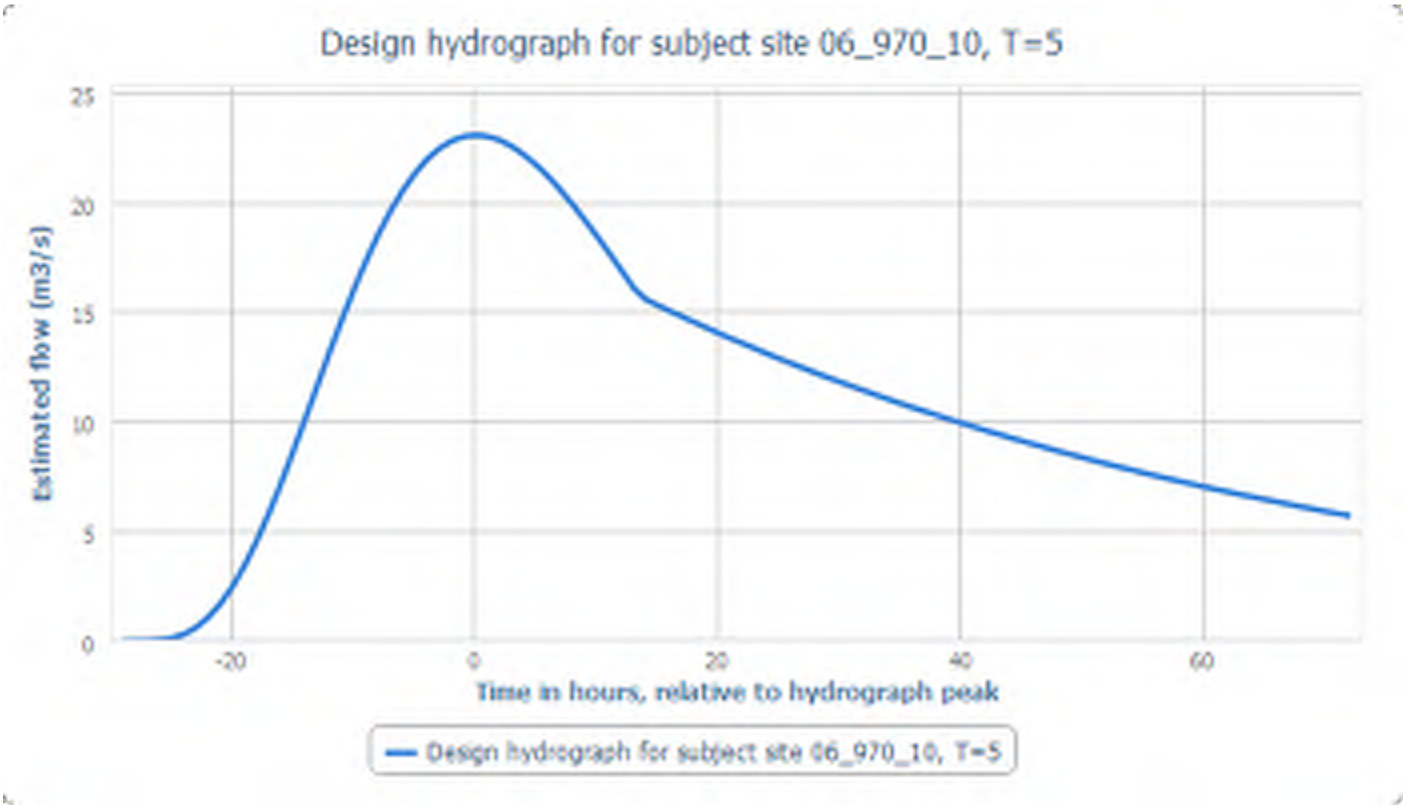
Return Period	Growth Factor	Design Peak Flow (m^3/s)
1.3	0.85	15.86
2	1	18.66
5	1.23	22.95
10	1.39	25.93
20	1.54	28.73
30	1.62	30.23
50	1.73	32.28
100	1.87	34.89
200	2.02	37.69
500	2.21	41.23
1000	2.35	43.85

Hydrograph Width Estimation Summary

Name	Value
Pivotal site	06013 "CHARLEVILLE"
Adjustment type	The user adopted the original PCD hydrograph
Transfer type	The user adjusted the subject site estimate with the pivotal site deformation factor
Deformation factor	1
Custom deformation factor	1
Accepted n	5.63098668882147
Accepted Tr	29.0252159177213
Accepted C	57.785376297456

Hydrograph Plots

Return Period: 5

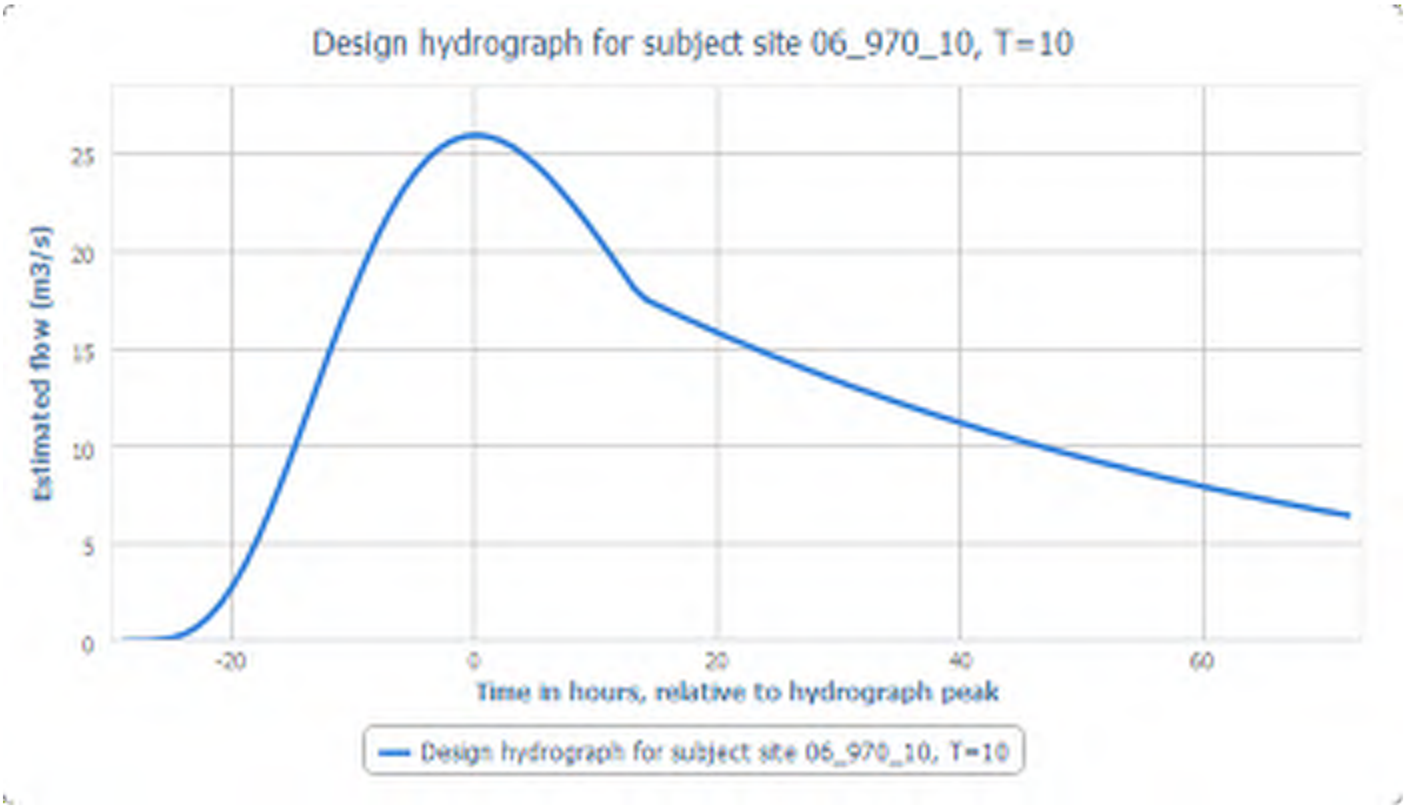


Hours relative to hydrograph peak	Estimated flow (m3/s)
-29.03	0
-29	0
-28	0
-27	0.01
-26	0.04
-25	0.13
-24	0.31
-23	0.62
-22	1.08
-21	1.71
-20	2.5
-19	3.47
-18	4.6
-17	5.86
-16	7.23
-15	8.69
-14	10.19
-13	11.7
-12	13.21
-11	14.67
-10	16.06
-9	17.35
-8	18.54
-7	19.6
-6	20.52
-5	21.3
-4	21.94
-3	22.42
-2	22.76

-1	22.96
0	23.03
1	22.96
2	22.79
3	22.5
4	22.12
5	21.65
6	21.11
7	20.5
8	19.84
9	19.13
10	18.4
11	17.63
12	16.85
13	16.06
14	15.54
15	15.27
16	15.01
17	14.75
18	14.5
19	14.25
20	14
21	13.76
22	13.53
23	13.3
24	13.07
25	12.84
26	12.62
27	12.41
28	12.19
29	11.98
30	11.78
31	11.58
32	11.38
33	11.18
34	10.99
35	10.8
36	10.62
37	10.44
38	10.26
39	10.08
40	9.91
41	9.74
42	9.57
43	9.41
44	9.24
45	9.09
46	8.93
47	8.78
48	8.63
49	8.48
50	8.33
51	8.19
52	8.05
53	7.91
54	7.78
55	7.64

56	7.51
57	7.38
58	7.26
59	7.13
60	7.01
61	6.89
62	6.77
63	6.65
64	6.54
65	6.43
66	6.32
67	6.21
68	6.1
69	6
70	5.89
71	5.79
72	5.69

Return Period: 10

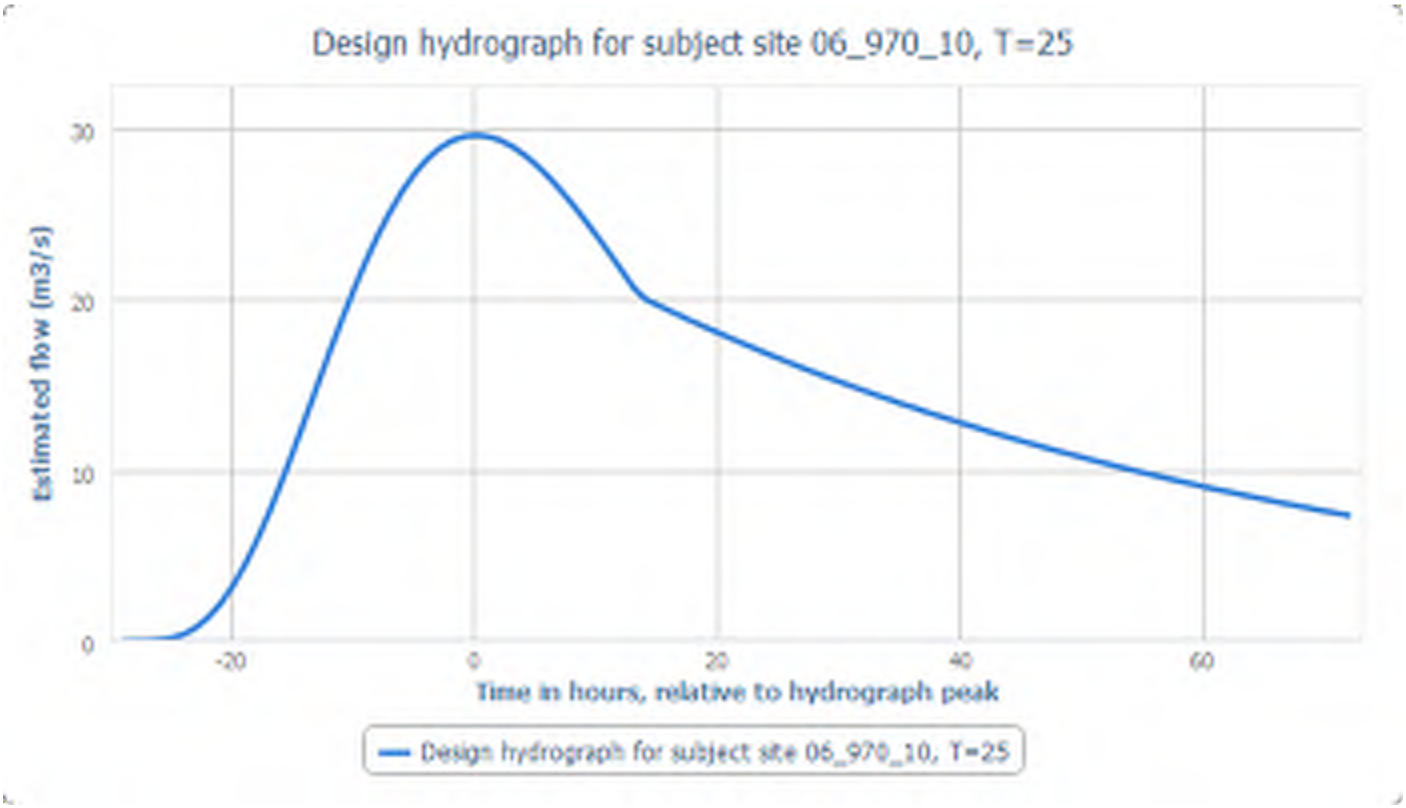


Hours relative to hydrograph peak	Estimated flow (m3/s)
-29.03	0
-29	0
-28	0
-27	0.01
-26	0.05
-25	0.15
-24	0.35
-23	0.7
-22	1.22
-21	1.92
-20	2.82
-19	3.91
-18	5.18
-17	6.6
-16	8.14
-15	9.78
-14	11.47
-13	13.17
-12	14.87
-11	16.51
-10	18.07
-9	19.53
-8	20.87
-7	22.06
-6	23.1
-5	23.98
-4	24.69
-3	25.24
-2	25.62
-1	25.85
0	25.92

1	25.85
2	25.65
3	25.33
4	24.89
5	24.37
6	23.76
7	23.07
8	22.33
9	21.54
10	20.71
11	19.85
12	18.97
13	18.08
14	17.49
15	17.19
16	16.89
17	16.6
18	16.32
19	16.04
20	15.76
21	15.49
22	15.23
23	14.97
24	14.71
25	14.46
26	14.21
27	13.97
28	13.73
29	13.49
30	13.26
31	13.03
32	12.81
33	12.59
34	12.37
35	12.16
36	11.95
37	11.75
38	11.54
39	11.35
40	11.15
41	10.96
42	10.77
43	10.59
44	10.41
45	10.23
46	10.05
47	9.88
48	9.71
49	9.54
50	9.38
51	9.22
52	9.06
53	8.91
54	8.75
55	8.6
56	8.45
57	8.31

58	8.17
59	8.03
60	7.89
61	7.75
62	7.62
63	7.49
64	7.36
65	7.24
66	7.11
67	6.99
68	6.87
69	6.75
70	6.64
71	6.52
72	6.41

Return Period: 25

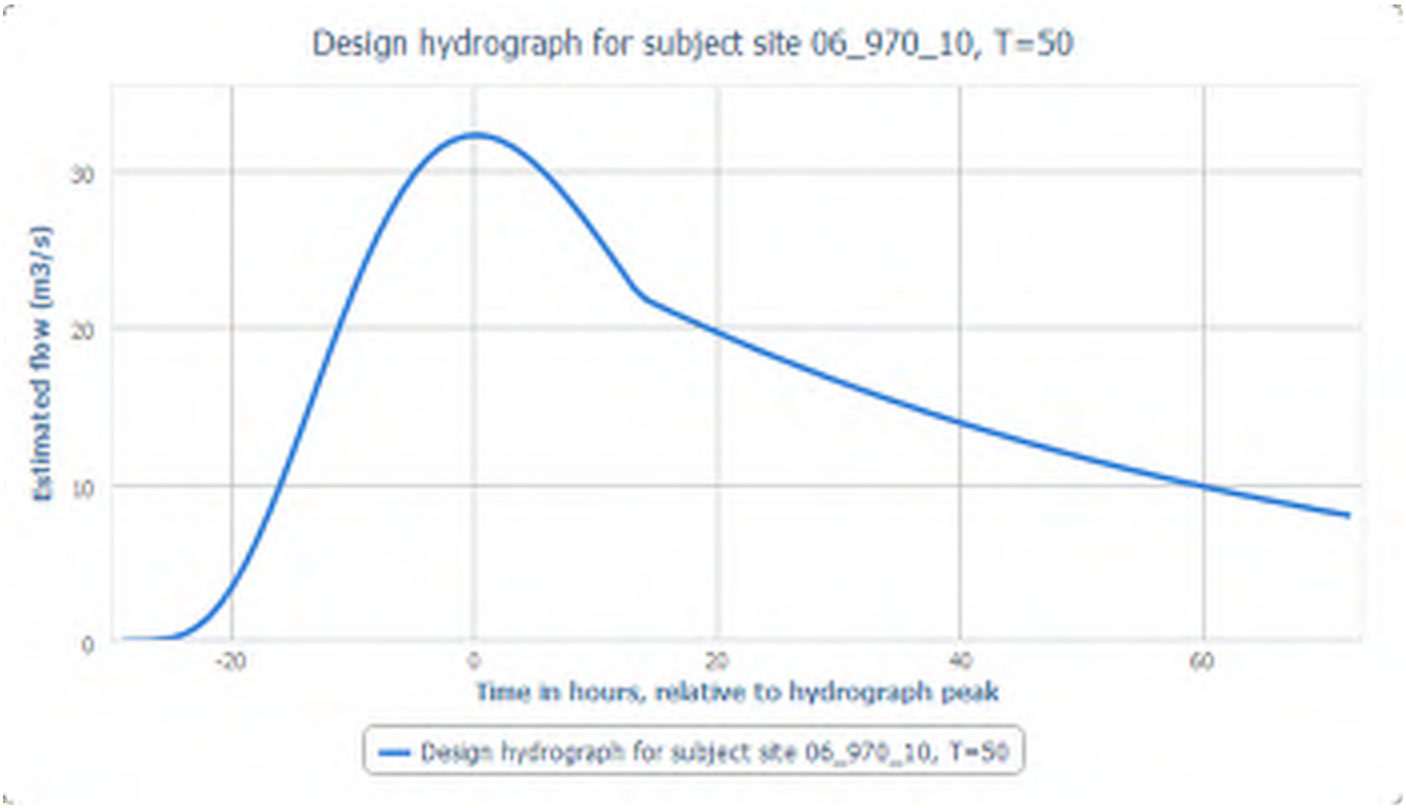


Hours relative to hydrograph peak	Estimated flow (m3/s)
-29.03	0
-29	0
-28	0
-27	0.01
-26	0.05
-25	0.17
-24	0.4
-23	0.8
-22	1.39
-21	2.19
-20	3.22
-19	4.46
-18	5.91
-17	7.53
-16	9.29
-15	11.16
-14	13.08
-13	15.03
-12	16.96
-11	18.84
-10	20.62
-9	22.29
-8	23.81
-7	25.17
-6	26.36
-5	27.36
-4	28.17
-3	28.8
-2	29.23
-1	29.49
0	29.57

1	29.49
2	29.26
3	28.9
4	28.41
5	27.8
6	27.11
7	26.33
8	25.48
9	24.57
10	23.63
11	22.65
12	21.64
13	20.63
14	19.95
15	19.61
16	19.28
17	18.94
18	18.62
19	18.3
20	17.99
21	17.68
22	17.37
23	17.08
24	16.78
25	16.5
26	16.21
27	15.93
28	15.66
29	15.39
30	15.13
31	14.87
32	14.61
33	14.36
34	14.12
35	13.87
36	13.64
37	13.4
38	13.17
39	12.95
40	12.72
41	12.51
42	12.29
43	12.08
44	11.87
45	11.67
46	11.47
47	11.27
48	11.08
49	10.89
50	10.7
51	10.52
52	10.34
53	10.16
54	9.99
55	9.82
56	9.65
57	9.48

58	9.32
59	9.16
60	9
61	8.85
62	8.7
63	8.55
64	8.4
65	8.26
66	8.11
67	7.97
68	7.84
69	7.7
70	7.57
71	7.44
72	7.31

Return Period: 50

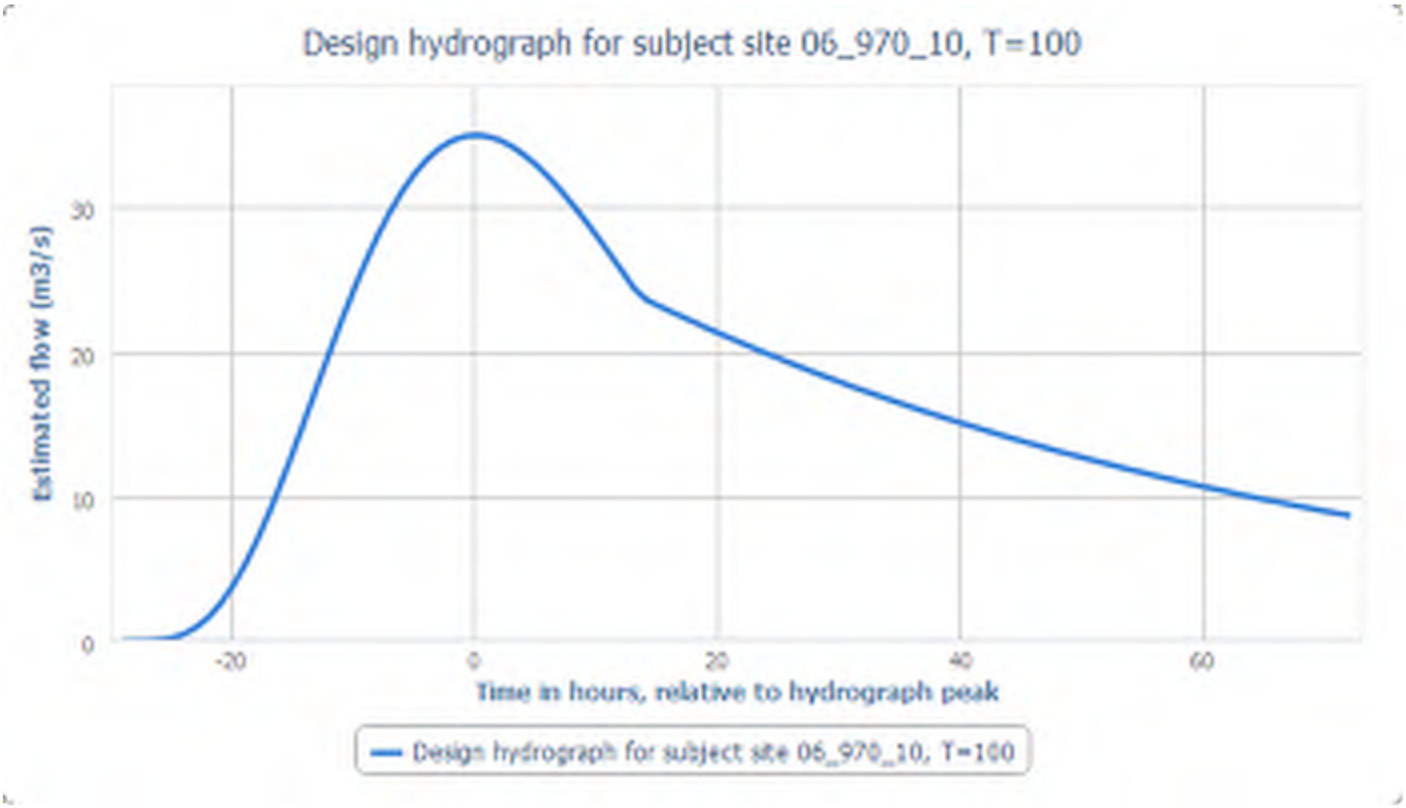


Hours relative to hydrograph peak	Estimated flow (m3/s)
-29.03	0
-29	0
-28	0
-27	0.01
-26	0.06
-25	0.19
-24	0.44
-23	0.87
-22	1.51
-21	2.39
-20	3.51
-19	4.87
-18	6.45
-17	8.22
-16	10.14
-15	12.18
-14	14.28
-13	16.41
-12	18.52
-11	20.56
-10	22.51
-9	24.33
-8	25.99
-7	27.48
-6	28.77
-5	29.87
-4	30.76
-3	31.44
-2	31.91
-1	32.19
0	32.28

1	32.2
2	31.95
3	31.55
4	31.01
5	30.35
6	29.59
7	28.74
8	27.81
9	26.83
10	25.79
11	24.72
12	23.63
13	22.52
14	21.78
15	21.41
16	21.04
17	20.68
18	20.33
19	19.98
20	19.64
21	19.3
22	18.97
23	18.64
24	18.32
25	18.01
26	17.7
27	17.39
28	17.1
29	16.8
30	16.51
31	16.23
32	15.95
33	15.68
34	15.41
35	15.15
36	14.89
37	14.63
38	14.38
39	14.13
40	13.89
41	13.65
42	13.42
43	13.19
44	12.96
45	12.74
46	12.52
47	12.31
48	12.09
49	11.89
50	11.68
51	11.48
52	11.29
53	11.09
54	10.9
55	10.71
56	10.53
57	10.35

58	10.17
59	10
60	9.83
61	9.66
62	9.49
63	9.33
64	9.17
65	9.01
66	8.86
67	8.71
68	8.56
69	8.41
70	8.27
71	8.12
72	7.98

Return Period: 100

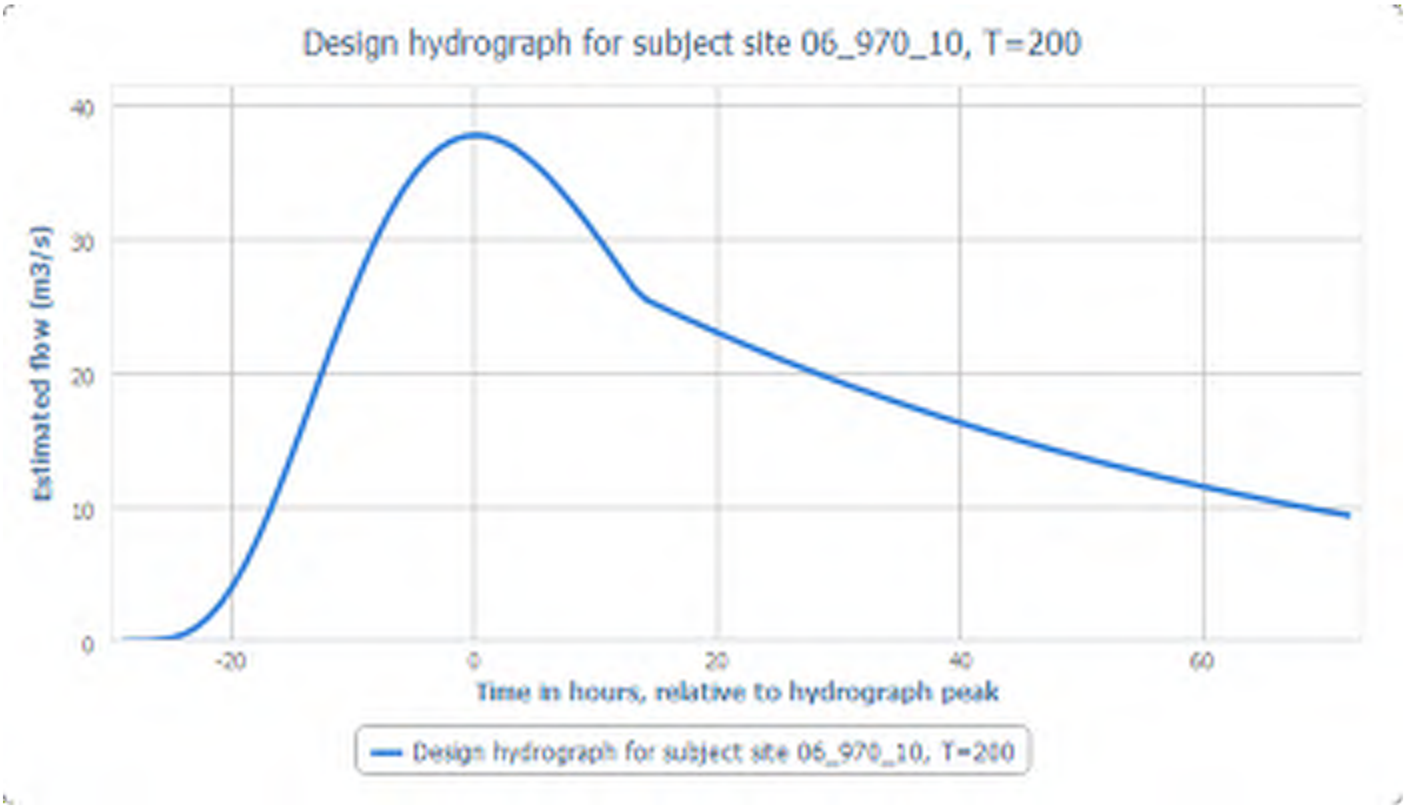


Hours relative to hydrograph peak	Estimated flow (m3/s)
-29.03	0
-29	0
-28	0
-27	0.01
-26	0.06
-25	0.2
-24	0.48
-23	0.95
-22	1.64
-21	2.59
-20	3.8
-19	5.28
-18	6.99
-17	8.9
-16	10.99
-15	13.19
-14	15.47
-13	17.78
-12	20.06
-11	22.28
-10	24.39
-9	26.36
-8	28.16
-7	29.77
-6	31.17
-5	32.36
-4	33.32
-3	34.06
-2	34.58
-1	34.88
0	34.98

1	34.88
2	34.61
3	34.18
4	33.59
5	32.88
6	32.06
7	31.14
8	30.13
9	29.06
10	27.94
11	26.78
12	25.6
13	24.4
14	23.6
15	23.19
16	22.8
17	22.41
18	22.02
19	21.64
20	21.27
21	20.91
22	20.55
23	20.2
24	19.85
25	19.51
26	19.17
27	18.84
28	18.52
29	18.2
30	17.89
31	17.58
32	17.28
33	16.99
34	16.69
35	16.41
36	16.13
37	15.85
38	15.58
39	15.31
40	15.05
41	14.79
42	14.54
43	14.29
44	14.04
45	13.8
46	13.56
47	13.33
48	13.1
49	12.88
50	12.66
51	12.44
52	12.23
53	12.02
54	11.81
55	11.61
56	11.41
57	11.21

58	11.02
59	10.83
60	10.65
61	10.46
62	10.28
63	10.11
64	9.93
65	9.76
66	9.6
67	9.43
68	9.27
69	9.11
70	8.95
71	8.8
72	8.65

Return Period: 200



Hours relative to hydrograph peak	Estimated flow (m3/s)
-29.03	0
-29	0
-28	0
-27	0.01
-26	0.07
-25	0.22
-24	0.51
-23	1.02
-22	1.77
-21	2.79
-20	4.1
-19	5.68
-18	7.52
-17	9.59
-16	11.83
-15	14.21
-14	16.66
-13	19.14
-12	21.6
-11	23.98
-10	26.26
-9	28.38
-8	30.32
-7	32.05
-6	33.56
-5	34.84
-4	35.88
-3	36.67
-2	37.23
-1	37.55
0	37.66

1	37.56
2	37.26
3	36.8
4	36.17
5	35.4
6	34.52
7	33.52
8	32.44
9	31.29
10	30.08
11	28.84
12	27.56
13	26.27
14	25.41
15	24.97
16	24.54
17	24.12
18	23.71
19	23.3
20	22.9
21	22.51
22	22.12
23	21.74
24	21.37
25	21
26	20.64
27	20.29
28	19.94
29	19.6
30	19.26
31	18.93
32	18.61
33	18.29
34	17.97
35	17.67
36	17.36
37	17.07
38	16.77
39	16.48
40	16.2
41	15.92
42	15.65
43	15.38
44	15.12
45	14.86
46	14.6
47	14.35
48	14.11
49	13.87
50	13.63
51	13.39
52	13.16
53	12.94
54	12.72
55	12.5
56	12.28
57	12.07

58	11.87
59	11.66
60	11.46
61	11.27
62	11.07
63	10.88
64	10.7
65	10.51
66	10.33
67	10.15
68	9.98
69	9.81
70	9.64
71	9.48
72	9.31

IBIDEM Plots and Tables

No IBIDEM plots were saved by the user.

Audit Trail Report #11385 (19.153 N52 Ardee Catchment A)

User ID:	warren.vokes@rod.ie
Name:	Vokes, Warren
Company:	
Address:	
Report date & time:	09-11-2020 11:50
Start of Calculation:	06-11-2020 17:40

Decisions made by the user:

Decision	User comment	System information	Date
2.1 Subject site accepted	N/A	Location 06_970_10	06-11-2020 17:41
2.4 Pivotal site accepted	Reason for accepting: Pivotal site directly downstream of subject site Reason for ignoring warnings:	Station: 06025 BURLEY	06-11-2020 17:44
2.8 QMED data transfer performed	N/A		06-11-2020 17:54
2.11 Pooling group accepted	N/A	Pooled group accepted with the following stations: [06025, 16001, 24002, 06026, 06014, 16004, 25016, 25023, 25022, 06013, 07006, 07001, 14013, 36018] and distribution: GEV	06-11-2020 18:02
2.13 Module 2 finalized	N/A	Finished pooled analysis with the following distribution selected: EV1.	06-11-2020 18:03
3.2 Hydrograph pivotal site accepted	Burley gauge has known hysteresis between rising and receding limbs	Station: 06025 BURLEY	06-11-2020 18:06

3.1 Hydrograph pivotal site rejected	Good representation of rising and falling limbs.	Station: 06013 CHARLEVILLE	06-11-2020 18:07
3.3 Proceeded from hydrograph display	N/A		06-11-2020 18:08
3.3 Proceeded from hydrograph display	N/A		06-11-2020 18:08
3.4 Hydrograph inspected and adjusted	N/A	The user adopted the original PCD hydrograph	06-11-2020 18:08
3.5 Hydrograph transferred to subject site	N/A	The user adjusted the subject site estimate with n = 5.63098668882147, Tr = 29.0252159177213, C = 57.785376297456	06-11-2020 18:08

Flood Estimation Report #11386 (19.153 N52 Ardee Catchment B)

Generated 09-11-2020 11:50

Subject site

Attributes

Name	Unit	Value
Coordinate [X]		-732025.064471295
Coordinate [Y]		7141842.2733152
Distance	km	130.723009680325
Station Number		06_50_2
Location		
Water Body		
Catchment		
Hydrometric Area		
Organisation		
FSU Rating Classification		
Drainage works	year	
Contributing Catchment Area	km^2	224.596
Center Northing	m	287060
Center Easting	m	285680
Northing	m	289899
Easting	m	293771
A-Max series gap in years	year	
A-Max series number of years	year	
A-Max series number of usable years	year	
A-Max series end year	year	
A-Max series start year	year	
FARL		0.962
ALLUV		0.0498
PEAT		0.0001
FOREST		0.0239
PASTURE		0.9901
S1085	m/km	3.35196
MSL	km	40.446
DRAIND	km/km^2	1.114
ALTBAR		96.1
NETLEN	km	250.144
T4		
T3		

SAAPE	mm	504.41
T2		
ARTDRAIN2		0.7737
ARTDRAIN		0.145
TAYSLO		0.233412
STMFRQ		200
BFISOIL		0.615206096
SAAR	mm	893.09
RWSEG_CD		06_50
TOP_RWSEG		
Bankfull		
HGF	m^3/s	
MAF	m^3/s	
FAI		0.1343
FLATWET		0.6
URBEXT		0.0017
HGF/QMED		
centroidx3857		-745904.656796532
centroidy3857		7137050.813404
x3857		-732025.064471295
y3857		7141842.2733152

Pivotal site

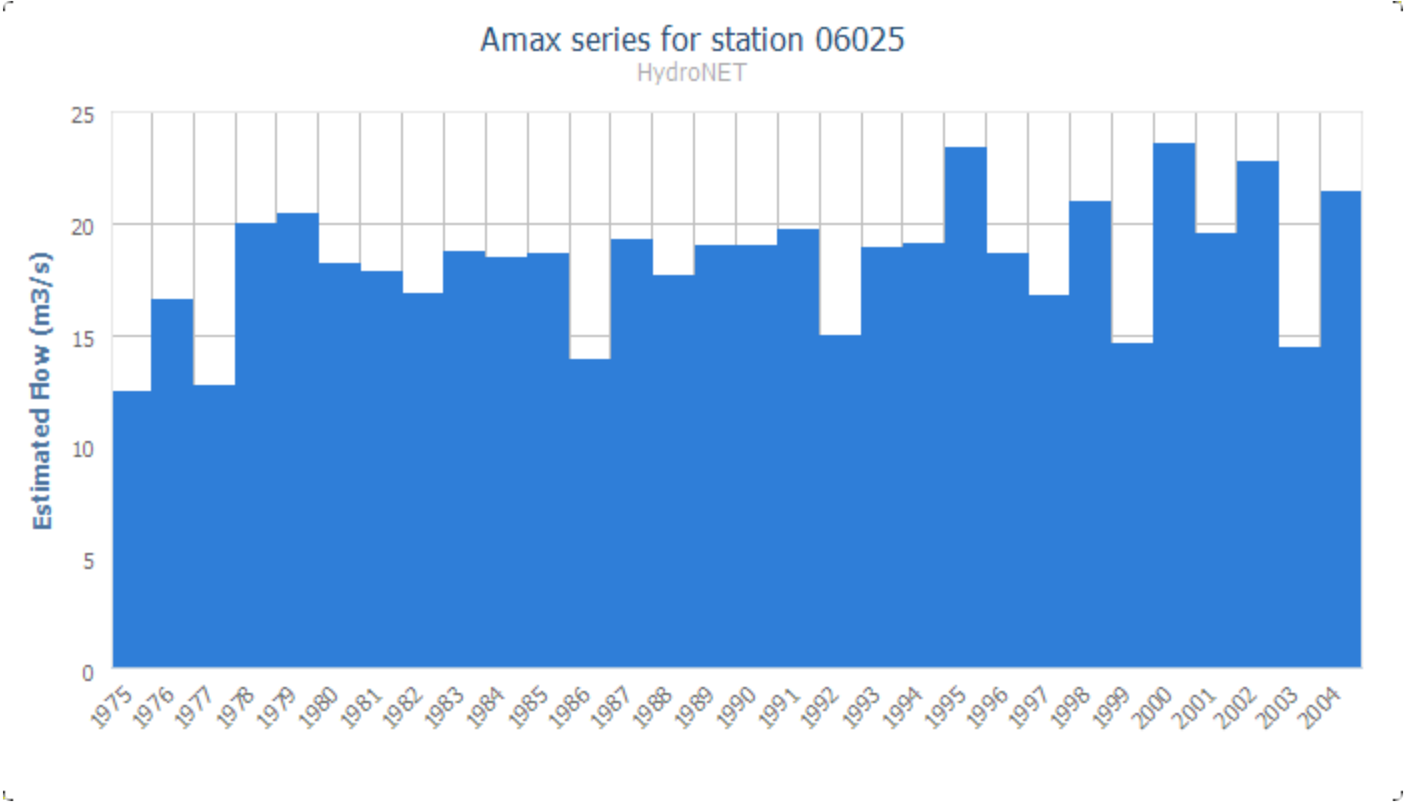
Attributes

Name	Unit	Value
Coordinate [X]		-734078.386803591
Coordinate [Y]		7141428.93086189
Station Number		06025
Location		BURLEY
Water Body		DEE
Catchment		Glyde & Dee
Hydrometric Area		6
Organisation		OPW
FSU Rating Classification		A1
Drainage works	year	1950-57
Contributing Catchment Area	km^2	175.9788
Center Northing	m	287060
Center Easting	m	282580
Northing	m	289631
Easting	m	292562
A-Max series gap in years	year	0
A-Max series number of years	year	30
A-Max series number of usable years	year	30
A-Max series end year	year	2004
A-Max series start year	year	1975
FARL		0.956
ALLUV		0.0428
PEAT		0.0001
FOREST		0.0278
PASTURE		0
S1085	m/km	3.45541
MSL	km	38.625
DRAIND	km/km^2	0.997
ALTBAR		0
NETLEN	km	175.534
T4		0.18514059303461
T3		-0.070647479780504
SAAPE	mm	503.33
T2		0.088084547648673
ARTDRAIN2		0.8298
ARTDRAIN		0.1435
TAYSLO		0.234649
STMFRQ		124
BFISOIL		0.615
SAAR	mm	908.31
RWSEG_CD		06_970
TOP_RWSEG		06_804
Bankfull		3.59 from survey
HGF	m^3/s	26
MAF	m^3/s	18
FAI		0.13
FLATWET		0.6
URBEXT		0.0022
HGF/QMED		1.3911182450508
x3857		-734078.386803591
y3857		7141428.93086189

centroidx3857		-750152.401101113
centroidy3857		7137568.00764289
Distance	km	4.27911457638599

Map

Amax Series Chart



QMED Estimates

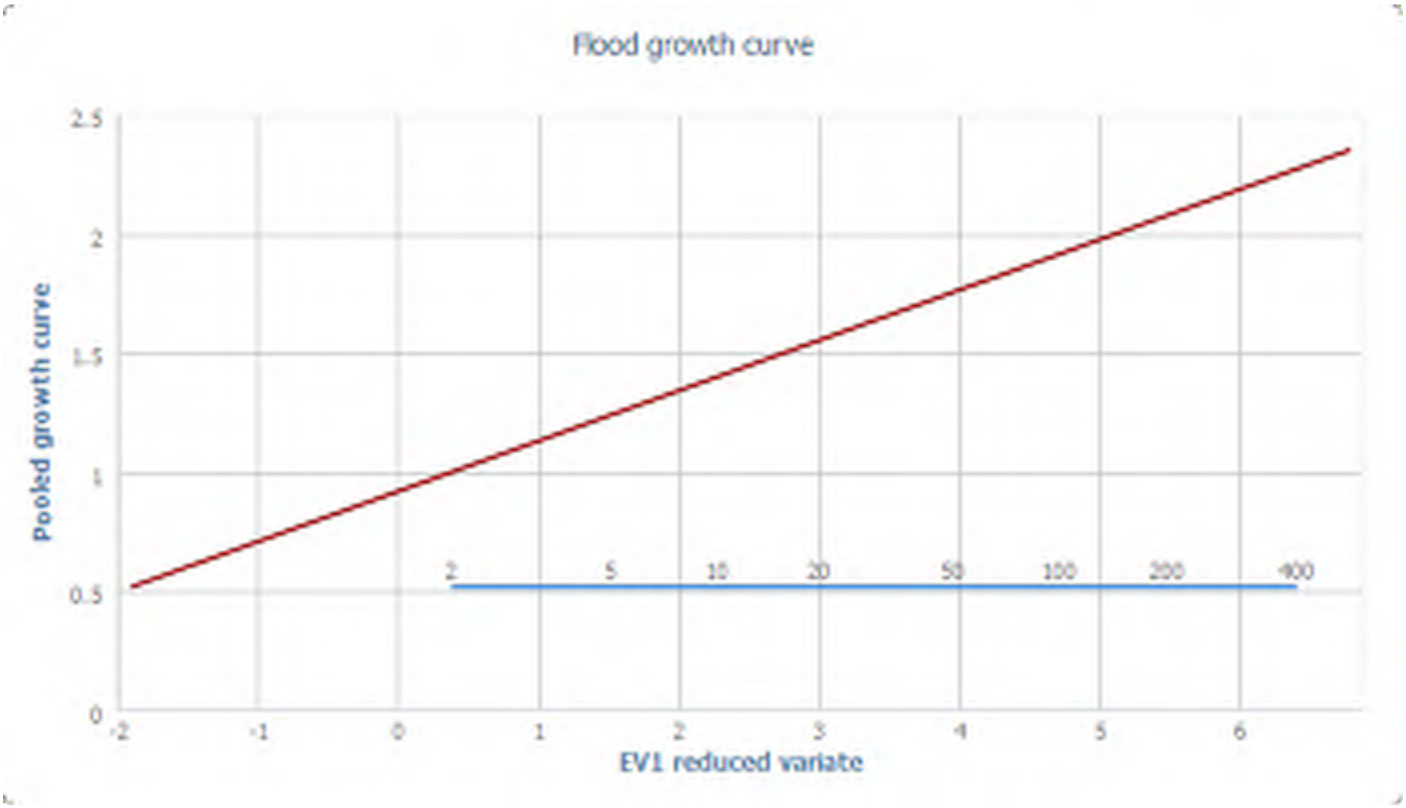
Subject rural QMED	33.22
Subject urban QMED	33.31
Pivotal gauged QMED	18.69
Pivotal adjustment factor QMED	0.71
Subject adjusted QMED	**23.73**

Pooling Group

Station	Amax years
06025 BURLEY	30
24002 GRAYS BR.	32
06013 CHARLEVILLE	30
06014 TALLANSTOWN	30
25016 RAHAN	48
16004 THURLES	48
16001 ATHLUMMON	33
06026 ACLINT	46
07006 FYANSTOWN	19
25022 SYNGEFIELD	22

25023 MILLTOWN	33
07003 CASTLERICKARD	46
36018 ASHFIELD	50
14011 RATHANGAN	25

Selected Flood Growth Curve



Pooled growth curve	EV1 reduced variate
0.52	-1.91
0.55	-1.75
0.57	-1.66
0.59	-1.6
0.6	-1.54
0.61	-1.5
0.61	-1.46
0.62	-1.43
0.63	-1.4
0.63	-1.37
0.64	-1.35
0.64	-1.32
0.65	-1.3
0.65	-1.28
0.66	-1.26
0.66	-1.24
0.66	-1.22
0.67	-1.2
0.67	-1.19
0.68	-1.17
0.68	-1.16
0.68	-1.14
0.69	-1.13
0.69	-1.11
0.69	-1.1
0.69	-1.08
0.7	-1.07
0.7	-1.06
0.7	-1.05

0.7	-1.03
0.71	-1.02
0.71	-1.01
0.71	-1
0.71	-0.99
0.72	-0.98
0.72	-0.97
0.72	-0.96
0.72	-0.94
0.73	-0.93
0.73	-0.92
0.73	-0.91
0.73	-0.9
0.73	-0.9
0.74	-0.89
0.74	-0.88
0.74	-0.87
0.74	-0.86
0.74	-0.85
0.75	-0.84
0.75	-0.83
0.75	-0.82
0.75	-0.81
0.75	-0.81
0.75	-0.8
0.76	-0.79
0.76	-0.78
0.76	-0.77
0.76	-0.76
0.76	-0.76
0.76	-0.75
0.77	-0.74
0.77	-0.73
0.77	-0.72
0.77	-0.72
0.77	-0.71
0.77	-0.7
0.78	-0.69
0.78	-0.69
0.78	-0.68
0.78	-0.67
0.78	-0.66
0.78	-0.66
0.79	-0.65
0.79	-0.64
0.79	-0.64
0.79	-0.63
0.79	-0.62
0.79	-0.61
0.79	-0.61
0.8	-0.6
0.8	-0.59
0.8	-0.59
0.8	-0.58
0.8	-0.57
0.8	-0.57
0.8	-0.56

0.81	-0.55
0.81	-0.55
0.81	-0.54
0.81	-0.53
0.81	-0.53
0.81	-0.52
0.81	-0.51
0.82	-0.51
0.82	-0.5
0.82	-0.49
0.82	-0.49
0.82	-0.48
0.82	-0.48
0.82	-0.47
0.83	-0.46
0.83	-0.46
0.83	-0.45
0.83	-0.44
0.83	-0.44
0.83	-0.43
0.83	-0.43
0.83	-0.42
0.84	-0.41
0.84	-0.41
0.84	-0.4
0.84	-0.39
0.84	-0.39
0.84	-0.38
0.84	-0.38
0.84	-0.37
0.85	-0.36
0.85	-0.36
0.85	-0.35
0.85	-0.35
0.85	-0.34
0.85	-0.34
0.85	-0.33
0.85	-0.32
0.86	-0.32
0.86	-0.31
0.86	-0.31
0.86	-0.3
0.86	-0.29
0.86	-0.29
0.86	-0.28
0.86	-0.28
0.87	-0.27
0.87	-0.27
0.87	-0.26
0.87	-0.25
0.87	-0.25
0.87	-0.24
0.87	-0.24
0.87	-0.23
0.88	-0.23
0.88	-0.22
0.88	-0.21

0.88	-0.21
0.88	-0.2
0.88	-0.2
0.88	-0.19
0.88	-0.19
0.88	-0.18
0.89	-0.17
0.89	-0.17
0.89	-0.16
0.89	-0.16
0.89	-0.15
0.89	-0.15
0.89	-0.14
0.89	-0.14
0.9	-0.13
0.9	-0.12
0.9	-0.12
0.9	-0.11
0.9	-0.11
0.9	-0.1
0.9	-0.1
0.9	-0.09
0.9	-0.09
0.91	-0.08
0.91	-0.07
0.91	-0.07
0.91	-0.06
0.91	-0.06
0.91	-0.05
0.91	-0.05
0.91	-0.04
0.92	-0.04
0.92	-0.03
0.92	-0.02
0.92	-0.02
0.92	-0.01
0.92	-0.01
0.92	0
0.92	0
0.92	0.01
0.93	0.01
0.93	0.02
0.93	0.02
0.93	0.03
0.93	0.04
0.93	0.04
0.93	0.05
0.93	0.05
0.93	0.06
0.94	0.06
0.94	0.07
0.94	0.07
0.94	0.08
0.94	0.09
0.94	0.09
0.94	0.1
0.94	0.1

0.95	0.11
0.95	0.11
0.95	0.12
0.95	0.12
0.95	0.13
0.95	0.14
0.95	0.14
0.95	0.15
0.95	0.15
0.96	0.16
0.96	0.16
0.96	0.17
0.96	0.17
0.96	0.18
0.96	0.19
0.96	0.19
0.96	0.2
0.97	0.2
0.97	0.21
0.97	0.21
0.97	0.22
0.97	0.23
0.97	0.23
0.97	0.24
0.97	0.24
0.98	0.25
0.98	0.25
0.98	0.26
0.98	0.27
0.98	0.27
0.98	0.28
0.98	0.28
0.98	0.29
0.98	0.29
0.99	0.3
0.99	0.31
0.99	0.31
0.99	0.32
0.99	0.32
0.99	0.33
0.99	0.33
0.99	0.34
1	0.35
1	0.35
1	0.36
1	0.36
1	0.37
1	0.38
1	0.38
1	0.39
1.01	0.39
1.01	0.4
1.01	0.4
1.01	0.41
1.01	0.42
1.01	0.42
1.01	0.43

1.01	0.43
1.02	0.44
1.02	0.45
1.02	0.45
1.02	0.46
1.02	0.46
1.02	0.47
1.02	0.48
1.02	0.48
1.03	0.49
1.03	0.5
1.03	0.5
1.03	0.51
1.03	0.51
1.03	0.52
1.03	0.53
1.03	0.53
1.04	0.54
1.04	0.54
1.04	0.55
1.04	0.56
1.04	0.56
1.04	0.57
1.04	0.58
1.05	0.58
1.05	0.59
1.05	0.6
1.05	0.6
1.05	0.61
1.05	0.61
1.05	0.62
1.06	0.63
1.06	0.63
1.06	0.64
1.06	0.65
1.06	0.65
1.06	0.66
1.06	0.67
1.06	0.67
1.07	0.68
1.07	0.69
1.07	0.69
1.07	0.7
1.07	0.71
1.07	0.71
1.07	0.72
1.08	0.73
1.08	0.73
1.08	0.74
1.08	0.75
1.08	0.75
1.08	0.76
1.08	0.77
1.09	0.78
1.09	0.78
1.09	0.79
1.09	0.8

1.09	0.8
1.09	0.81
1.1	0.82
1.1	0.83
1.1	0.83
1.1	0.84
1.1	0.85
1.1	0.85
1.1	0.86
1.11	0.87
1.11	0.88
1.11	0.88
1.11	0.89
1.11	0.9
1.11	0.91
1.12	0.91
1.12	0.92
1.12	0.93
1.12	0.94
1.12	0.94
1.12	0.95
1.13	0.96
1.13	0.97
1.13	0.98
1.13	0.98
1.13	0.99
1.13	1
1.14	1.01
1.14	1.02
1.14	1.02
1.14	1.03
1.14	1.04
1.14	1.05
1.15	1.06
1.15	1.06
1.15	1.07
1.15	1.08
1.15	1.09
1.15	1.1
1.16	1.11
1.16	1.12
1.16	1.12
1.16	1.13
1.16	1.14
1.17	1.15
1.17	1.16
1.17	1.17
1.17	1.18
1.17	1.19
1.17	1.19
1.18	1.2
1.18	1.21
1.18	1.22
1.18	1.23
1.18	1.24
1.19	1.25
1.19	1.26

1.19	1.27
1.19	1.28
1.19	1.29
1.2	1.3
1.2	1.31
1.2	1.32
1.2	1.33
1.2	1.34
1.21	1.35
1.21	1.36
1.21	1.37
1.21	1.38
1.22	1.39
1.22	1.4
1.22	1.41
1.22	1.42
1.22	1.43
1.23	1.44
1.23	1.45
1.23	1.46
1.23	1.48
1.24	1.49
1.24	1.5
1.24	1.51
1.24	1.52
1.25	1.53
1.25	1.54
1.25	1.56
1.25	1.57
1.26	1.58
1.26	1.59
1.26	1.61
1.26	1.62
1.27	1.63
1.27	1.64
1.27	1.66
1.27	1.67
1.28	1.68
1.28	1.69
1.28	1.71
1.29	1.72
1.29	1.74
1.29	1.75
1.29	1.76
1.3	1.78
1.3	1.79
1.3	1.81
1.31	1.82
1.31	1.84
1.31	1.85
1.32	1.87
1.32	1.88
1.32	1.9
1.33	1.91
1.33	1.93
1.33	1.95
1.34	1.96

1.34	1.98
1.34	2
1.35	2.01
1.35	2.03
1.35	2.05
1.36	2.07
1.36	2.08
1.37	2.1
1.37	2.12
1.37	2.14
1.38	2.16
1.38	2.18
1.39	2.2
1.39	2.22
1.4	2.24
1.4	2.26
1.41	2.29
1.41	2.31
1.41	2.33
1.42	2.35
1.42	2.38
1.43	2.4
1.43	2.43
1.44	2.45
1.45	2.48
1.45	2.51
1.46	2.53
1.46	2.56
1.47	2.59
1.48	2.62
1.48	2.65
1.49	2.68
1.5	2.71
1.5	2.75
1.51	2.78
1.52	2.82
1.52	2.85
1.53	2.89
1.54	2.93
1.55	2.97
1.56	3.01
1.57	3.06
1.58	3.11
1.59	3.15
1.6	3.21
1.61	3.26
1.62	3.31
1.63	3.37
1.65	3.44
1.66	3.51
1.68	3.58
1.69	3.66
1.71	3.74
1.73	3.83
1.75	3.93
1.78	4.04
1.8	4.17

1.83	4.31
1.87	4.48
1.91	4.68
1.96	4.93
2.03	5.26
2.14	5.75
2.35	6.78

Adopted Growth Factors

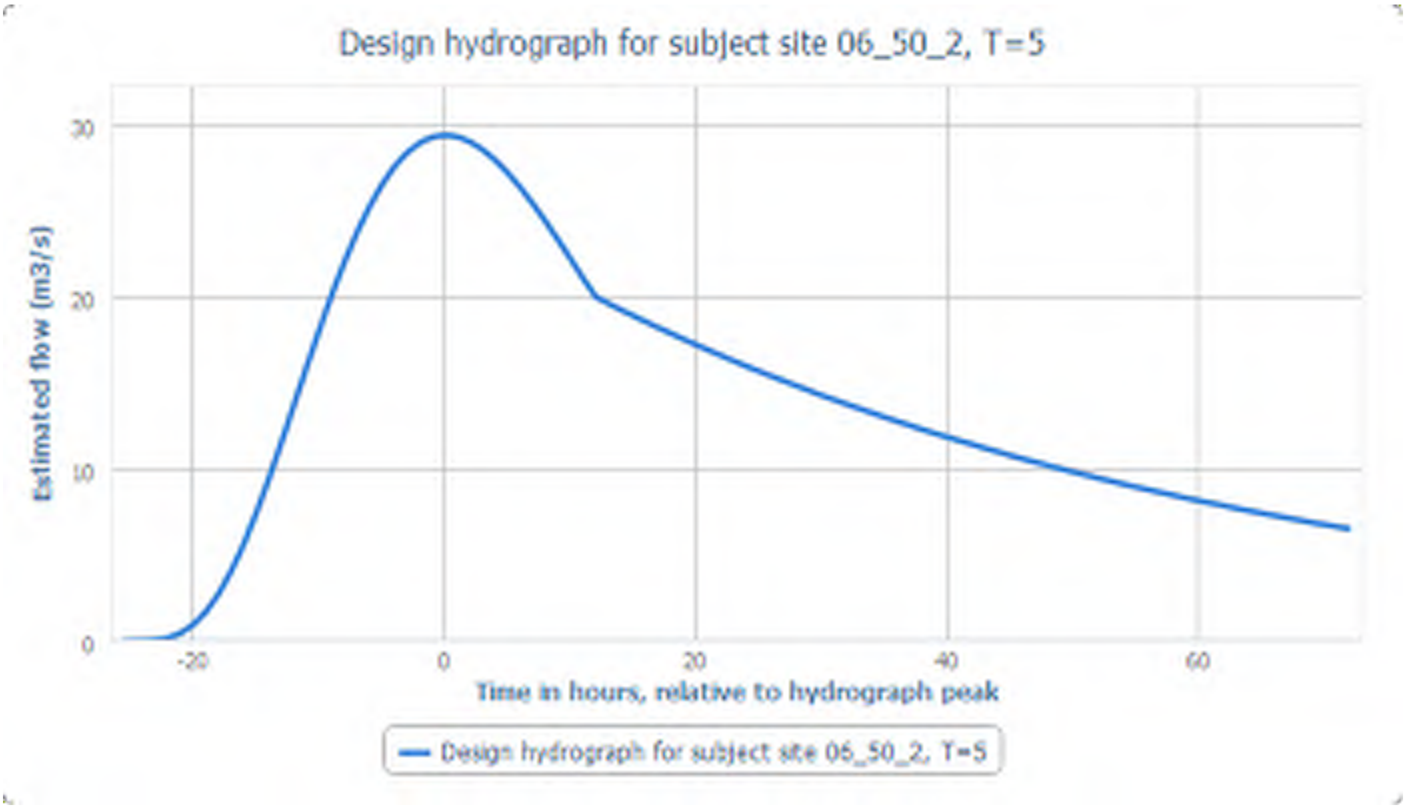
Return Period	Growth Factor	Design Peak Flow (m^3/s)
1.3	0.84	19.93
2	1	23.73
5	1.24	29.43
10	1.4	33.22
20	1.55	36.78
30	1.64	38.92
50	1.75	41.53
100	1.89	44.85
200	2.04	48.41
500	2.23	52.92
1000	2.38	56.48

Hydrograph Width Estimation Summary

Name	Value
Pivotal site	06013 "CHARLEVILLE"
Adjustment type	The user adopted the original PCD hydrograph
Transfer type	The user adjusted the subject site estimate with the pivotal site deformation factor
Deformation factor	1
Custom deformation factor	1
Accepted n	5.63098668882147
Accepted Tr	25.5952369733001
Accepted C	53.43046694836

Hydrograph Plots

Return Period: 5

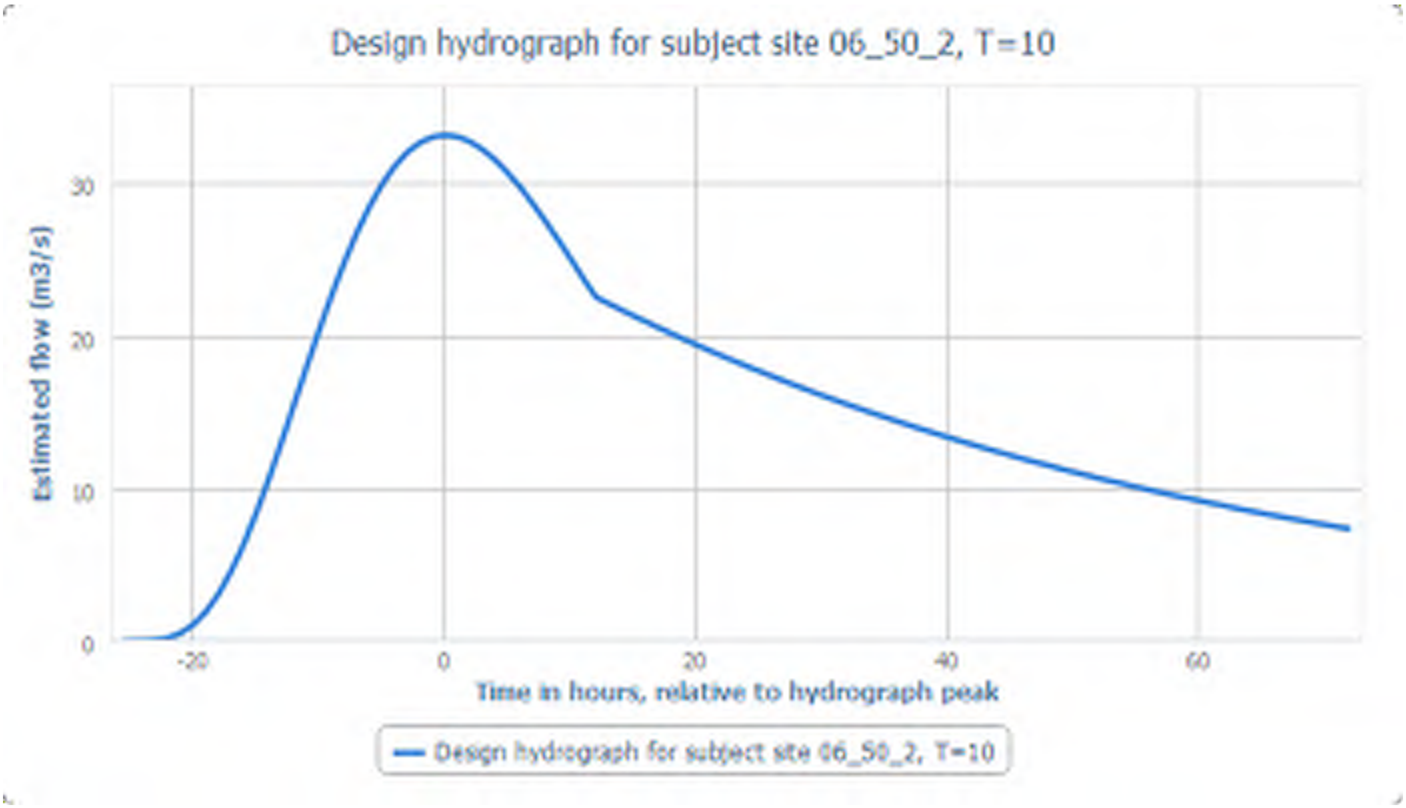


Hours relative to hydrograph peak	Estimated flow (m3/s)
-25.6	0
-25	0
-24	0.01
-23	0.05
-22	0.18
-21	0.46
-20	0.96
-19	1.71
-18	2.75
-17	4.07
-16	5.65
-15	7.47
-14	9.46
-13	11.58
-12	13.77
-11	15.96
-10	18.1
-9	20.15
-8	22.05
-7	23.76
-6	25.27
-5	26.56
-4	27.61
-3	28.41
-2	28.97
-1	29.3
0	29.41
1	29.31
2	29.01

3	28.55
4	27.94
5	27.19
6	26.34
7	25.39
8	24.37
9	23.29
10	22.18
11	21.04
12	19.98
13	19.61
14	19.24
15	18.89
16	18.54
17	18.19
18	17.86
19	17.53
20	17.2
21	16.88
22	16.57
23	16.26
24	15.96
25	15.66
26	15.37
27	15.09
28	14.81
29	14.53
30	14.26
31	14
32	13.74
33	13.49
34	13.24
35	12.99
36	12.75
37	12.51
38	12.28
39	12.05
40	11.83
41	11.61
42	11.4
43	11.18
44	10.98
45	10.77
46	10.57
47	10.38
48	10.18
49	10
50	9.81
51	9.63
52	9.45
53	9.27
54	9.1
55	8.93
56	8.77
57	8.61
58	8.45
59	8.29

60	8.14
61	7.99
62	7.84
63	7.69
64	7.55
65	7.41
66	7.27
67	7.14
68	7
69	6.87
70	6.75
71	6.62
72	6.5

Return Period: 10

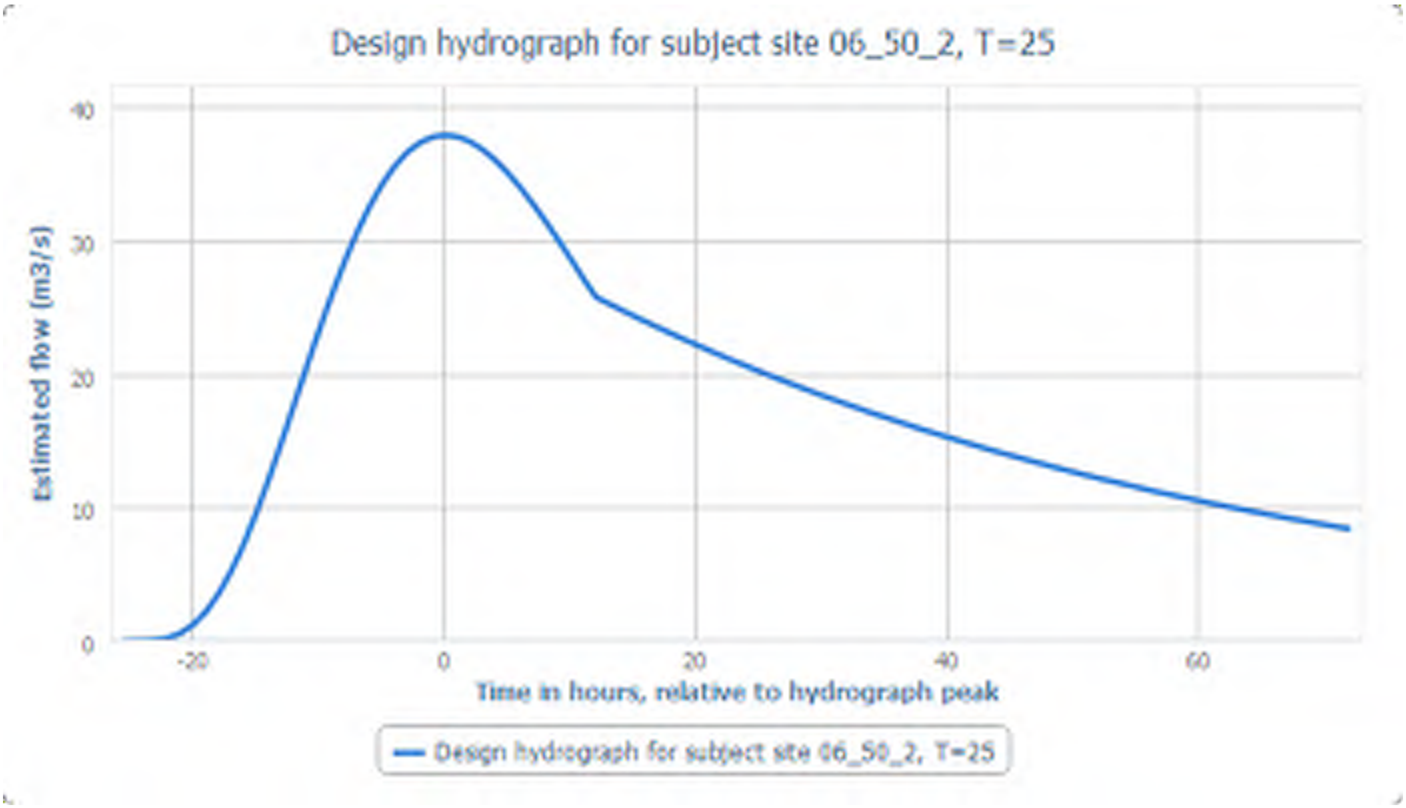


Hours relative to hydrograph peak	Estimated flow (m3/s)
-25.6	0
-25	0
-24	0.01
-23	0.05
-22	0.2
-21	0.52
-20	1.08
-19	1.93
-18	3.1
-17	4.59
-16	6.38
-15	8.42
-14	10.67
-13	13.06
-12	15.53
-11	18
-10	20.42
-9	22.72
-8	24.86
-7	26.8
-6	28.5
-5	29.95
-4	31.13
-3	32.04
-2	32.67
-1	33.04
0	33.16
1	33.05
2	32.72
3	32.2
4	31.51

5	30.67
6	29.7
7	28.63
8	27.48
9	26.27
10	25.02
11	23.73
12	22.53
13	22.11
14	21.7
15	21.3
16	20.91
17	20.52
18	20.14
19	19.76
20	19.4
21	19.04
22	18.69
23	18.34
24	18
25	17.67
26	17.34
27	17.02
28	16.7
29	16.39
30	16.09
31	15.79
32	15.5
33	15.21
34	14.93
35	14.65
36	14.38
37	14.11
38	13.85
39	13.59
40	13.34
41	13.09
42	12.85
43	12.61
44	12.38
45	12.15
46	11.92
47	11.7
48	11.49
49	11.27
50	11.06
51	10.86
52	10.66
53	10.46
54	10.27
55	10.08
56	9.89
57	9.71
58	9.53
59	9.35
60	9.18
61	9.01

62	8.84
63	8.67
64	8.51
65	8.36
66	8.2
67	8.05
68	7.9
69	7.75
70	7.61
71	7.47
72	7.33

Return Period: 25

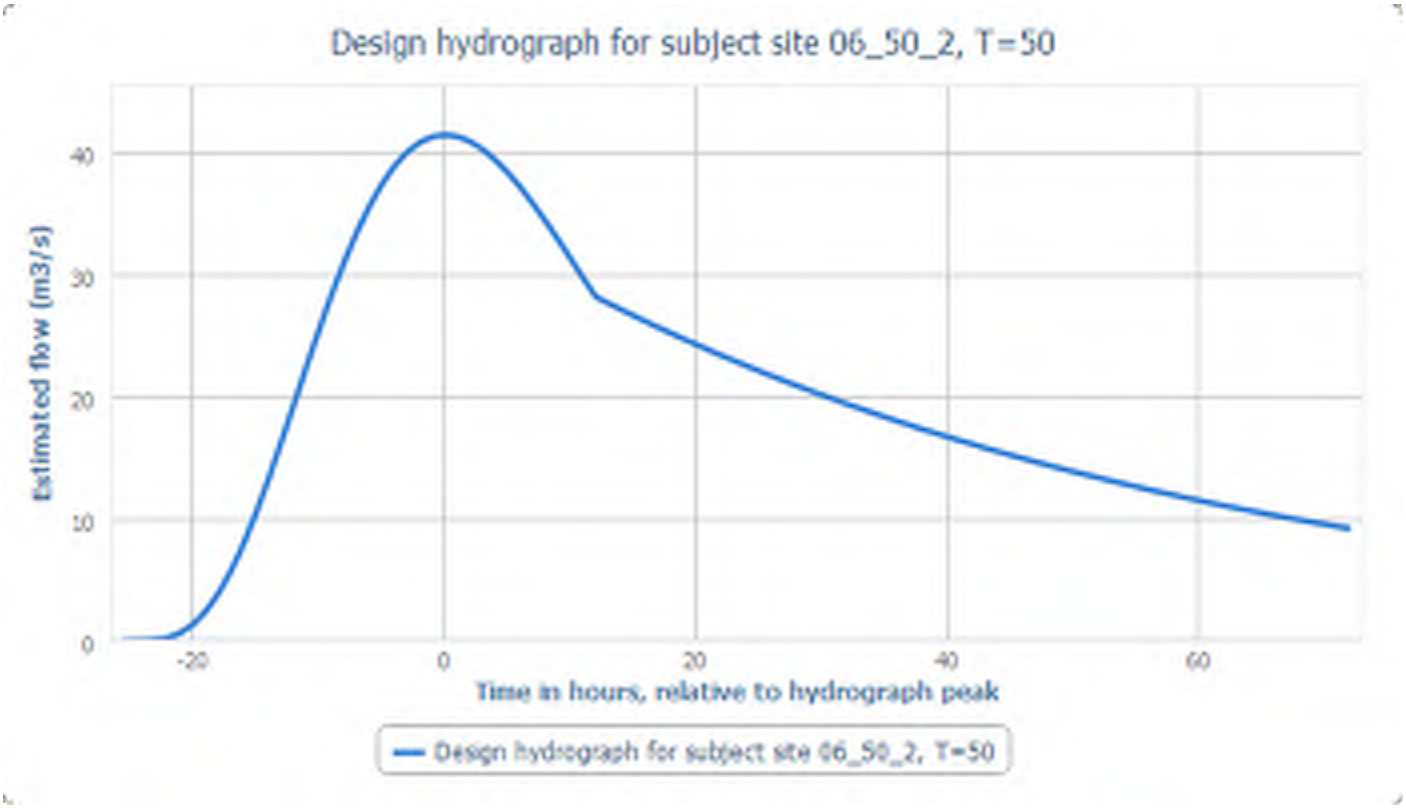


Hours relative to hydrograph peak	Estimated flow (m3/s)
-25.6	0
-25	0
-24	0.01
-23	0.06
-22	0.23
-21	0.6
-20	1.24
-19	2.21
-18	3.55
-17	5.25
-16	7.29
-15	9.63
-14	12.2
-13	14.93
-12	17.75
-11	20.58
-10	23.34
-9	25.97
-8	28.42
-7	30.64
-6	32.58
-5	34.24
-4	35.59
-3	36.63
-2	37.35
-1	37.77
0	37.91
1	37.78
2	37.41
3	36.81
4	36.02

5	35.06
6	33.95
7	32.73
8	31.42
9	30.03
10	28.6
11	27.13
12	25.76
13	25.28
14	24.81
15	24.35
16	23.9
17	23.46
18	23.02
19	22.59
20	22.18
21	21.76
22	21.36
23	20.96
24	20.58
25	20.19
26	19.82
27	19.45
28	19.09
29	18.74
30	18.39
31	18.05
32	17.71
33	17.39
34	17.06
35	16.75
36	16.44
37	16.13
38	15.83
39	15.54
40	15.25
41	14.97
42	14.69
43	14.42
44	14.15
45	13.89
46	13.63
47	13.38
48	13.13
49	12.89
50	12.65
51	12.41
52	12.18
53	11.96
54	11.74
55	11.52
56	11.3
57	11.09
58	10.89
59	10.69
60	10.49
61	10.29

62	10.1
63	9.92
64	9.73
65	9.55
66	9.37
67	9.2
68	9.03
69	8.86
70	8.7
71	8.54
72	8.38

Return Period: 50

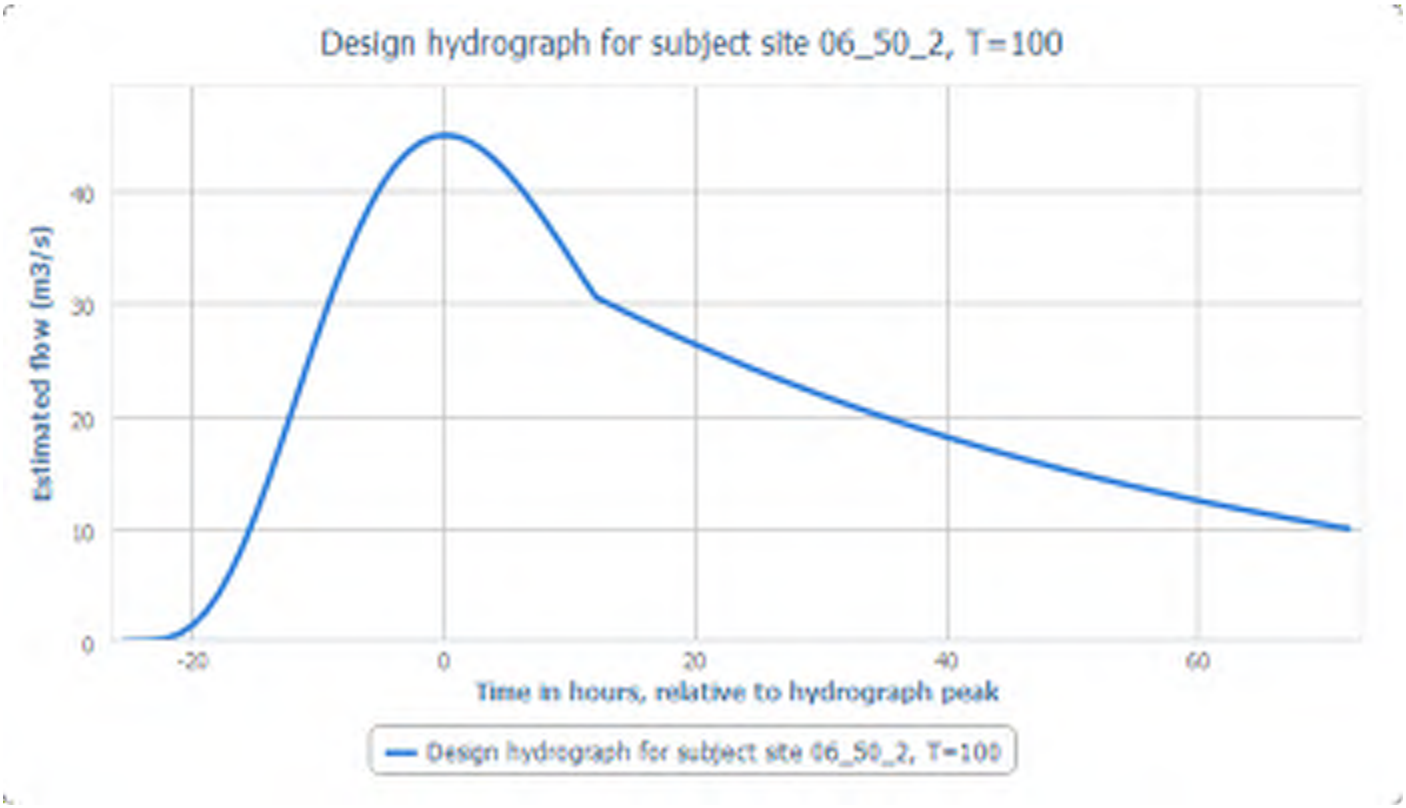


Hours relative to hydrograph peak	Estimated flow (m3/s)
-25.6	0
-25	0
-24	0.01
-23	0.07
-22	0.25
-21	0.65
-20	1.35
-19	2.42
-18	3.88
-17	5.74
-16	7.97
-15	10.52
-14	13.33
-13	16.32
-12	19.4
-11	22.49
-10	25.51
-9	28.39
-8	31.06
-7	33.48
-6	35.61
-5	37.42
-4	38.9
-3	40.03
-2	40.82
-1	41.28
0	41.43
1	41.29
2	40.88
3	40.23
4	39.36

5	38.31
6	37.11
7	35.77
8	34.34
9	32.82
10	31.25
11	29.65
12	28.15
13	27.63
14	27.12
15	26.61
16	26.12
17	25.63
18	25.16
19	24.69
20	24.24
21	23.79
22	23.34
23	22.91
24	22.49
25	22.07
26	21.66
27	21.26
28	20.87
29	20.48
30	20.1
31	19.73
32	19.36
33	19
34	18.65
35	18.3
36	17.96
37	17.63
38	17.3
39	16.98
40	16.67
41	16.36
42	16.06
43	15.76
44	15.47
45	15.18
46	14.9
47	14.62
48	14.35
49	14.08
50	13.82
51	13.57
52	13.32
53	13.07
54	12.83
55	12.59
56	12.35
57	12.13
58	11.9
59	11.68
60	11.46
61	11.25

62	11.04
63	10.84
64	10.64
65	10.44
66	10.25
67	10.06
68	9.87
69	9.69
70	9.51
71	9.33
72	9.16

Return Period: 100

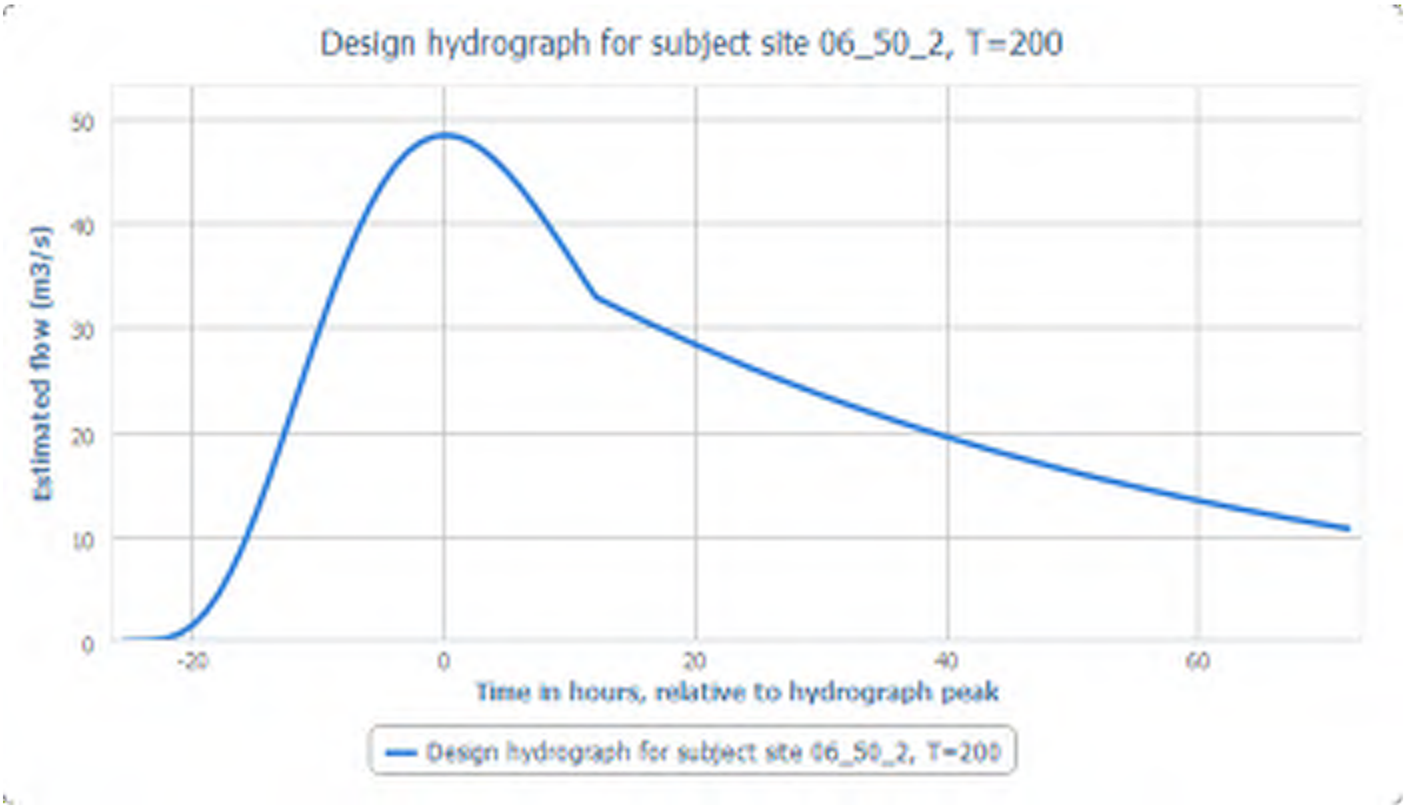


Hours relative to hydrograph peak	Estimated flow (m3/s)
-25.6	0
-25	0
-24	0.01
-23	0.07
-22	0.27
-21	0.71
-20	1.47
-19	2.62
-18	4.2
-17	6.22
-16	8.64
-15	11.41
-14	14.46
-13	17.7
-12	21.04
-11	24.39
-10	27.66
-9	30.78
-8	33.68
-7	36.31
-6	38.62
-5	40.58
-4	42.18
-3	43.4
-2	44.26
-1	44.77
0	44.93
1	44.78
2	44.33
3	43.62
4	42.68

5	41.55
6	40.24
7	38.79
8	37.23
9	35.59
10	33.89
11	32.15
12	30.52
13	29.96
14	29.4
15	28.86
16	28.32
17	27.8
18	27.28
19	26.78
20	26.28
21	25.79
22	25.31
23	24.85
24	24.38
25	23.93
26	23.49
27	23.05
28	22.63
29	22.21
30	21.79
31	21.39
32	20.99
33	20.6
34	20.22
35	19.85
36	19.48
37	19.12
38	18.76
39	18.42
40	18.07
41	17.74
42	17.41
43	17.09
44	16.77
45	16.46
46	16.15
47	15.85
48	15.56
49	15.27
50	14.99
51	14.71
52	14.44
53	14.17
54	13.91
55	13.65
56	13.4
57	13.15
58	12.9
59	12.67
60	12.43
61	12.2

62	11.97
63	11.75
64	11.53
65	11.32
66	11.11
67	10.9
68	10.7
69	10.5
70	10.31
71	10.12
72	9.93

Return Period: 200



Hours relative to hydrograph peak	Estimated flow (m3/s)
-25.6	0
-25	0
-24	0.01
-23	0.08
-22	0.29
-21	0.76
-20	1.58
-19	2.82
-18	4.53
-17	6.7
-16	9.31
-15	12.3
-14	15.58
-13	19.07
-12	22.67
-11	26.28
-10	29.81
-9	33.17
-8	36.29
-7	39.12
-6	41.61
-5	43.72
-4	45.45
-3	46.77
-2	47.7
-1	48.24
0	48.41
1	48.25
2	47.77
3	47
4	45.99

5	44.77
6	43.36
7	41.8
8	40.12
9	38.35
10	36.52
11	34.65
12	32.89
13	32.28
14	31.68
15	31.1
16	30.52
17	29.95
18	29.4
19	28.85
20	28.32
21	27.79
22	27.28
23	26.77
24	26.27
25	25.79
26	25.31
27	24.84
28	24.38
29	23.93
30	23.48
31	23.05
32	22.62
33	22.2
34	21.79
35	21.39
36	20.99
37	20.6
38	20.22
39	19.84
40	19.48
41	19.11
42	18.76
43	18.41
44	18.07
45	17.74
46	17.41
47	17.08
48	16.77
49	16.46
50	16.15
51	15.85
52	15.56
53	15.27
54	14.99
55	14.71
56	14.44
57	14.17
58	13.91
59	13.65
60	13.39
61	13.15

62	12.9
63	12.66
64	12.43
65	12.2
66	11.97
67	11.75
68	11.53
69	11.32
70	11.11
71	10.9
72	10.7

IBIDEM Plots and Tables

No IBIDEM plots were saved by the user.

Audit Trail Report #11386 (19.153 N52 Ardee Catchment B)

User ID:	warren.vokes@rod.ie
Name:	Vokes, Warren
Company:	
Address:	
Report date & time:	09-11-2020 11:50
Start of Calculation:	06-11-2020 18:09

Decisions made by the user:

Decision	**User comment**	**System information**	**Date**
2.1 Subject site accepted	N/A	Location 06_50_2	06-11-2020 18:10
2.4 Pivotal site accepted	Reason for accepting: Burley is significantly closer, limited difference between potential pivotal sites. Reason for ignoring warnings:	Station: 06025 BURLEY The user has been notified that 1 candidates where either hydrologically or geographically closer to the subject site than the chosen pivotal site. The user has accepted to reject these sites in preference of the chosen pivotal site.	06-11-2020 18:15
2.8 QMED data transfer performed	N/A		06-11-2020 18:16

2.11 Pooling group accepted	N/A	Pooled group accepted with the following stations: [06025, 24002, 06013, 06014, 25016, 16004, 16001, 06026, 07006, 25022, 25023, 07003, 36018, 14011] and distribution: GEV	06-11-2020 18:17
2.13 Module 2 finalized	N/A	Finished pooled analysis with the following distribution selected: EV1.	06-11-2020 18:17
3.2 Hydrograph pivotal site accepted	Burley gauge exhibits hysteresis. Receding limb is constrained.	Station: 06013 CHARLEVILLE	06-11-2020 18:19
3.2 Hydrograph pivotal site accepted	Burley Gauge exhibits hysteresis. Receding limb is constrained and not representative.	Station: 06025 BURLEY	06-11-2020 18:20
3.1 Hydrograph pivotal site rejected	Good representation of rising and falling limbs.	Station: 06013 CHARLEVILLE	06-11-2020 18:21
3.3 Proceeded from hydrograph display	N/A		06-11-2020 18:21
3.3 Proceeded from hydrograph display	N/A		06-11-2020 18:21
3.4 Hydrograph inspected and adjusted	N/A	The user adopted the original PCD hydrograph	06-11-2020 18:21
3.5 Hydrograph transferred to subject site	N/A	The user adjusted the subject site estimate with n = 5.63098668882147, Tr = 25.5952369733001, C = 53.43046694836	06-11-2020 18:21

Flood Estimation Report #11401 (19.153 N52 Ardee Catchment C2)

Generated 09-11-2020 12:42

Subject site

Attributes

Name	Unit	Value
Coordinate [X]		-729189.631783105
Coordinate [Y]		7142603.68511422
Distance	km	331.30407974211
Station Number		06_1012_5
Location		
Water Body		
Catchment		
Hydrometric Area		
Organisation		
FSU Rating Classification		
Drainage works	year	
Contributing Catchment Area	km^2	276.72
Center Northing	m	287060
Center Easting	m	285680
Northing	m	290382
Easting	m	295438
A-Max series gap in years	year	
A-Max series number of years	year	
A-Max series number of usable years	year	
A-Max series end year	year	
A-Max series start year	year	
FARL		0.967
ALLUV		0.0461
PEAT		0.0001
FOREST		0.025
PASTURE		0.9804
S1085	m/km	3.17229
MSL	km	42.45
DRAIND	km/km^2	1.108
ALTBAR		88.3
NETLEN	km	306.489
T4		
T3		

SAAPE	mm	505.19
T2		
ARTDRAIN2		0.7904
ARTDRAIN		0.1702
TAYSLO		0.228371
STMFRQ		247
BFISOIL		0.617152865
SAAR	mm	883.61
RWSEG_CD		06_1012
TOP_RWSEG		
Bankfull		
HGF	m^3/s	
MAF	m^3/s	
FAI		0.1501
FLATWET		0.6
URBEXT		0.0015
HGF/QMED		
centroidx3857		-744775.766720524
centroidy3857		7138650.36247094
x3857		-729189.631783105
y3857		7142603.68511422

Pivotal site

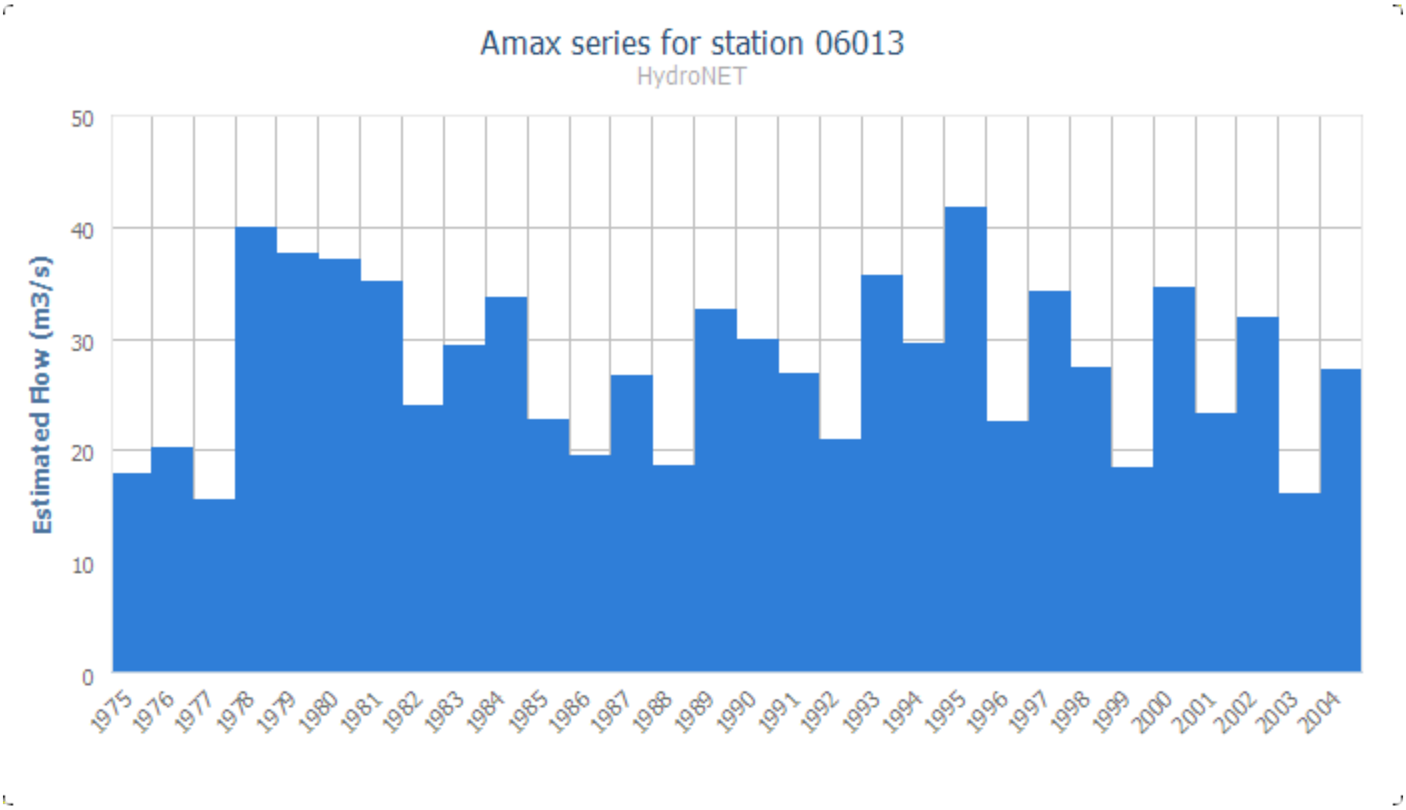
Attributes

Name	Unit	Value
Coordinate [X]		-714002.56465469
Coordinate [Y]		7142901.9394013
Station Number		06013
Location		CHARLEVILLE
Water Body		DEE
Catchment		Glyde & Dee
Hydrometric Area		6
Organisation		OPW
FSU Rating Classification		A1
Drainage works	year	1950-57
Contributing Catchment Area	km^2	309.1472
Center Northing	m	287060
Center Easting	m	287730
Northing	m	290750
Easting	m	304411
A-Max series gap in years	year	0
A-Max series number of years	year	30
A-Max series number of usable years	year	30
A-Max series end year	year	2004
A-Max series start year	year	1975
FARL		0.971
ALLUV		0.0523
PEAT		0.0001
FOREST		0.0244
PASTURE		0
S1085	m/km	2.58328
MSL	km	53.967
DRAIND	km/km^2	1.117
ALTBAR		0
NETLEN	km	345.391
T4		0.01187019679232
T3		0.019151845261223
SAAPE	mm	506.39
T2		0.15721341210169
ARTDRAIN2		0.782
ARTDRAIN		0.1688
TAYSLO		0.205344
STMFRQ		275
BFISOIL		0.6165
SAAR	mm	873.08
RWSEG_CD		06_49
TOP_RWSEG		06_804
Bankfull		1.62 from survey
HGF	m^3/s	36
MAF	m^3/s	28.2
FAI		0.16
FLATWET		0.6
URBEXT		0.009
HGF/QMED		1.3153087321885
x3857		-714002.56465469
y3857		7142901.9394013

centroidx3857		-742512.229174255
centroidy3857		7139058.32890722
Distance	km	2.30000844270072

Map

Amax Series Chart



QMED Estimates

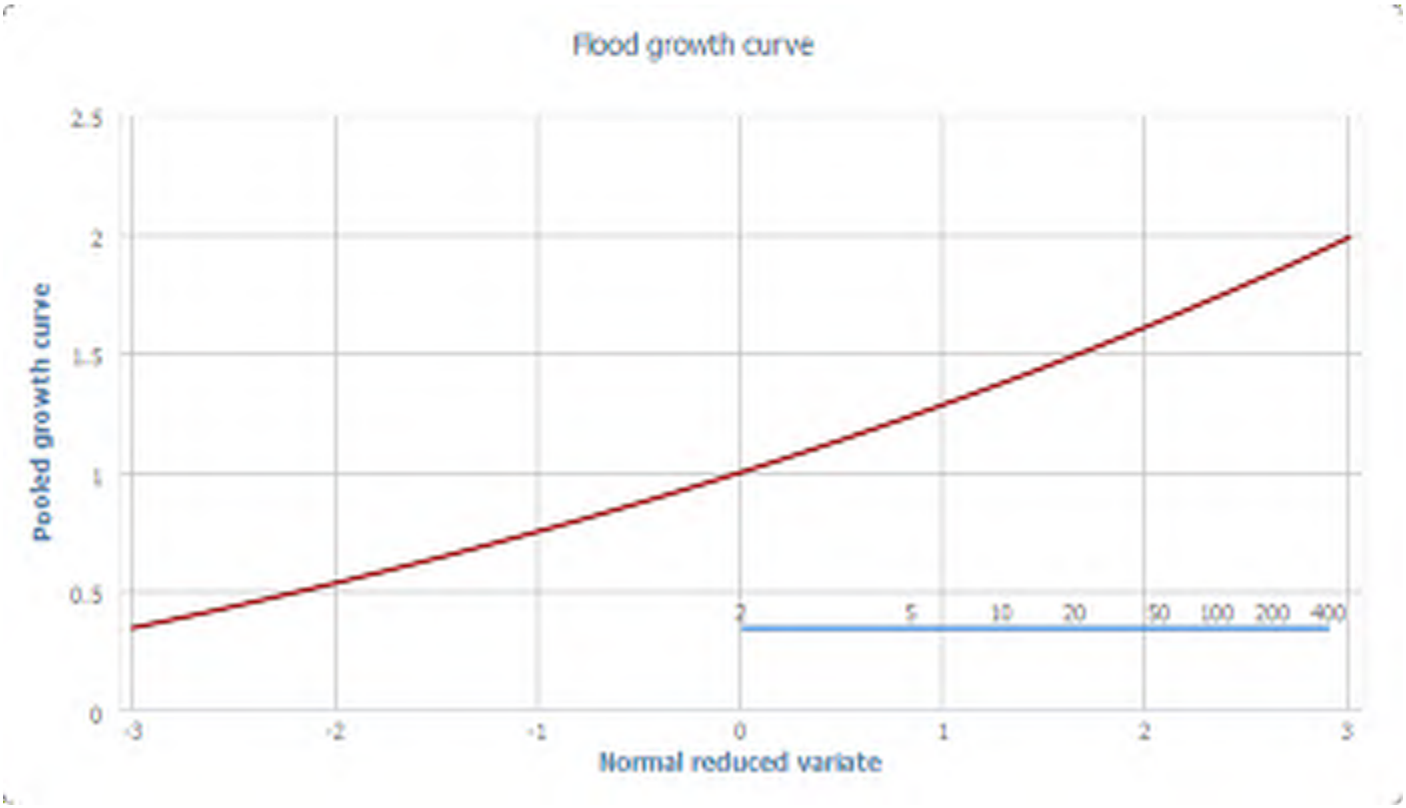
Subject rural QMED	39.85
Subject urban QMED	39.94
Pivotal gauged QMED	27.36
Pivotal adjustment factor QMED	0.64
Subject adjusted QMED	**25.46**

Pooling Group

Station	**Amax years**
06013 CHARLEVILLE	30
06014 TALLANSTOWN	30
24002 GRAYS BR.	32
06025 BURLEY	30
25016 RAHAN	48
16004 THURLES	48
07007 BOYNE AQUEDUCT	45
16002 BEAKSTOWN	51
25021 CROGHAN	44
16001 ATHLUMMON	33

07003 CASTLERICKARD	46
06026 ACLINT	46

Selected Flood Growth Curve



Pooled growth curve	Normal reduced variate
0.35	-3.01
0.4	-2.71
0.43	-2.55
0.45	-2.43
0.47	-2.34
0.48	-2.27
0.5	-2.21
0.51	-2.15
0.52	-2.1
0.53	-2.06
0.53	-2.01
0.54	-1.98
0.55	-1.94
0.56	-1.91
0.56	-1.88
0.57	-1.85
0.57	-1.82
0.58	-1.79
0.58	-1.77
0.59	-1.74
0.59	-1.72
0.6	-1.7
0.6	-1.68
0.61	-1.66
0.61	-1.64
0.62	-1.62
0.62	-1.6
0.62	-1.58
0.63	-1.56

0.63	-1.54
0.64	-1.53
0.64	-1.51
0.64	-1.49
0.65	-1.48
0.65	-1.46
0.65	-1.45
0.66	-1.43
0.66	-1.42
0.66	-1.41
0.66	-1.39
0.67	-1.38
0.67	-1.36
0.67	-1.35
0.68	-1.34
0.68	-1.33
0.68	-1.31
0.68	-1.3
0.69	-1.29
0.69	-1.28
0.69	-1.27
0.69	-1.25
0.7	-1.24
0.7	-1.23
0.7	-1.22
0.7	-1.21
0.71	-1.2
0.71	-1.19
0.71	-1.18
0.71	-1.17
0.72	-1.16
0.72	-1.15
0.72	-1.14
0.72	-1.13
0.73	-1.12
0.73	-1.11
0.73	-1.1
0.73	-1.09
0.73	-1.08
0.74	-1.07
0.74	-1.06
0.74	-1.05
0.74	-1.04
0.74	-1.04
0.75	-1.03
0.75	-1.02
0.75	-1.01
0.75	-1
0.75	-0.99
0.76	-0.98
0.76	-0.98
0.76	-0.97
0.76	-0.96
0.76	-0.95
0.77	-0.94
0.77	-0.93
0.77	-0.93

0.77	-0.92
0.77	-0.91
0.78	-0.9
0.78	-0.89
0.78	-0.89
0.78	-0.88
0.78	-0.87
0.78	-0.86
0.79	-0.86
0.79	-0.85
0.79	-0.84
0.79	-0.83
0.79	-0.83
0.79	-0.82
0.8	-0.81
0.8	-0.81
0.8	-0.8
0.8	-0.79
0.8	-0.78
0.8	-0.78
0.81	-0.77
0.81	-0.76
0.81	-0.76
0.81	-0.75
0.81	-0.74
0.81	-0.74
0.82	-0.73
0.82	-0.72
0.82	-0.72
0.82	-0.71
0.82	-0.7
0.82	-0.7
0.83	-0.69
0.83	-0.68
0.83	-0.68
0.83	-0.67
0.83	-0.66
0.83	-0.66
0.84	-0.65
0.84	-0.64
0.84	-0.64
0.84	-0.63
0.84	-0.62
0.84	-0.62
0.84	-0.61
0.85	-0.61
0.85	-0.6
0.85	-0.59
0.85	-0.59
0.85	-0.58
0.85	-0.57
0.86	-0.57
0.86	-0.56
0.86	-0.56
0.86	-0.55
0.86	-0.54
0.86	-0.54

0.86	-0.53
0.87	-0.53
0.87	-0.52
0.87	-0.51
0.87	-0.51
0.87	-0.5
0.87	-0.5
0.87	-0.49
0.88	-0.49
0.88	-0.48
0.88	-0.47
0.88	-0.47
0.88	-0.46
0.88	-0.46
0.88	-0.45
0.89	-0.44
0.89	-0.44
0.89	-0.43
0.89	-0.43
0.89	-0.42
0.89	-0.42
0.89	-0.41
0.9	-0.41
0.9	-0.4
0.9	-0.39
0.9	-0.39
0.9	-0.38
0.9	-0.38
0.9	-0.37
0.91	-0.37
0.91	-0.36
0.91	-0.35
0.91	-0.35
0.91	-0.34
0.91	-0.34
0.91	-0.33
0.92	-0.33
0.92	-0.32
0.92	-0.32
0.92	-0.31
0.92	-0.31
0.92	-0.3
0.92	-0.29
0.92	-0.29
0.93	-0.28
0.93	-0.28
0.93	-0.27
0.93	-0.27
0.93	-0.26
0.93	-0.26
0.93	-0.25
0.94	-0.25
0.94	-0.24
0.94	-0.24
0.94	-0.23
0.94	-0.22
0.94	-0.22

0.94	-0.21
0.95	-0.21
0.95	-0.2
0.95	-0.2
0.95	-0.19
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0.95	-0.18
0.95	-0.18
0.95	-0.17
0.96	-0.17
0.96	-0.16
0.96	-0.16
0.96	-0.15
0.96	-0.15
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0.97	-0.1
0.98	-0.09
0.98	-0.09
0.98	-0.08
0.98	-0.08
0.98	-0.07
0.98	-0.07
0.98	-0.06
0.98	-0.06
0.99	-0.05
0.99	-0.05
0.99	-0.04
0.99	-0.04
0.99	-0.03
0.99	-0.03
0.99	-0.02
1	-0.02
1	-0.01
1	-0.01
1	0
1	0.01
1	0.01
1	0.02
1.01	0.02
1.01	0.03
1.01	0.03
1.01	0.04
1.01	0.04
1.01	0.05
1.01	0.05
1.02	0.06
1.02	0.06
1.02	0.07
1.02	0.07
1.02	0.08

1.02	0.08
1.02	0.09
1.02	0.09
1.03	0.1
1.03	0.1
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1.03	0.11
1.03	0.12
1.03	0.12
1.03	0.13
1.04	0.14
1.04	0.14
1.04	0.15
1.04	0.15
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1.04	0.16
1.04	0.17
1.05	0.17
1.05	0.18
1.05	0.18
1.05	0.19
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1.05	0.2
1.05	0.2
1.06	0.21
1.06	0.21
1.06	0.22
1.06	0.22
1.06	0.23
1.06	0.24
1.06	0.24
1.07	0.25
1.07	0.25
1.07	0.26
1.07	0.26
1.07	0.27
1.07	0.27
1.08	0.28
1.08	0.28
1.08	0.29
1.08	0.29
1.08	0.3
1.08	0.31
1.08	0.31
1.09	0.32
1.09	0.32
1.09	0.33
1.09	0.33
1.09	0.34
1.09	0.34
1.09	0.35
1.1	0.35
1.1	0.36
1.1	0.37
1.1	0.37
1.1	0.38
1.1	0.38

1.11	0.39
1.11	0.39
1.11	0.4
1.11	0.41
1.11	0.41
1.11	0.42
1.12	0.42
1.12	0.43
1.12	0.43
1.12	0.44
1.12	0.44
1.12	0.45
1.12	0.46
1.13	0.46
1.13	0.47
1.13	0.47
1.13	0.48
1.13	0.49
1.13	0.49
1.14	0.5
1.14	0.5
1.14	0.51
1.14	0.51
1.14	0.52
1.14	0.53
1.15	0.53
1.15	0.54
1.15	0.54
1.15	0.55
1.15	0.56
1.15	0.56
1.16	0.57
1.16	0.57
1.16	0.58
1.16	0.59
1.16	0.59
1.17	0.6
1.17	0.61
1.17	0.61
1.17	0.62
1.17	0.62
1.17	0.63
1.18	0.64
1.18	0.64
1.18	0.65
1.18	0.66
1.18	0.66
1.19	0.67
1.19	0.68
1.19	0.68
1.19	0.69
1.19	0.7
1.2	0.7
1.2	0.71
1.2	0.72
1.2	0.72
1.2	0.73

1.2	0.74
1.21	0.74
1.21	0.75
1.21	0.76
1.21	0.76
1.21	0.77
1.22	0.78
1.22	0.78
1.22	0.79
1.22	0.8
1.23	0.81
1.23	0.81
1.23	0.82
1.23	0.83
1.23	0.83
1.24	0.84
1.24	0.85
1.24	0.86
1.24	0.86
1.25	0.87
1.25	0.88
1.25	0.89
1.25	0.89
1.25	0.9
1.26	0.91
1.26	0.92
1.26	0.93
1.26	0.93
1.27	0.94
1.27	0.95
1.27	0.96
1.27	0.97
1.28	0.98
1.28	0.98
1.28	0.99
1.28	1
1.29	1.01
1.29	1.02
1.29	1.03
1.29	1.04
1.3	1.04
1.3	1.05
1.3	1.06
1.31	1.07
1.31	1.08
1.31	1.09
1.31	1.1
1.32	1.11
1.32	1.12
1.32	1.13
1.33	1.14
1.33	1.15
1.33	1.16
1.34	1.17
1.34	1.18
1.34	1.19
1.35	1.2

1.35	1.21
1.35	1.22
1.36	1.23
1.36	1.24
1.36	1.25
1.37	1.27
1.37	1.28
1.37	1.29
1.38	1.3
1.38	1.31
1.39	1.33
1.39	1.34
1.39	1.35
1.4	1.36
1.4	1.38
1.41	1.39
1.41	1.41
1.41	1.42
1.42	1.43
1.42	1.45
1.43	1.46
1.43	1.48
1.44	1.49
1.44	1.51
1.45	1.53
1.46	1.54
1.46	1.56
1.47	1.58
1.47	1.6
1.48	1.62
1.49	1.64
1.49	1.66
1.5	1.68
1.51	1.7
1.51	1.72
1.52	1.74
1.53	1.77
1.54	1.79
1.55	1.82
1.56	1.85
1.57	1.88
1.58	1.91
1.59	1.94
1.6	1.98
1.61	2.01
1.63	2.06
1.64	2.1
1.66	2.15
1.68	2.21
1.7	2.27
1.73	2.34
1.76	2.43
1.81	2.55
1.87	2.71
1.99	3.01

Adopted Growth Factors

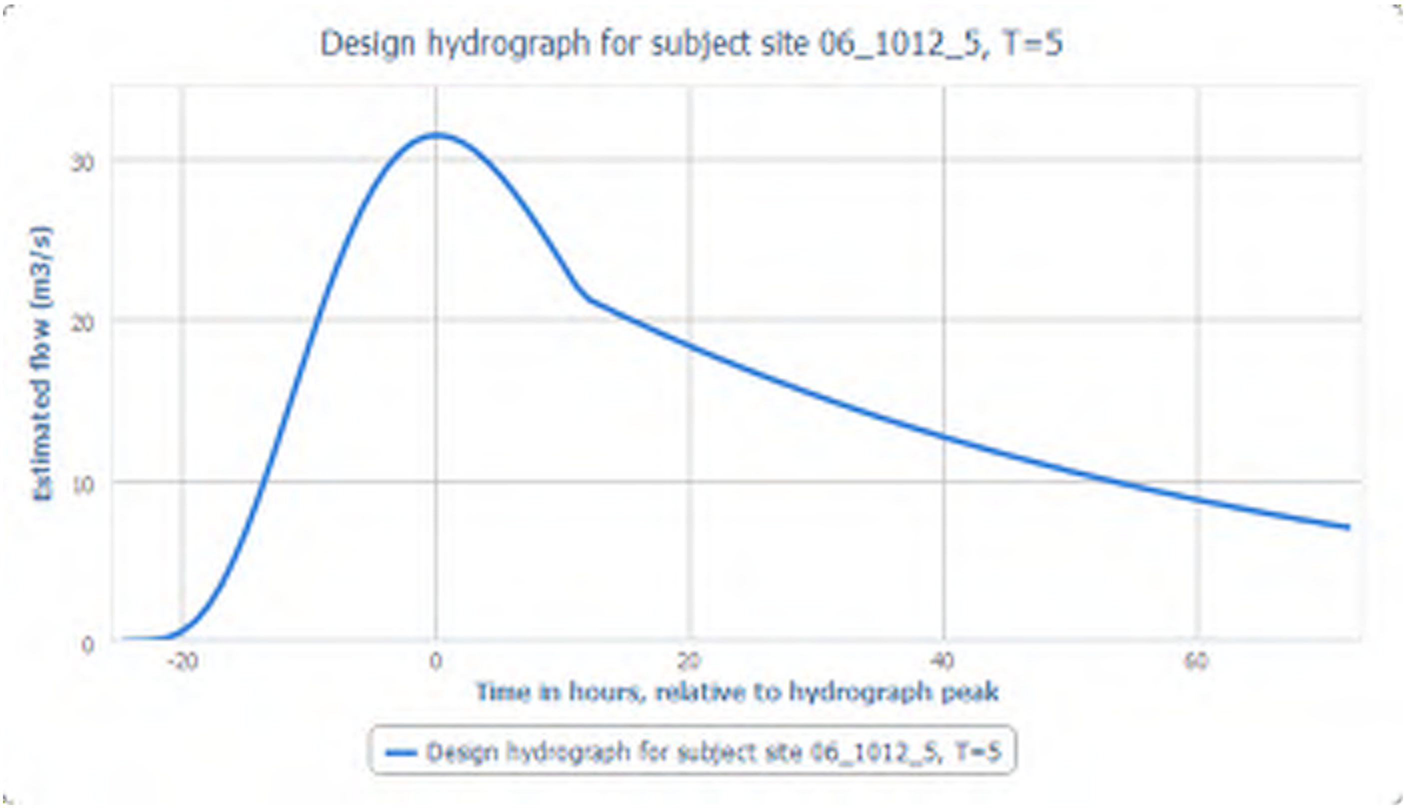
Return Period	Growth Factor	Design Peak Flow (m^3/s)
1.3	0.81	20.62
2	1	25.46
5	1.24	31.57
10	1.37	34.88
20	1.49	37.93
30	1.55	39.46
50	1.63	41.5
100	1.73	44.04
200	1.82	46.34
500	1.93	49.14
1000	2.02	51.43

Hydrograph Width Estimation Summary

Name	Value
Pivotal site	06013 "CHARLEVILLE"
Adjustment type	The user adopted the original PCD hydrograph
Transfer type	The user adjusted the subject site estimate with the pivotal site deformation factor
Deformation factor	1
Custom deformation factor	1
Accepted n	5.63098668882147
Accepted Tr	24.7292504431066
Accepted C	54.2851993391786

Hydrograph Plots

Return Period: 5

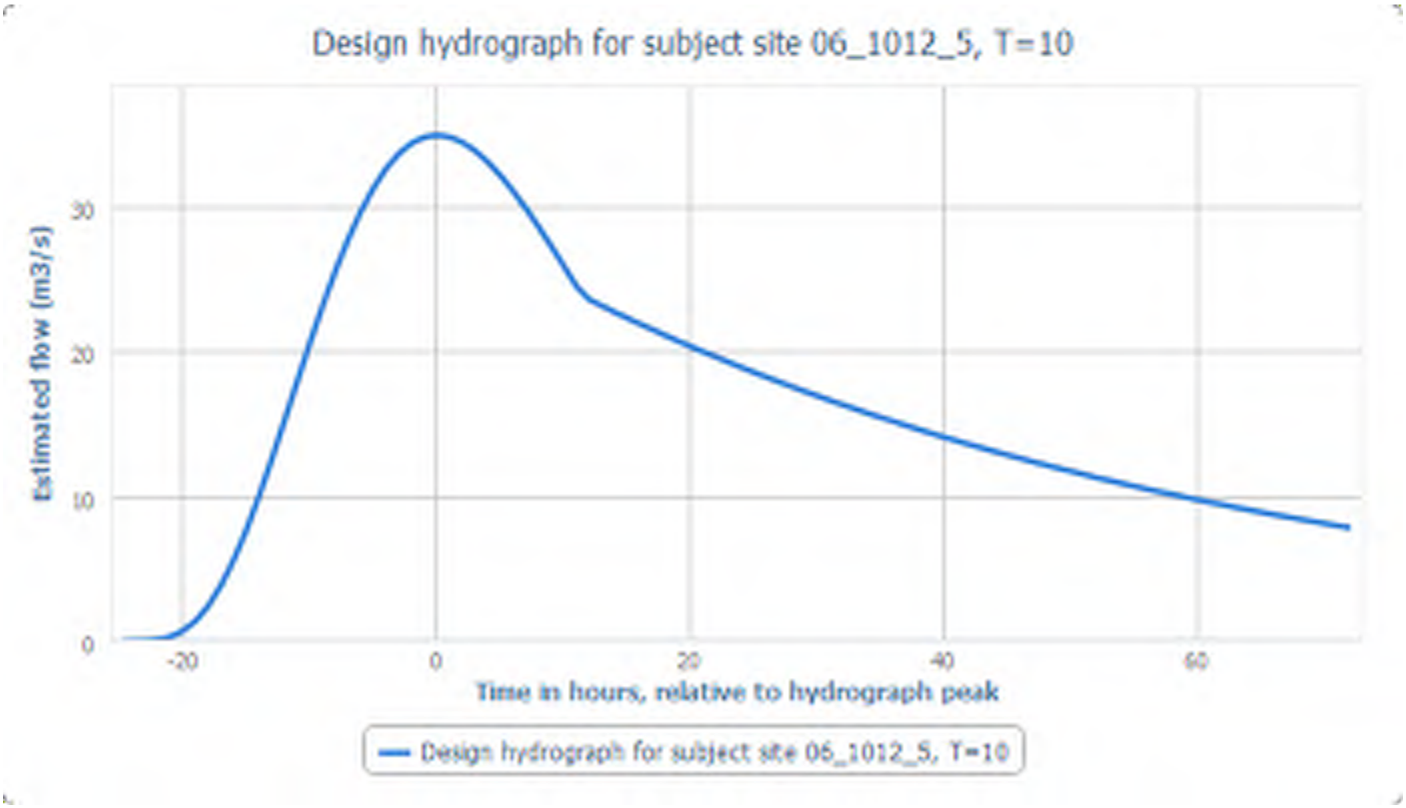


Hours relative to hydrograph peak	Estimated flow (m3/s)
-24.73	0
-24	0
-23	0.01
-22	0.07
-21	0.25
-20	0.63
-19	1.26
-18	2.21
-17	3.48
-16	5.07
-15	6.95
-14	9.06
-13	11.35
-12	13.75
-11	16.18
-10	18.58
-9	20.89
-8	23.04
-7	25
-6	26.73
-5	28.2
-4	29.4
-3	30.32
-2	30.97
-1	31.35
0	31.47
1	31.36
2	31.02
3	30.49

4	29.79
5	28.95
6	27.98
7	26.91
8	25.76
9	24.56
10	23.31
11	22.05
12	21.22
13	20.84
14	20.46
15	20.08
16	19.72
17	19.36
18	19
19	18.66
20	18.32
21	17.98
22	17.65
23	17.33
24	17.01
25	16.7
26	16.4
27	16.1
28	15.81
29	15.52
30	15.23
31	14.96
32	14.68
33	14.41
34	14.15
35	13.89
36	13.64
37	13.39
38	13.15
39	12.91
40	12.67
41	12.44
42	12.21
43	11.99
44	11.77
45	11.56
46	11.35
47	11.14
48	10.93
49	10.74
50	10.54
51	10.35
52	10.16
53	9.97
54	9.79
55	9.61
56	9.44
57	9.26
58	9.1
59	8.93
60	8.77

61	8.61
62	8.45
63	8.29
64	8.14
65	7.99
66	7.85
67	7.71
68	7.56
69	7.43
70	7.29
71	7.16
72	7.03

Return Period: 10

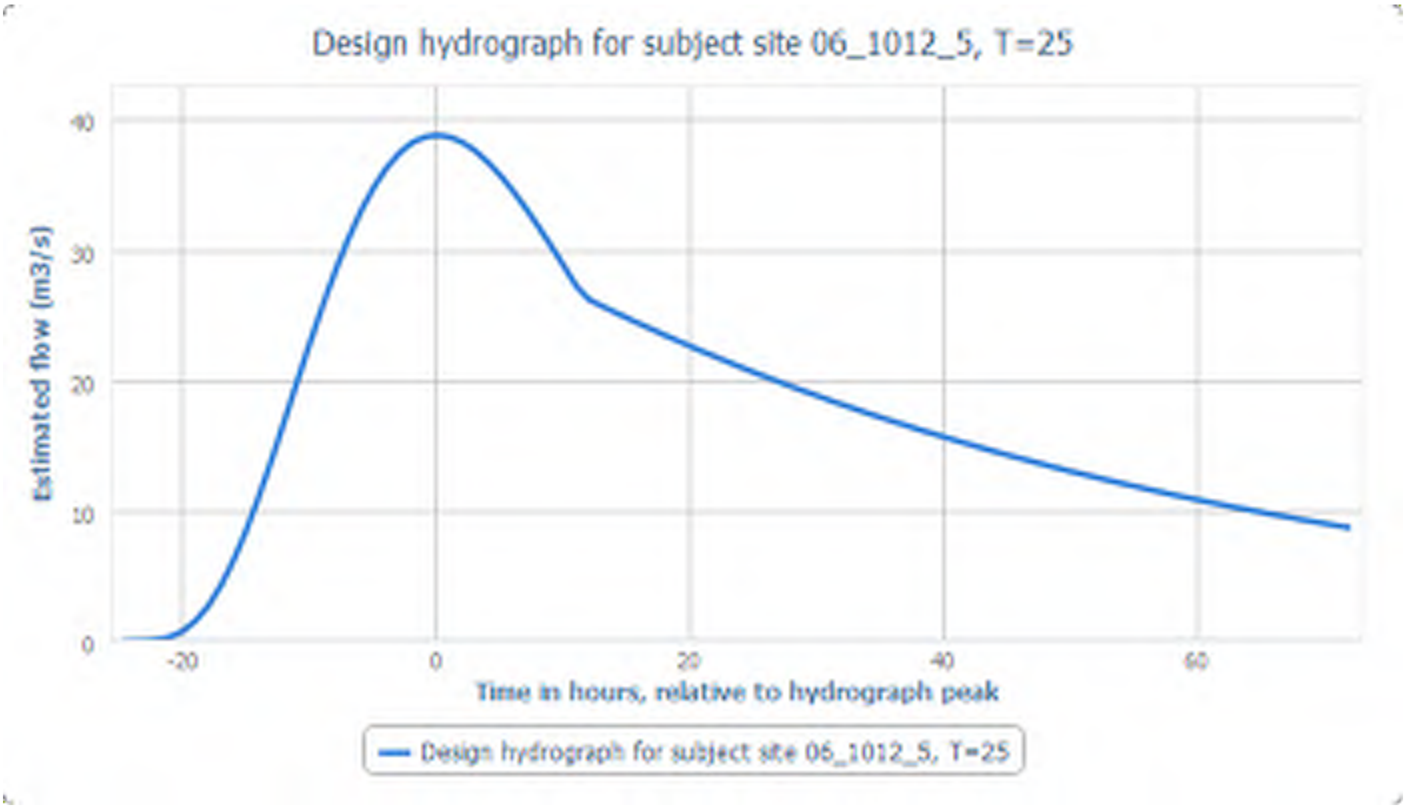


Hours relative to hydrograph peak	Estimated flow (m3/s)
-24.73	0
-24	0
-23	0.01
-22	0.08
-21	0.28
-20	0.7
-19	1.4
-18	2.45
-17	3.86
-16	5.62
-15	7.7
-14	10.05
-13	12.59
-12	15.25
-11	17.94
-10	20.61
-9	23.16
-8	25.55
-7	27.72
-6	29.64
-5	31.27
-4	32.6
-3	33.63
-2	34.35
-1	34.76
0	34.9
1	34.77
2	34.4
3	33.82
4	33.04
5	32.1

6	31.03
7	29.84
8	28.57
9	27.23
10	25.85
11	24.45
12	23.54
13	23.11
14	22.68
15	22.27
16	21.86
17	21.47
18	21.07
19	20.69
20	20.31
21	19.94
22	19.58
23	19.22
24	18.87
25	18.52
26	18.19
27	17.85
28	17.53
29	17.21
30	16.89
31	16.59
32	16.28
33	15.99
34	15.69
35	15.41
36	15.13
37	14.85
38	14.58
39	14.31
40	14.05
41	13.8
42	13.54
43	13.3
44	13.05
45	12.82
46	12.58
47	12.35
48	12.13
49	11.9
50	11.69
51	11.47
52	11.26
53	11.06
54	10.86
55	10.66
56	10.46
57	10.27
58	10.09
59	9.9
60	9.72
61	9.54
62	9.37

63	9.2
64	9.03
65	8.87
66	8.7
67	8.55
68	8.39
69	8.24
70	8.09
71	7.94
72	7.79

Return Period: 25

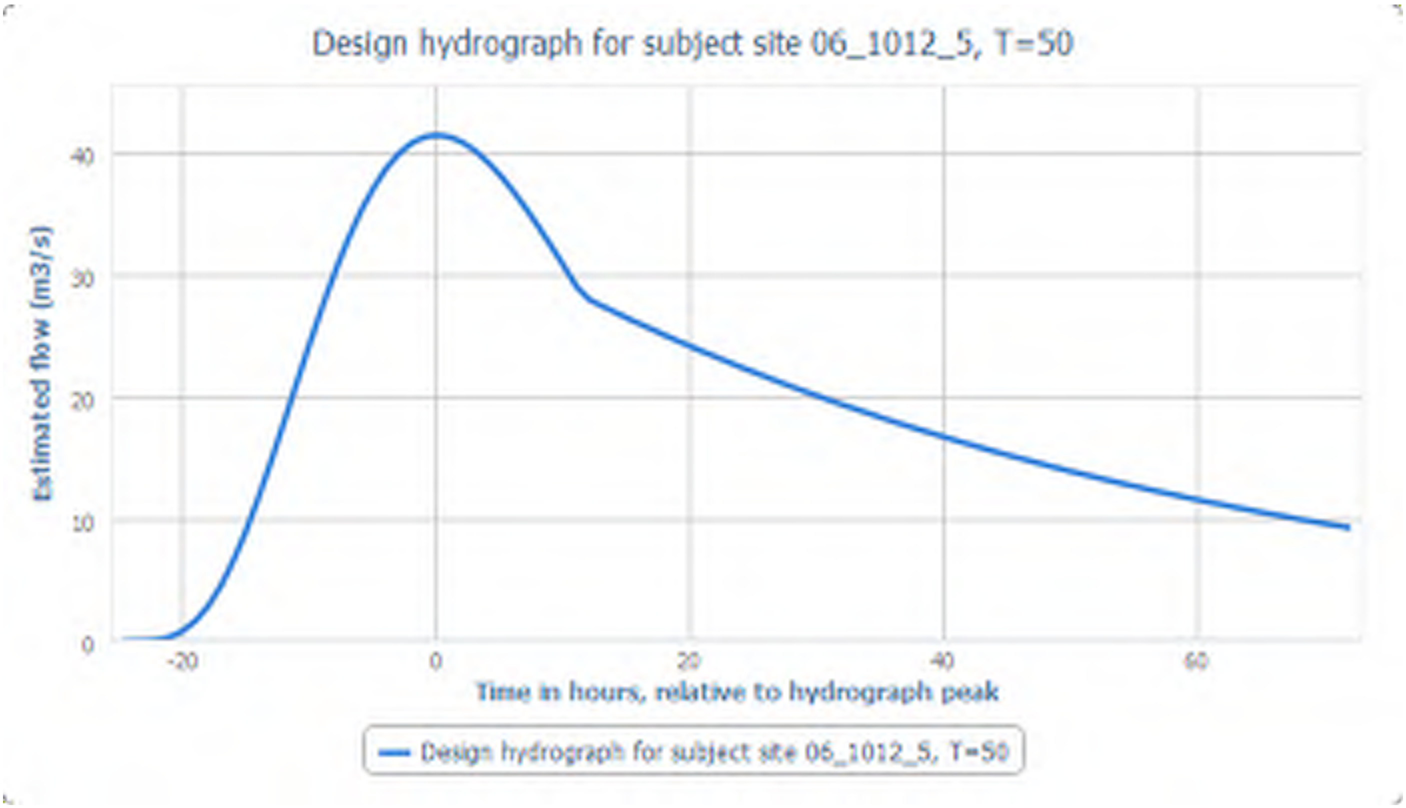


Hours relative to hydrograph peak	Estimated flow (m3/s)
-24.73	0
-24	0
-23	0.01
-22	0.09
-21	0.31
-20	0.77
-19	1.56
-18	2.72
-17	4.29
-16	6.25
-15	8.56
-14	11.17
-13	13.99
-12	16.95
-11	19.95
-10	22.9
-9	25.75
-8	28.4
-7	30.82
-6	32.95
-5	34.76
-4	36.24
-3	37.38
-2	38.18
-1	38.64
0	38.79
1	38.65
2	38.24
3	37.59
4	36.72
5	35.68

6	34.49
7	33.17
8	31.75
9	30.27
10	28.74
11	27.18
12	26.16
13	25.68
14	25.21
15	24.75
16	24.3
17	23.86
18	23.42
19	23
20	22.58
21	22.16
22	21.76
23	21.36
24	20.97
25	20.59
26	20.21
27	19.84
28	19.48
29	19.13
30	18.78
31	18.43
32	18.1
33	17.77
34	17.44
35	17.13
36	16.81
37	16.51
38	16.2
39	15.91
40	15.62
41	15.33
42	15.05
43	14.78
44	14.51
45	14.24
46	13.98
47	13.73
48	13.48
49	13.23
50	12.99
51	12.75
52	12.52
53	12.29
54	12.07
55	11.85
56	11.63
57	11.42
58	11.21
59	11.01
60	10.81
61	10.61
62	10.41

63	10.22
64	10.04
65	9.85
66	9.67
67	9.5
68	9.32
69	9.15
70	8.99
71	8.82
72	8.66

Return Period: 50

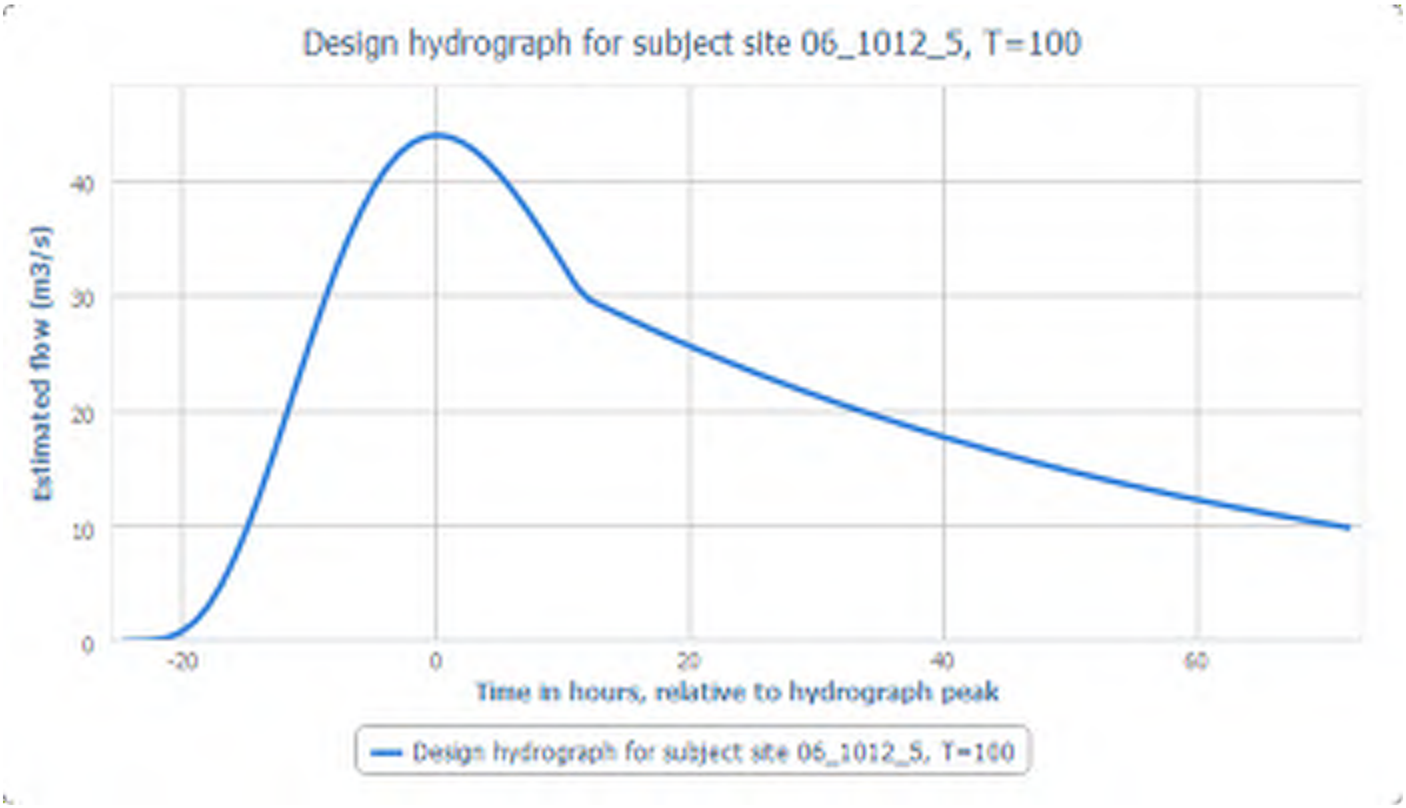


Hours relative to hydrograph peak	Estimated flow (m3/s)
-24.73	0
-24	0
-23	0.01
-22	0.09
-21	0.33
-20	0.83
-19	1.67
-18	2.91
-17	4.58
-16	6.67
-15	9.15
-14	11.93
-13	14.95
-12	18.1
-11	21.31
-10	24.47
-9	27.5
-8	30.34
-7	32.92
-6	35.2
-5	37.13
-4	38.72
-3	39.93
-2	40.78
-1	41.28
0	41.44
1	41.29
2	40.85
3	40.15
4	39.23
5	38.12

6	36.84
7	35.43
8	33.92
9	32.34
10	30.7
11	29.03
12	27.95
13	27.44
14	26.94
15	26.44
16	25.96
17	25.49
18	25.02
19	24.57
20	24.12
21	23.68
22	23.25
23	22.82
24	22.4
25	22
26	21.59
27	21.2
28	20.81
29	20.43
30	20.06
31	19.69
32	19.33
33	18.98
34	18.64
35	18.3
36	17.96
37	17.63
38	17.31
39	17
40	16.69
41	16.38
42	16.08
43	15.79
44	15.5
45	15.22
46	14.94
47	14.67
48	14.4
49	14.14
50	13.88
51	13.62
52	13.38
53	13.13
54	12.89
55	12.66
56	12.43
57	12.2
58	11.98
59	11.76
60	11.54
61	11.33
62	11.13

63	10.92
64	10.72
65	10.53
66	10.34
67	10.15
68	9.96
69	9.78
70	9.6
71	9.43
72	9.25

Return Period: 100

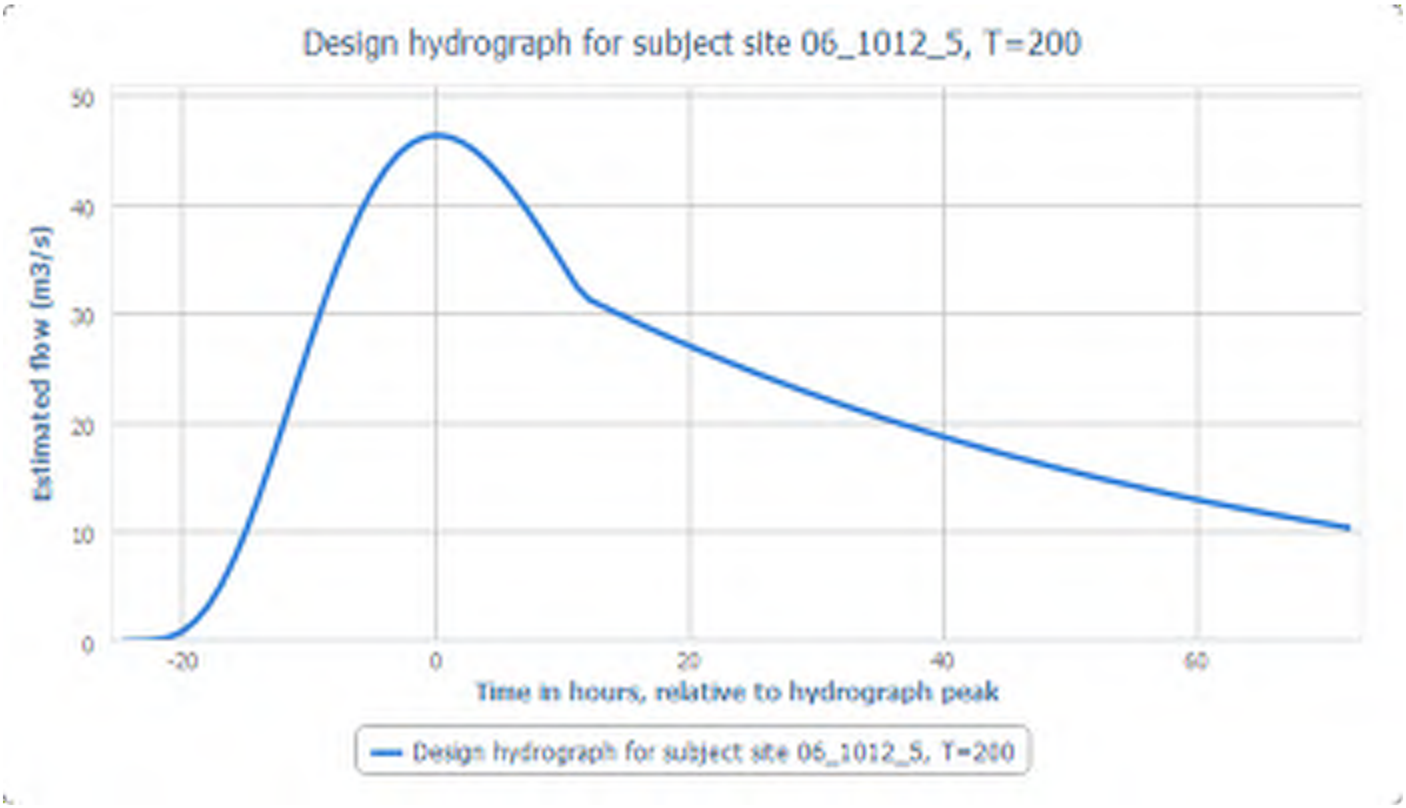


Hours relative to hydrograph peak	Estimated flow (m3/s)
-24.73	0
-24	0
-23	0.01
-22	0.1
-21	0.35
-20	0.88
-19	1.76
-18	3.08
-17	4.86
-16	7.07
-15	9.69
-14	12.64
-13	15.84
-12	19.19
-11	22.58
-10	25.93
-9	29.15
-8	32.16
-7	34.89
-6	37.3
-5	39.36
-4	41.03
-3	42.32
-2	43.22
-1	43.75
0	43.92
1	43.76
2	43.29
3	42.56
4	41.58
5	40.4

6	39.05
7	37.55
8	35.95
9	34.27
10	32.54
11	30.77
12	29.62
13	29.08
14	28.55
15	28.03
16	27.52
17	27.01
18	26.52
19	26.04
20	25.56
21	25.09
22	24.64
23	24.19
24	23.75
25	23.31
26	22.89
27	22.47
28	22.06
29	21.66
30	21.26
31	20.87
32	20.49
33	20.12
34	19.75
35	19.39
36	19.04
37	18.69
38	18.35
39	18.01
40	17.68
41	17.36
42	17.04
43	16.73
44	16.43
45	16.13
46	15.83
47	15.54
48	15.26
49	14.98
50	14.71
51	14.44
52	14.18
53	13.92
54	13.66
55	13.41
56	13.17
57	12.93
58	12.69
59	12.46
60	12.23
61	12.01
62	11.79

63	11.58
64	11.36
65	11.16
66	10.95
67	10.75
68	10.56
69	10.36
70	10.18
71	9.99
72	9.81

Return Period: 200



Hours relative to hydrograph peak	Estimated flow (m3/s)
-24.73	0
-24	0
-23	0.02
-22	0.11
-21	0.37
-20	0.92
-19	1.86
-18	3.25
-17	5.12
-16	7.45
-15	10.21
-14	13.32
-13	16.69
-12	20.21
-11	23.79
-10	27.32
-9	30.71
-8	33.88
-7	36.76
-6	39.3
-5	41.46
-4	43.23
-3	44.59
-2	45.54
-1	46.09
0	46.27
1	46.1
2	45.61
3	44.84
4	43.81
5	42.56

6	41.14
7	39.57
8	37.88
9	36.11
10	34.28
11	32.42
12	31.21
13	30.64
14	30.08
15	29.53
16	28.99
17	28.46
18	27.94
19	27.43
20	26.93
21	26.44
22	25.96
23	25.48
24	25.02
25	24.56
26	24.11
27	23.67
28	23.24
29	22.82
30	22.4
31	21.99
32	21.59
33	21.19
34	20.81
35	20.43
36	20.06
37	19.69
38	19.33
39	18.98
40	18.63
41	18.29
42	17.96
43	17.63
44	17.31
45	16.99
46	16.68
47	16.38
48	16.08
49	15.78
50	15.5
51	15.21
52	14.94
53	14.66
54	14.4
55	14.13
56	13.87
57	13.62
58	13.37
59	13.13
60	12.89
61	12.65
62	12.42

63	12.2
64	11.97
65	11.75
66	11.54
67	11.33
68	11.12
69	10.92
70	10.72
71	10.52
72	10.33

IBIDEM Plots and Tables

No IBIDEM plots were saved by the user.

Audit Trail Report #11401 (19.153 N52 Ardee Catchment C2)

User ID:	warren.vokes@rod.ie
Name:	Vokes, Warren
Company:	
Address:	
Report date & time:	09-11-2020 12:43
Start of Calculation:	09-11-2020 13:31

Decisions made by the user:

Decision	**User comment**	**System information**	**Date**
2.1 Subject site accepted	N/A	Location 06_1012_5	09-11-2020 13:32
2.4 Pivotal site accepted	Reason for accepting: Subject site is directly downstream of pivotal site Reason for ignoring warnings:	Station: 06013 CHARLEVILLE	09-11-2020 13:33
2.8 QMED data transfer performed	N/A		09-11-2020 13:34
2.11 Pooling group accepted	N/A	Pooled group accepted with the following stations: [06013, 06014, 24002, 06025, 25016, 16004, 07007, 16002, 25021, 16001, 07003, 06026] and distribution: LN3	09-11-2020 13:34
2.13 Module 2 finalized	N/A	Finished pooled analysis with the following distribution selected: LN3.	09-11-2020 13:34

3.1 Hydrograph pivotal site rejected	Burley site exhibits hysteresis between rising and receding limbs caused by ins stream structures and is therefore not suitable.	Station: 06025 BURLEY	09-11-2020 13:36
3.2 Hydrograph pivotal site accepted	Burley gauge exhibits hysteresis between rising and receding limbs caused by in channel structures and is therefore not suitable.	Station: 06025 BURLEY	09-11-2020 13:39
3.1 Hydrograph pivotal site rejected	Pivotal site is directly downstream of pivotal site.	Station: 06013 CHARLEVILLE	09-11-2020 13:40
3.3 Proceeded from hydrograph display	N/A		09-11-2020 13:40
3.3 Proceeded from hydrograph display	N/A		09-11-2020 13:40
3.4 Hydrograph inspected and adjusted	N/A	The user adopted the original PCD hydrograph	09-11-2020 13:40
3.5 Hydrograph transferred to subject site	N/A	The user adjusted the subject site estimate with n = 5.63098668882147, Tr = 24.7292504431066, C = 54.2851993391786	09-11-2020 13:41

Flood Estimation Report #11396 (19.153 N52 Ardee Catchment D)

Generated 09-11-2020 11:50

Subject site

Attributes

Name	Unit	Value
Coordinate [X]		-735092.258818523
Coordinate [Y]		7143979.06261373
Distance	km	242.821268580015
Station Number		06_723_2
Location		
Water Body		
Catchment		
Hydrometric Area		
Organisation		
FSU Rating Classification		
Drainage works	year	
Contributing Catchment Area	km^2	7.37
Center Northing	m	292620
Center Easting	m	293310
Northing	m	291123
Easting	m	291933
A-Max series gap in years	year	
A-Max series number of years	year	
A-Max series number of usable years	year	
A-Max series end year	year	
A-Max series start year	year	
FARL		1
ALLUV		0.0016
PEAT		0
FOREST		0.0708
PASTURE		0.8934
S1085	m/km	2.50851
MSL	km	5.048
DRAIND	km/km^2	1.585
ALTBAR		34.1
NETLEN	km	11.679
T4		
T3		

SAAPE	mm	512.26
T2		
ARTDRAIN2		0.8938
ARTDRAIN		0.3596
TAYSLO		0.430434
STMFRQ		13
BFISOIL		0.621847131
SAAR	mm	799.83
RWSEG_CD		06_723
TOP_RWSEG		
Bankfull		
HGF	m^3/s	
MAF	m^3/s	
FAI		0.2843
FLATWET		0.61
URBEXT		0
HGF/QMED		
centroidx3857		-732589.340549362
centroidy3857		7146250.46947558
x3857		-735092.258818523
y3857		7143979.06261373

Pivotal site

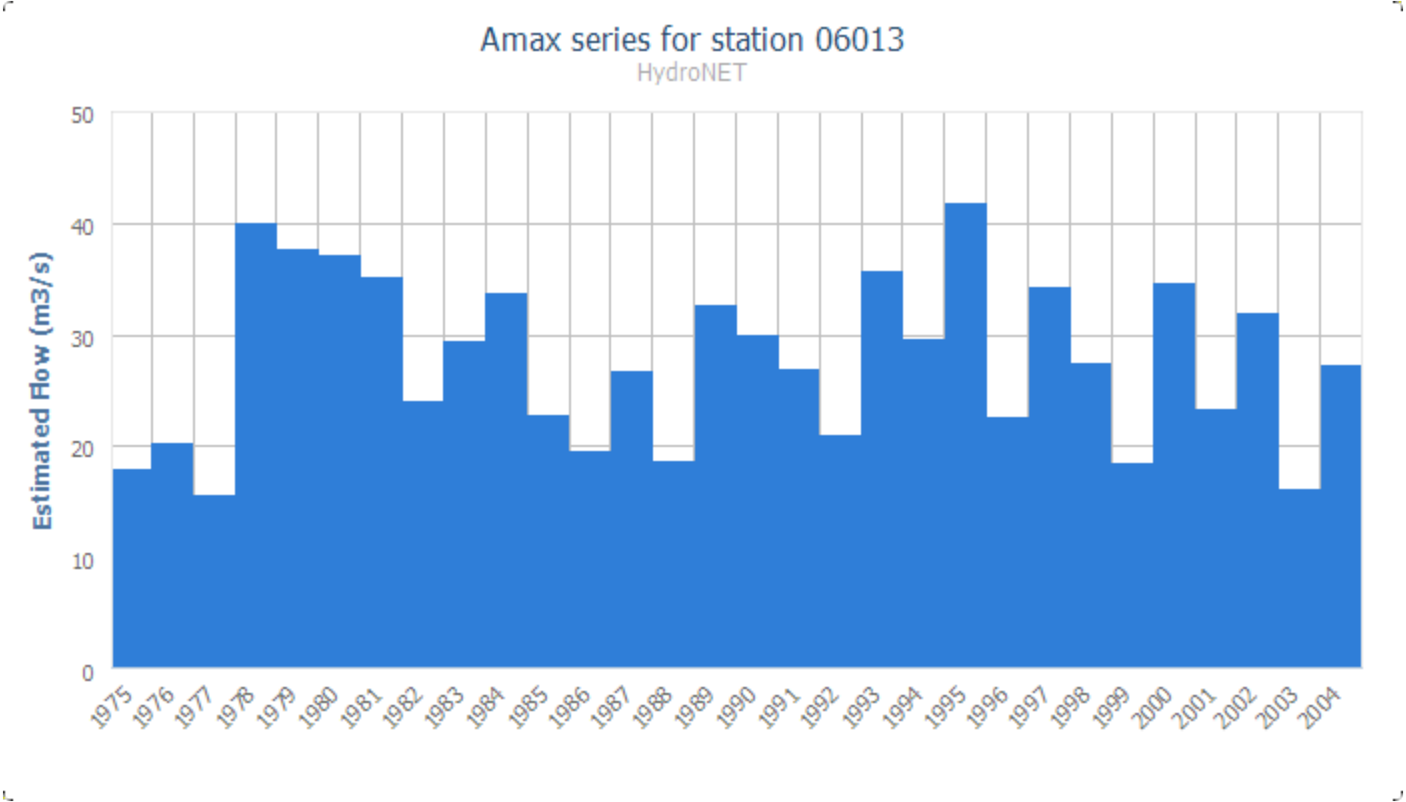
Attributes

Name	Unit	Value
Coordinate [X]		-714002.56465469
Coordinate [Y]		7142901.9394013
Station Number		06013
Location		CHARLEVILLE
Water Body		DEE
Catchment		Glyde & Dee
Hydrometric Area		6
Organisation		OPW
FSU Rating Classification		A1
Drainage works	year	1950-57
Contributing Catchment Area	km^2	309.1472
Center Northing	m	287060
Center Easting	m	287730
Northing	m	290750
Easting	m	304411
A-Max series gap in years	year	0
A-Max series number of years	year	30
A-Max series number of usable years	year	30
A-Max series end year	year	2004
A-Max series start year	year	1975
FARL		0.971
ALLUV		0.0523
PEAT		0.0001
FOREST		0.0244
PASTURE		0
S1085	m/km	2.58328
MSL	km	53.967
DRAIND	km/km^2	1.117
ALTBAR		0
NETLEN	km	345.391
T4		0.01187019679232
T3		0.019151845261223
SAAPE	mm	506.39
T2		0.15721341210169
ARTDRAIN2		0.782
ARTDRAIN		0.1688
TAYSLO		0.205344
STMFRQ		275
BFISOIL		0.6165
SAAR	mm	873.08
RWSEG_CD		06_49
TOP_RWSEG		06_804
Bankfull		1.62 from survey
HGF	m^3/s	36
MAF	m^3/s	28.2
FAI		0.16
FLATWET		0.6
URBEXT		0.009
HGF/QMED		1.3153087321885
x3857		-714002.56465469
y3857		7142901.9394013

centroidx3857		-742512.229174255
centroidy3857		7139058.32890722
Distance	km	12.2552276444448

Map

Amax Series Chart



QMED Estimates

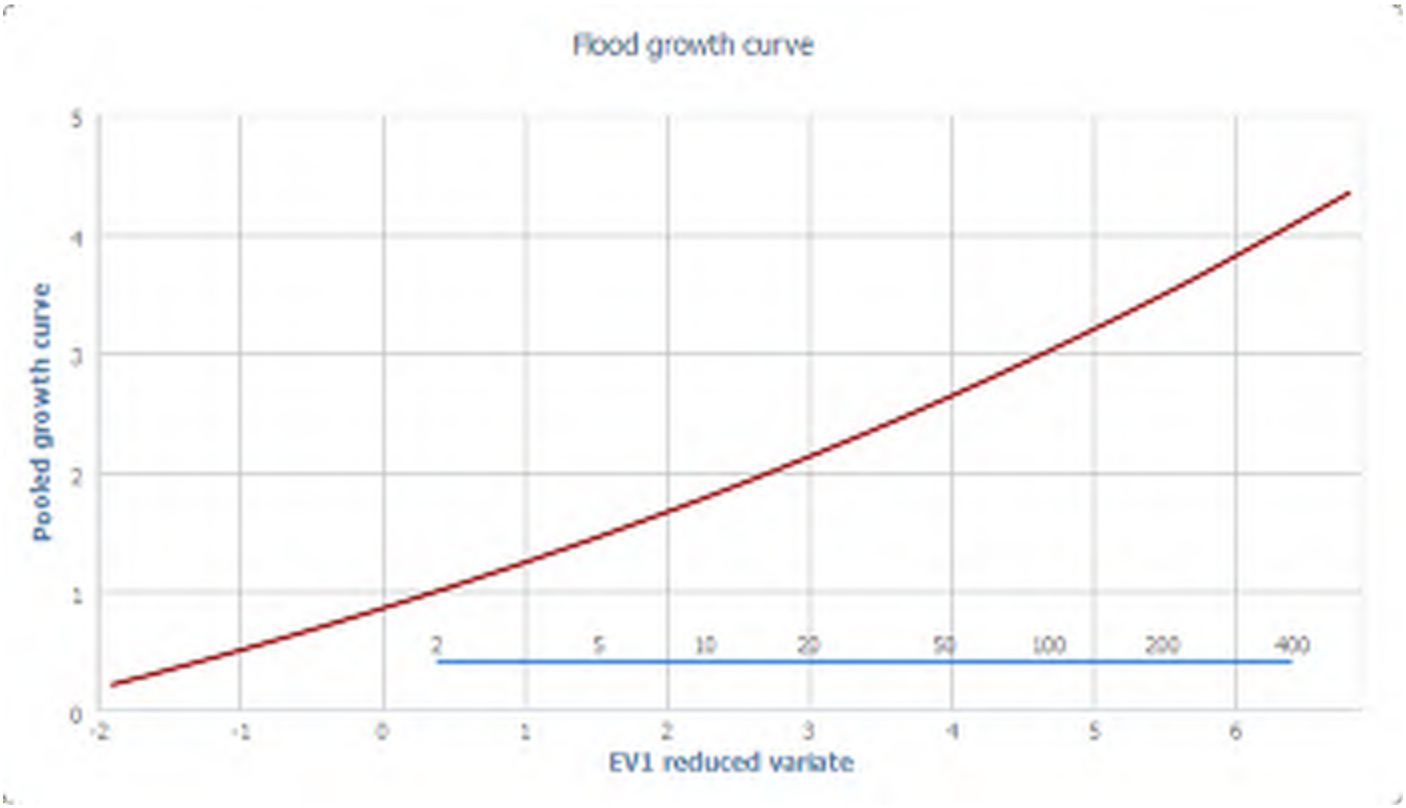
Subject rural QMED	1.39
Subject urban QMED	1.39
Pivotal gauged QMED	27.36
Pivotal adjustment factor QMED	0.64
Subject adjusted QMED	**0.88**

Pooling Group

Station	**Amax years**
10022 CARRICKMINES	17
08005 KINSALEY HALL	18
10021 COMMONS ROAD	24
08002 NAUL	21
08012 BALLYBOGHIL	19
09002 LUCAN	25
09035 KILLEEN ROAD	9
16051 CLOBANNA	13
25034 ROCHFORT	26
25040 ROSCREA	19

06031 CURRALHIR	18
24022 HOSPITAL	20
08009 BALHEARY	15
14009 CUSHINA	25
26022 KILMORE	33
06033 CONEYBURROW BR.	25
36031 LISDARN	30
14007 DERRYBROCK	24
26058 BALLINRINK BR.	24
09010 WALDRONS BRIDGE	19
25023 MILLTOWN	33
08003 FIELDSTOWN	18
08008 BROADMEADOW	25

Selected Flood Growth Curve



Pooled growth curve	EV1 reduced variate
0.22	-1.92
0.27	-1.75
0.3	-1.66
0.32	-1.6
0.33	-1.55
0.35	-1.5
0.36	-1.47
0.37	-1.43
0.38	-1.4
0.39	-1.38
0.4	-1.35
0.4	-1.33
0.41	-1.3
0.42	-1.28
0.42	-1.26
0.43	-1.24
0.44	-1.23
0.44	-1.21
0.45	-1.19
0.45	-1.18
0.46	-1.16
0.46	-1.15
0.47	-1.13
0.47	-1.12
0.48	-1.1
0.48	-1.09
0.49	-1.08
0.49	-1.06
0.49	-1.05

0.5	-1.04
0.5	-1.03
0.51	-1.02
0.51	-1
0.51	-0.99
0.52	-0.98
0.52	-0.97
0.52	-0.96
0.53	-0.95
0.53	-0.94
0.53	-0.93
0.54	-0.92
0.54	-0.91
0.54	-0.9
0.55	-0.89
0.55	-0.88
0.55	-0.87
0.56	-0.86
0.56	-0.86
0.56	-0.85
0.57	-0.84
0.57	-0.83
0.57	-0.82
0.58	-0.81
0.58	-0.8
0.58	-0.8
0.58	-0.79
0.59	-0.78
0.59	-0.77
0.59	-0.76
0.59	-0.76
0.6	-0.75
0.6	-0.74
0.6	-0.73
0.61	-0.72
0.61	-0.72
0.61	-0.71
0.61	-0.7
0.62	-0.69
0.62	-0.69
0.62	-0.68
0.62	-0.67
0.63	-0.66
0.63	-0.66
0.63	-0.65
0.63	-0.64
0.64	-0.64
0.64	-0.63
0.64	-0.62
0.64	-0.62
0.65	-0.61
0.65	-0.6
0.65	-0.6
0.65	-0.59
0.65	-0.58
0.66	-0.58
0.66	-0.57

0.66	-0.56
0.66	-0.56
0.67	-0.55
0.67	-0.54
0.67	-0.54
0.67	-0.53
0.68	-0.52
0.68	-0.52
0.68	-0.51
0.68	-0.5
0.68	-0.5
0.69	-0.49
0.69	-0.49
0.69	-0.48
0.69	-0.47
0.69	-0.47
0.7	-0.46
0.7	-0.45
0.7	-0.45
0.7	-0.44
0.71	-0.44
0.71	-0.43
0.71	-0.42
0.71	-0.42
0.71	-0.41
0.72	-0.41
0.72	-0.4
0.72	-0.39
0.72	-0.39
0.72	-0.38
0.73	-0.38
0.73	-0.37
0.73	-0.36
0.73	-0.36
0.74	-0.35
0.74	-0.35
0.74	-0.34
0.74	-0.34
0.74	-0.33
0.75	-0.32
0.75	-0.32
0.75	-0.31
0.75	-0.31
0.75	-0.3
0.76	-0.29
0.76	-0.29
0.76	-0.28
0.76	-0.28
0.76	-0.27
0.77	-0.27
0.77	-0.26
0.77	-0.26
0.77	-0.25
0.77	-0.24
0.78	-0.24
0.78	-0.23
0.78	-0.23

0.78	-0.22
0.78	-0.22
0.79	-0.21
0.79	-0.2
0.79	-0.2
0.79	-0.19
0.79	-0.19
0.8	-0.18
0.8	-0.18
0.8	-0.17
0.8	-0.17
0.8	-0.16
0.81	-0.16
0.81	-0.15
0.81	-0.14
0.81	-0.14
0.81	-0.13
0.82	-0.13
0.82	-0.12
0.82	-0.12
0.82	-0.11
0.82	-0.11
0.83	-0.1
0.83	-0.09
0.83	-0.09
0.83	-0.08
0.83	-0.08
0.84	-0.07
0.84	-0.07
0.84	-0.06
0.84	-0.06
0.84	-0.05
0.85	-0.05
0.85	-0.04
0.85	-0.03
0.85	-0.03
0.85	-0.02
0.86	-0.02
0.86	-0.01
0.86	-0.01
0.86	0
0.86	0
0.87	0.01
0.87	0.01
0.87	0.02
0.87	0.02
0.87	0.03
0.88	0.04
0.88	0.04
0.88	0.05
0.88	0.05
0.88	0.06
0.89	0.06
0.89	0.07
0.89	0.07
0.89	0.08
0.89	0.08

0.9	0.09
0.9	0.1
0.9	0.1
0.9	0.11
0.9	0.11
0.91	0.12
0.91	0.12
0.91	0.13
0.91	0.13
0.91	0.14
0.92	0.14
0.92	0.15
0.92	0.16
0.92	0.16
0.92	0.17
0.93	0.17
0.93	0.18
0.93	0.18
0.93	0.19
0.94	0.19
0.94	0.2
0.94	0.21
0.94	0.21
0.94	0.22
0.95	0.22
0.95	0.23
0.95	0.23
0.95	0.24
0.95	0.24
0.96	0.25
0.96	0.26
0.96	0.26
0.96	0.27
0.96	0.27
0.97	0.28
0.97	0.28
0.97	0.29
0.97	0.3
0.98	0.3
0.98	0.31
0.98	0.31
0.98	0.32
0.98	0.32
0.99	0.33
0.99	0.33
0.99	0.34
0.99	0.35
0.99	0.35
1	0.36
1	0.36
1	0.37
1	0.38
1.01	0.38
1.01	0.39
1.01	0.39
1.01	0.4
1.01	0.4

1.02	0.41
1.02	0.42
1.02	0.42
1.02	0.43
1.03	0.43
1.03	0.44
1.03	0.45
1.03	0.45
1.03	0.46
1.04	0.46
1.04	0.47
1.04	0.48
1.04	0.48
1.05	0.49
1.05	0.49
1.05	0.5
1.05	0.51
1.06	0.51
1.06	0.52
1.06	0.52
1.06	0.53
1.06	0.54
1.07	0.54
1.07	0.55
1.07	0.55
1.07	0.56
1.08	0.57
1.08	0.57
1.08	0.58
1.08	0.59
1.09	0.59
1.09	0.6
1.09	0.6
1.09	0.61
1.1	0.62
1.1	0.62
1.1	0.63
1.1	0.64
1.11	0.64
1.11	0.65
1.11	0.66
1.11	0.66
1.12	0.67
1.12	0.67
1.12	0.68
1.12	0.69
1.13	0.69
1.13	0.7
1.13	0.71
1.13	0.71
1.14	0.72
1.14	0.73
1.14	0.73
1.15	0.74
1.15	0.75
1.15	0.75
1.15	0.76

1.16	0.77
1.16	0.78
1.16	0.78
1.16	0.79
1.17	0.8
1.17	0.8
1.17	0.81
1.18	0.82
1.18	0.82
1.18	0.83
1.18	0.84
1.19	0.85
1.19	0.85
1.19	0.86
1.2	0.87
1.2	0.87
1.2	0.88
1.2	0.89
1.21	0.9
1.21	0.9
1.21	0.91
1.22	0.92
1.22	0.93
1.22	0.93
1.22	0.94
1.23	0.95
1.23	0.96
1.23	0.96
1.24	0.97
1.24	0.98
1.24	0.99
1.25	1
1.25	1
1.25	1.01
1.26	1.02
1.26	1.03
1.26	1.03
1.27	1.04
1.27	1.05
1.27	1.06
1.28	1.07
1.28	1.08
1.28	1.08
1.29	1.09
1.29	1.1
1.29	1.11
1.3	1.12
1.3	1.13
1.3	1.13
1.31	1.14
1.31	1.15
1.31	1.16
1.32	1.17
1.32	1.18
1.32	1.19
1.33	1.2
1.33	1.2

1.34	1.21
1.34	1.22
1.34	1.23
1.35	1.24
1.35	1.25
1.35	1.26
1.36	1.27
1.36	1.28
1.37	1.29
1.37	1.3
1.37	1.31
1.38	1.32
1.38	1.33
1.39	1.34
1.39	1.35
1.39	1.36
1.4	1.37
1.4	1.38
1.41	1.39
1.41	1.4
1.42	1.41
1.42	1.42
1.43	1.43
1.43	1.44
1.43	1.45
1.44	1.46
1.44	1.47
1.45	1.48
1.45	1.49
1.46	1.51
1.46	1.52
1.47	1.53
1.47	1.54
1.48	1.55
1.48	1.56
1.49	1.57
1.49	1.59
1.5	1.6
1.5	1.61
1.51	1.62
1.51	1.64
1.52	1.65
1.52	1.66
1.53	1.67
1.53	1.69
1.54	1.7
1.55	1.71
1.55	1.73
1.56	1.74
1.56	1.75
1.57	1.77
1.58	1.78
1.58	1.79
1.59	1.81
1.59	1.82
1.6	1.84
1.61	1.85

1.61	1.87
1.62	1.88
1.63	1.9
1.63	1.91
1.64	1.93
1.65	1.95
1.65	1.96
1.66	1.98
1.67	2
1.68	2.01
1.68	2.03
1.69	2.05
1.7	2.07
1.71	2.08
1.72	2.1
1.73	2.12
1.73	2.14
1.74	2.16
1.75	2.18
1.76	2.2
1.77	2.22
1.78	2.24
1.79	2.26
1.8	2.28
1.81	2.3
1.82	2.33
1.83	2.35
1.84	2.37
1.85	2.4
1.86	2.42
1.87	2.44
1.88	2.47
1.9	2.5
1.91	2.52
1.92	2.55
1.93	2.58
1.95	2.61
1.96	2.64
1.98	2.67
1.99	2.7
2.01	2.73
2.02	2.76
2.04	2.8
2.06	2.83
2.07	2.87
2.09	2.91
2.11	2.95
2.13	2.99
2.15	3.03
2.17	3.08
2.2	3.12
2.22	3.17
2.24	3.22
2.27	3.27
2.3	3.33
2.33	3.39
2.36	3.45

2.4	3.52
2.43	3.59
2.47	3.67
2.52	3.76
2.56	3.85
2.62	3.95
2.68	4.06
2.74	4.18
2.82	4.33
2.92	4.49
3.03	4.69
3.17	4.94
3.37	5.27
3.67	5.77
4.35	6.79

Adopted Growth Factors

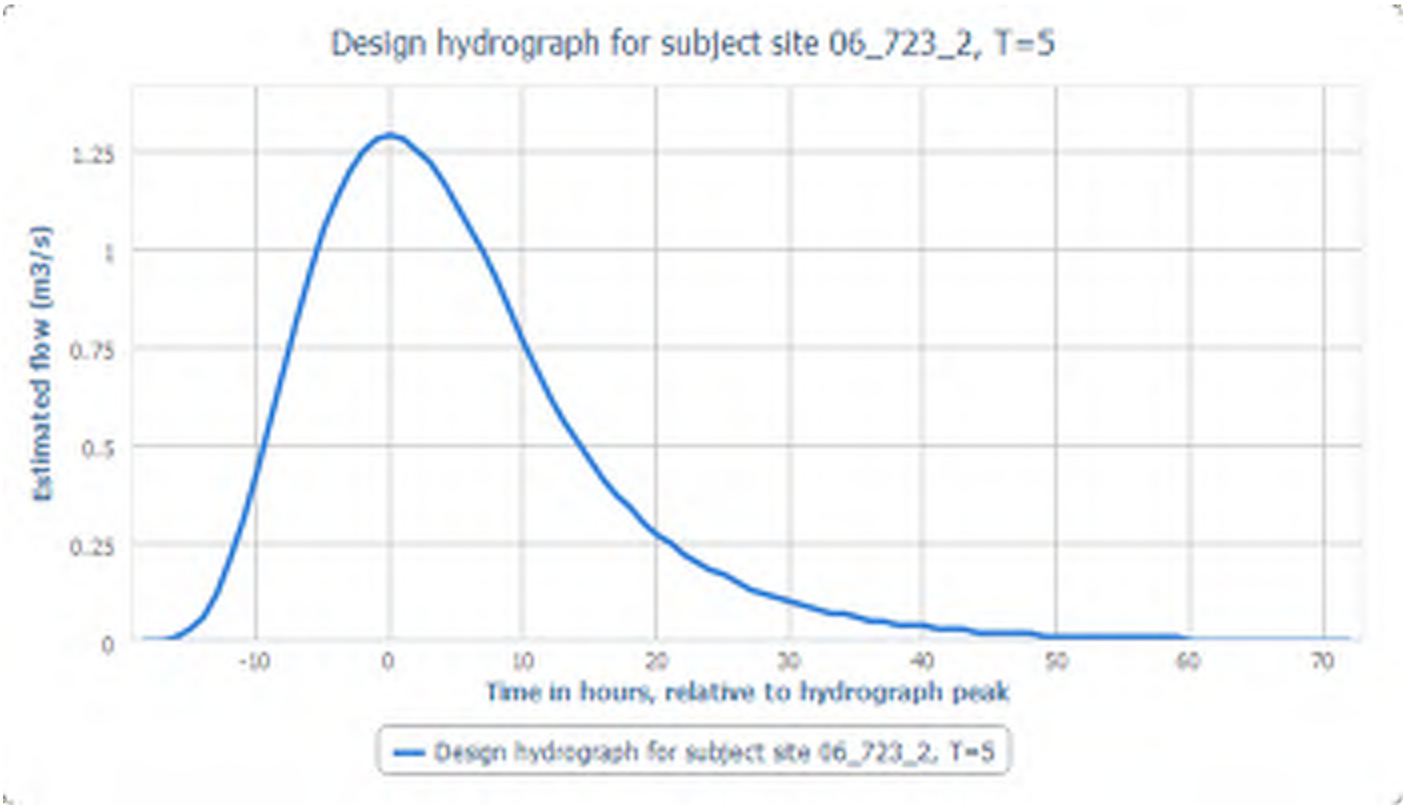
Return Period	**Growth Factor**	**Design Peak Flow (m^3/s)**
1.3	0.72	0.64
2	1	0.88
5	1.46	1.29
10	1.78	1.57
20	2.12	1.87
30	2.33	2.06
50	2.59	2.29
100	2.98	2.63
200	3.38	2.99
500	3.96	3.5
1000	4.43	3.92

Hydrograph Width Estimation Summary

Name	Value
Pivotal site	06013 "CHARLEVILLE"
Adjustment type	The user adopted the original PCD hydrograph
Transfer type	The user adjusted the subject site estimate with the pivotal site deformation factor
Deformation factor	1
Custom deformation factor	1
Accepted n	5.63098668882147
Accepted Tr	18.5298415014176
Accepted C	9.83416537858482

Hydrograph Plots

Return Period: 5

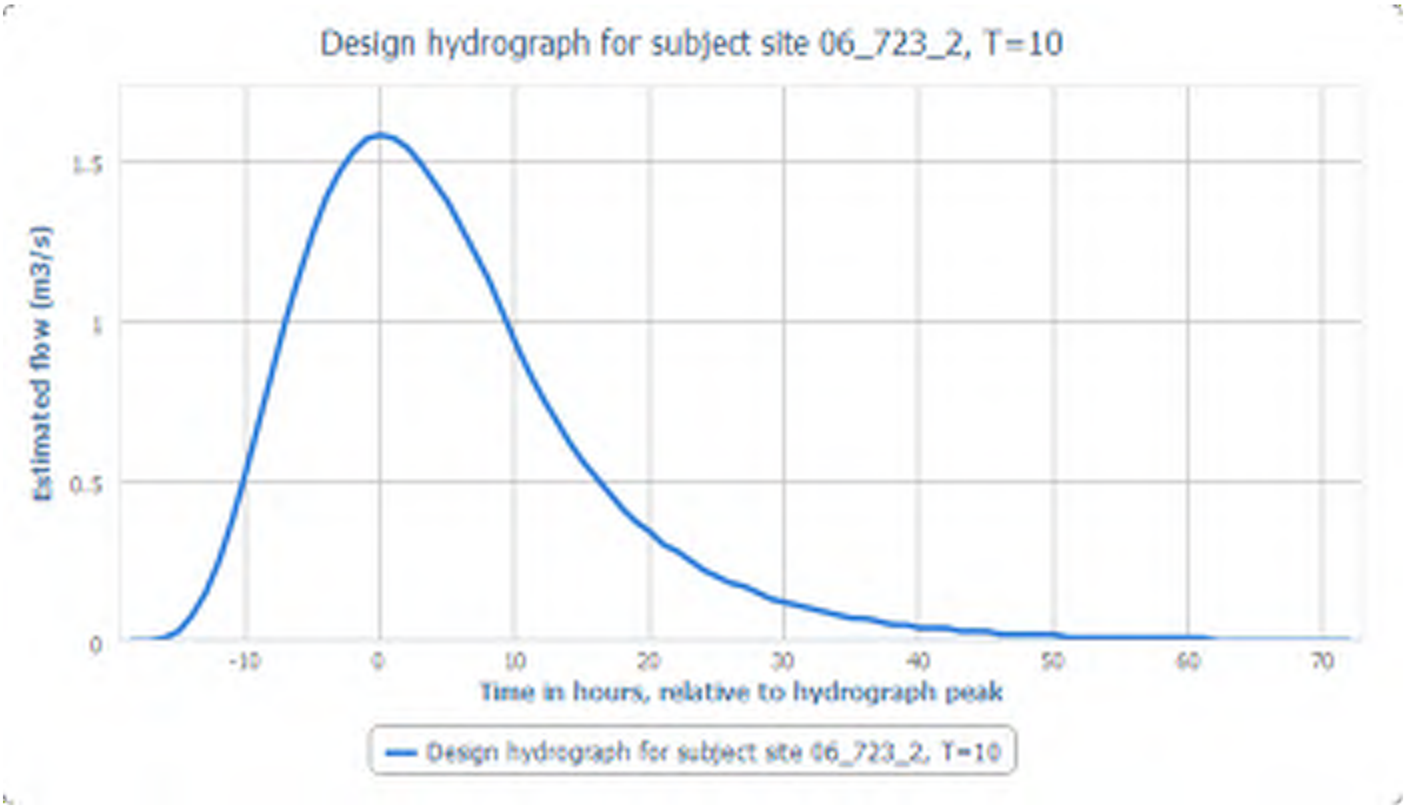


Hours relative to hydrograph peak	Estimated flow (m3/s)
-18.53	0
-18	0
-17	0
-16	0.01
-15	0.03
-14	0.06
-13	0.12
-12	0.21
-11	0.31
-10	0.43
-9	0.56
-8	0.69
-7	0.82
-6	0.94
-5	1.05
-4	1.13
-3	1.2
-2	1.25
-1	1.28
0	1.29
1	1.28
2	1.25
3	1.22
4	1.17
5	1.11
6	1.05
7	0.99
8	0.92
9	0.84

10	0.76
11	0.69
12	0.62
13	0.56
14	0.51
15	0.46
16	0.41
17	0.37
18	0.34
19	0.3
20	0.27
21	0.25
22	0.22
23	0.2
24	0.18
25	0.17
26	0.15
27	0.13
28	0.12
29	0.11
30	0.1
31	0.09
32	0.08
33	0.07
34	0.07
35	0.06
36	0.05
37	0.05
38	0.04
39	0.04
40	0.04
41	0.03
42	0.03
43	0.03
44	0.02
45	0.02
46	0.02
47	0.02
48	0.02
49	0.01
50	0.01
51	0.01
52	0.01
53	0.01
54	0.01
55	0.01
56	0.01
57	0.01
58	0.01
59	0.01
60	0
61	0
62	0
63	0
64	0
65	0
66	0

67	0
68	0
69	0
70	0
71	0
72	0

Return Period: 10

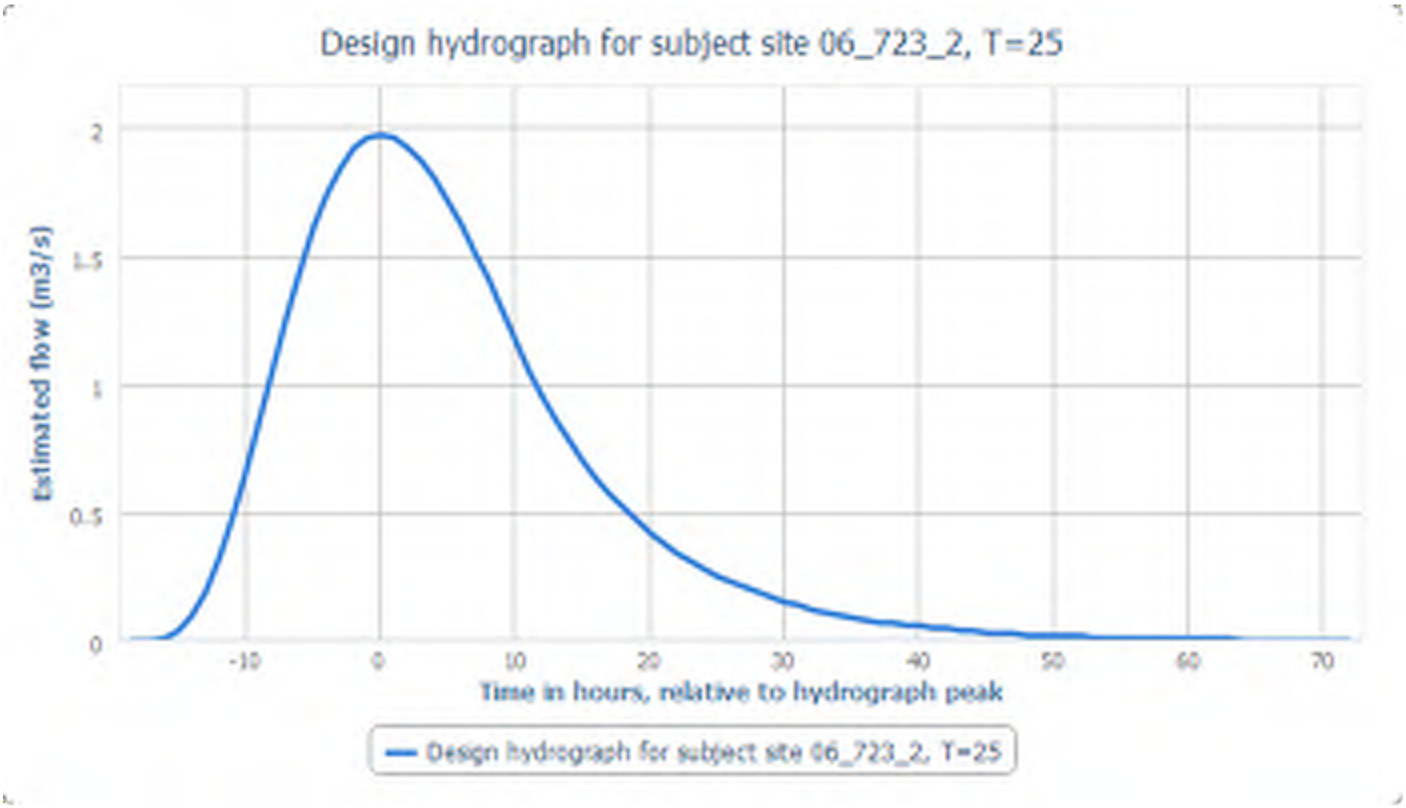


Hours relative to hydrograph peak	Estimated flow (m3/s)
-18.53	0
-18	0
-17	0
-16	0.01
-15	0.03
-14	0.08
-13	0.15
-12	0.25
-11	0.38
-10	0.53
-9	0.69
-8	0.85
-7	1.01
-6	1.15
-5	1.28
-4	1.39
-3	1.47
-2	1.53
-1	1.57
0	1.58
1	1.57
2	1.54
3	1.49
4	1.43
5	1.37
6	1.29
7	1.21
8	1.13
9	1.03
10	0.93
11	0.84

12	0.76
13	0.69
14	0.62
15	0.56
16	0.51
17	0.46
18	0.41
19	0.37
20	0.34
21	0.3
22	0.28
23	0.25
24	0.22
25	0.2
26	0.18
27	0.17
28	0.15
29	0.13
30	0.12
31	0.11
32	0.1
33	0.09
34	0.08
35	0.07
36	0.07
37	0.06
38	0.05
39	0.05
40	0.04
41	0.04
42	0.04
43	0.03
44	0.03
45	0.03
46	0.02
47	0.02
48	0.02
49	0.02
50	0.02
51	0.01
52	0.01
53	0.01
54	0.01
55	0.01
56	0.01
57	0.01
58	0.01
59	0.01
60	0.01
61	0.01
62	0
63	0
64	0
65	0
66	0
67	0
68	0

69	0
70	0
71	0
72	0

Return Period: 25

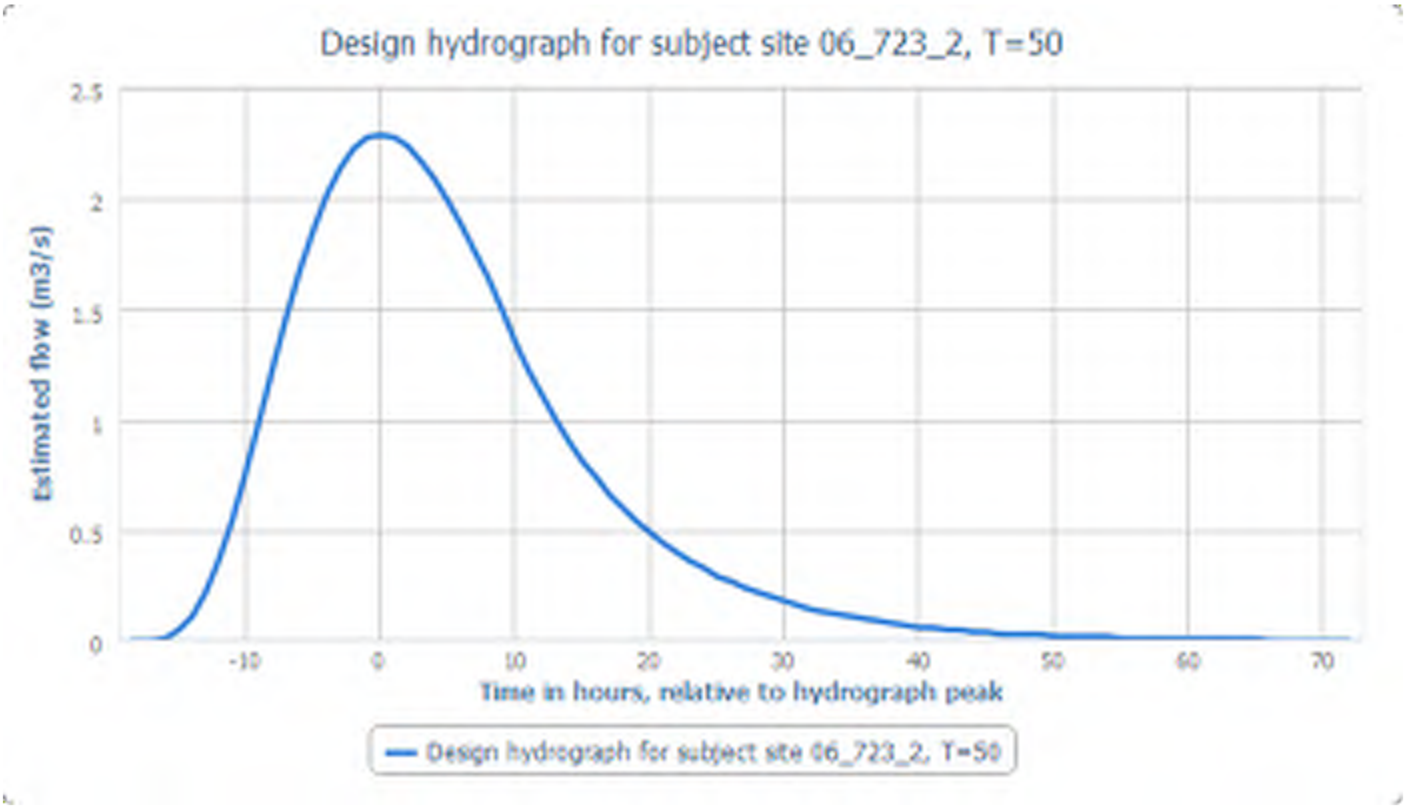


Hours relative to hydrograph peak	Estimated flow (m3/s)
-18.53	0
-18	0
-17	0
-16	0.01
-15	0.04
-14	0.1
-13	0.19
-12	0.32
-11	0.48
-10	0.66
-9	0.86
-8	1.06
-7	1.26
-6	1.44
-5	1.61
-4	1.74
-3	1.84
-2	1.92
-1	1.96
0	1.97
1	1.96
2	1.92
3	1.87
4	1.8
5	1.71
6	1.62
7	1.51
8	1.41
9	1.29
10	1.17
11	1.05

12	0.95
13	0.86
14	0.78
15	0.7
16	0.63
17	0.57
18	0.52
19	0.47
20	0.42
21	0.38
22	0.34
23	0.31
24	0.28
25	0.25
26	0.23
27	0.21
28	0.19
29	0.17
30	0.15
31	0.14
32	0.12
33	0.11
34	0.1
35	0.09
36	0.08
37	0.07
38	0.07
39	0.06
40	0.06
41	0.05
42	0.05
43	0.04
44	0.04
45	0.03
46	0.03
47	0.03
48	0.02
49	0.02
50	0.02
51	0.02
52	0.02
53	0.01
54	0.01
55	0.01
56	0.01
57	0.01
58	0.01
59	0.01
60	0.01
61	0.01
62	0.01
63	0.01
64	0
65	0
66	0
67	0
68	0

69	0
70	0
71	0
72	0

Return Period: 50

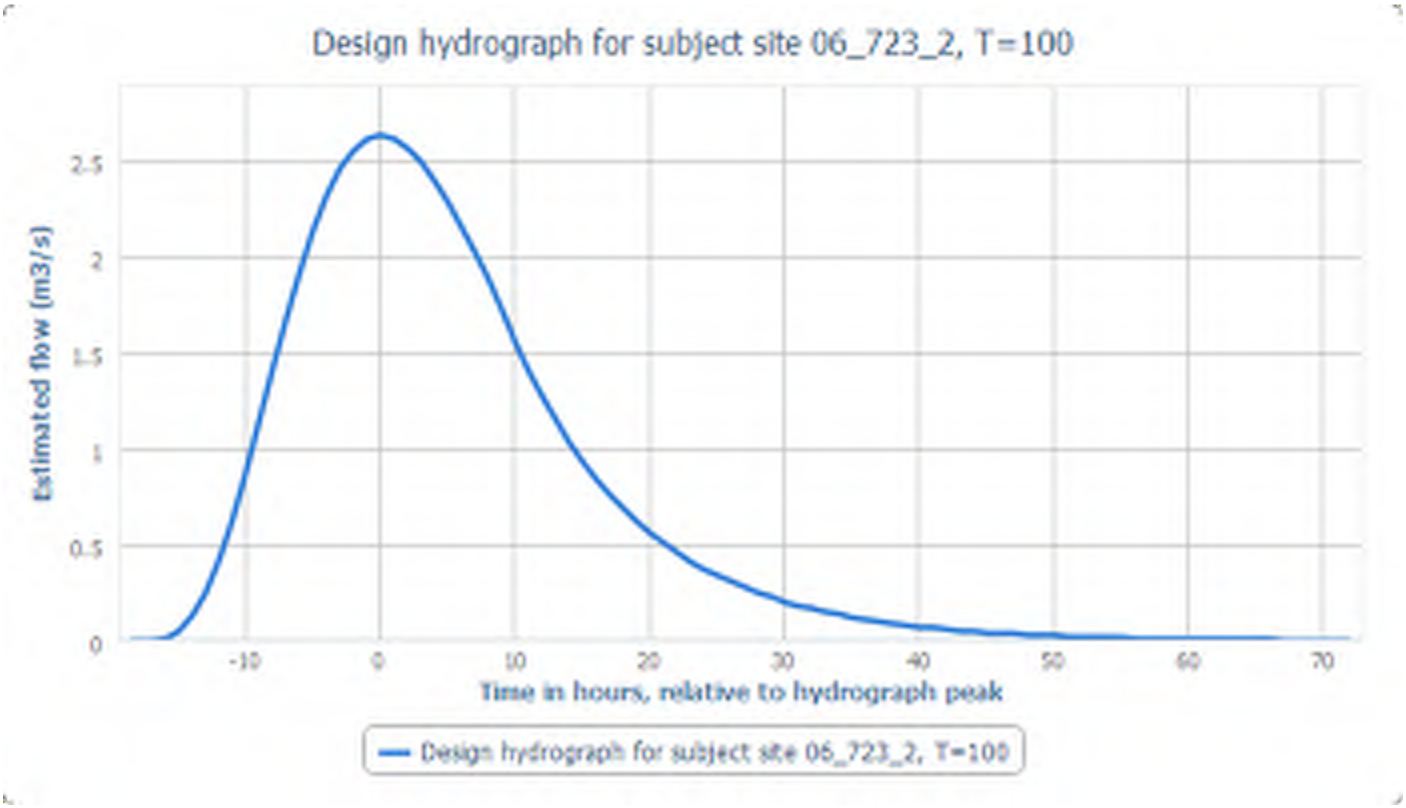


Hours relative to hydrograph peak	Estimated flow (m3/s)
-18.53	0
-18	0
-17	0
-16	0.01
-15	0.05
-14	0.11
-13	0.22
-12	0.37
-11	0.55
-10	0.77
-9	1
-8	1.24
-7	1.47
-6	1.68
-5	1.86
-4	2.02
-3	2.14
-2	2.23
-1	2.28
0	2.29
1	2.28
2	2.24
3	2.17
4	2.09
5	1.99
6	1.88
7	1.76
8	1.64
9	1.5
10	1.35
11	1.22

12	1.11
13	1
14	0.9
15	0.81
16	0.74
17	0.66
18	0.6
19	0.54
20	0.49
21	0.44
22	0.4
23	0.36
24	0.33
25	0.29
26	0.27
27	0.24
28	0.22
29	0.2
30	0.18
31	0.16
32	0.14
33	0.13
34	0.12
35	0.11
36	0.1
37	0.09
38	0.08
39	0.07
40	0.06
41	0.06
42	0.05
43	0.05
44	0.04
45	0.04
46	0.03
47	0.03
48	0.03
49	0.03
50	0.02
51	0.02
52	0.02
53	0.02
54	0.02
55	0.01
56	0.01
57	0.01
58	0.01
59	0.01
60	0.01
61	0.01
62	0.01
63	0.01
64	0.01
65	0.01
66	0
67	0
68	0

69	0
70	0
71	0
72	0

Return Period: 100

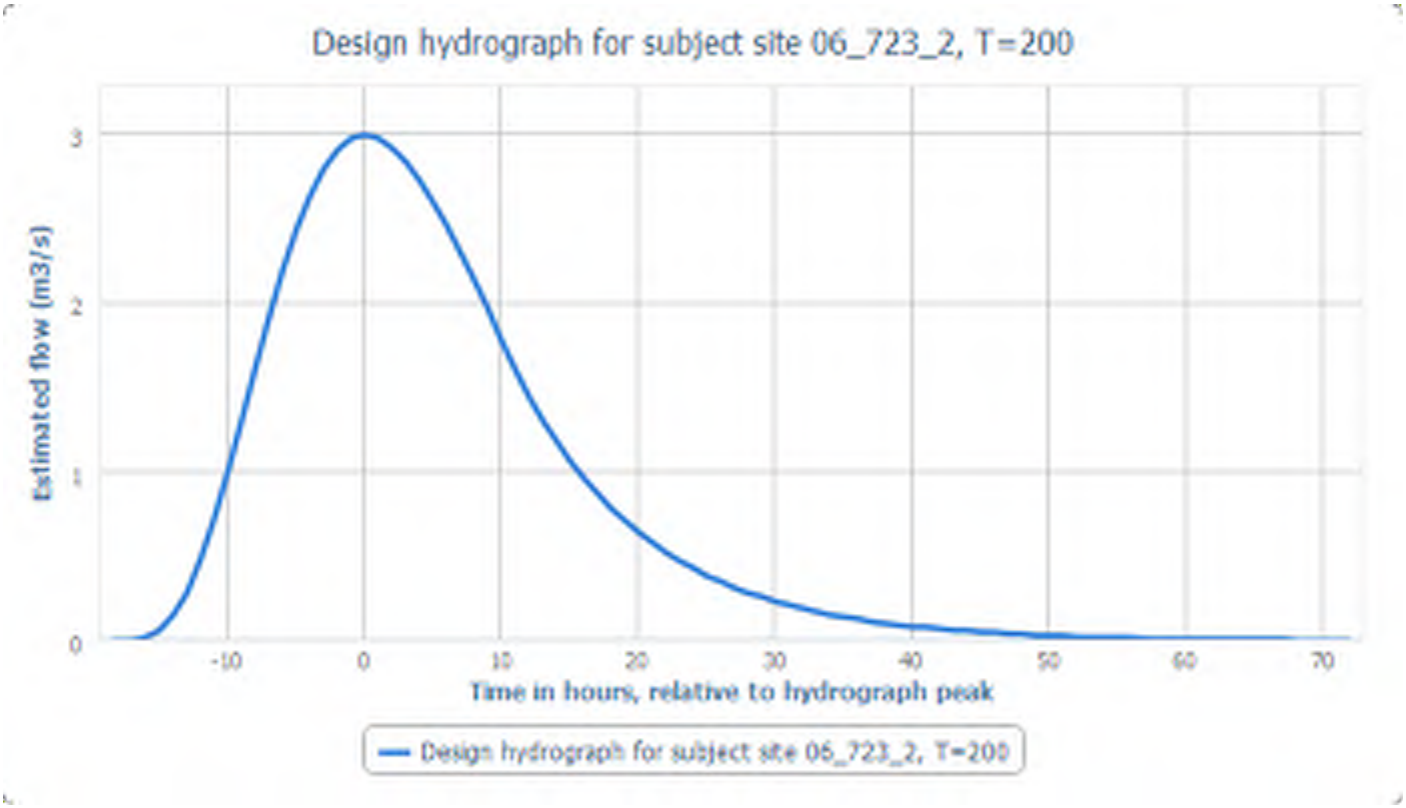


Hours relative to hydrograph peak	Estimated flow (m3/s)
-18.53	0
-18	0
-17	0
-16	0.01
-15	0.05
-14	0.13
-13	0.25
-12	0.42
-11	0.63
-10	0.88
-9	1.15
-8	1.42
-7	1.68
-6	1.92
-5	2.14
-4	2.32
-3	2.46
-2	2.55
-1	2.61
0	2.63
1	2.61
2	2.56
3	2.49
4	2.39
5	2.28
6	2.15
7	2.02
8	1.88
9	1.72
10	1.55
11	1.4

12	1.27
13	1.15
14	1.03
15	0.93
16	0.84
17	0.76
18	0.69
19	0.62
20	0.56
21	0.51
22	0.46
23	0.41
24	0.37
25	0.34
26	0.31
27	0.28
28	0.25
29	0.23
30	0.2
31	0.18
32	0.17
33	0.15
34	0.14
35	0.12
36	0.11
37	0.1
38	0.09
39	0.08
40	0.07
41	0.07
42	0.06
43	0.05
44	0.05
45	0.04
46	0.04
47	0.04
48	0.03
49	0.03
50	0.03
51	0.02
52	0.02
53	0.02
54	0.02
55	0.02
56	0.01
57	0.01
58	0.01
59	0.01
60	0.01
61	0.01
62	0.01
63	0.01
64	0.01
65	0.01
66	0.01
67	0
68	0

69	0
70	0
71	0
72	0

Return Period: 200



Hours relative to hydrograph peak	Estimated flow (m3/s)
-18.53	0
-18	0
-17	0
-16	0.02
-15	0.06
-14	0.15
-13	0.28
-12	0.48
-11	0.72
-10	1
-9	1.3
-8	1.61
-7	1.91
-6	2.19
-5	2.43
-4	2.63
-3	2.79
-2	2.9
-1	2.97
0	2.99
1	2.97
2	2.91
3	2.83
4	2.72
5	2.59
6	2.45
7	2.29
8	2.13
9	1.96
10	1.77
11	1.6

12	1.44
13	1.3
14	1.18
15	1.06
16	0.96
17	0.87
18	0.78
19	0.71
20	0.64
21	0.58
22	0.52
23	0.47
24	0.43
25	0.38
26	0.35
27	0.31
28	0.28
29	0.26
30	0.23
31	0.21
32	0.19
33	0.17
34	0.15
35	0.14
36	0.13
37	0.11
38	0.1
39	0.09
40	0.08
41	0.08
42	0.07
43	0.06
44	0.06
45	0.05
46	0.05
47	0.04
48	0.04
49	0.03
50	0.03
51	0.03
52	0.02
53	0.02
54	0.02
55	0.02
56	0.02
57	0.01
58	0.01
59	0.01
60	0.01
61	0.01
62	0.01
63	0.01
64	0.01
65	0.01
66	0.01
67	0.01
68	0

69	0
70	0
71	0
72	0

IBIDEM Plots and Tables

No IBIDEM plots were saved by the user.

Audit Trail Report #11396 (19.153 N52 Ardee Catchment D)

User ID:	warren.vokes@rod.ie
Name:	Vokes, Warren
Company:	
Address:	
Report date & time:	09-11-2020 11:50
Start of Calculation:	09-11-2020 12:21

Decisions made by the user:

Decision	User comment	System information	Date
2.1 Subject site accepted	N/A	Location 06_723_2	09-11-2020 12:23
2.2 Subject site with area < 25km2 accepted	N/A		09-11-2020 12:23
2.4 Pivotal site accepted	Reason for accepting: Pivotal site is directly downstream of subject site Reason for ignoring warnings:	Station: 06013 CHARLEVILLE The user has been notified that 61 candidates where either hydrologically or geographically closer to the subject site than the chosen pivotal site. The user has accepted to reject these sites in preference of the chosen pivotal site.	09-11-2020 12:25
2.8 QMED data transfer performed	N/A		09-11-2020 12:26

2.10 Pooling stations excluded	N/A	The following stations were excluded: Station: 09011, Atribute: urbext, Reason: Significantly different catchment parameters	09-11-2020 12:28
2.11 Pooling group accepted	N/A	Pooled group accepted with the following stations: [10022, 08005, 10021, 08002, 08012, 09002, 09035, 16051, 25034, 25040, 06031, 24022, 08009, 14009, 26022, 06033, 36031, 14007, 26058, 09010, 25023, 08003, 08008] and distribution: GEV	09-11-2020 12:28
2.13 Module 2 finalized	N/A	Finished pooled analysis with the following distribution selected: GEV.	09-11-2020 12:30
3.1 Hydrograph pivotal site rejected	Subject site rising and falling limbs are generally in agreement with parametric model	Station: 06013 CHARLEVILLE	09-11-2020 12:32
3.3 Proceeded from hydrograph display	N/A		09-11-2020 12:32
3.3 Proceeded from hydrograph display	N/A		09-11-2020 12:32
3.4 Hydrograph inspected and adjusted	N/A	The user adopted the original PCD hydrograph	09-11-2020 12:33
3.5 Hydrograph transferred to subject site	N/A	The user adjusted the subject site estimate with n = 5.63098668882147, Tr = 18.5298415014176, C = 9.83416537858482	09-11-2020 12:33

Flood Estimation Report #11397 (19.153 N52 Ardee Catchment E)

Generated 09-11-2020 11:50

Subject site

Attributes

Name	Unit	Value
Coordinate [X]		-735092.258818523
Coordinate [Y]		7143979.06261373
Distance	km	189.198528709673
Station Number		06_586_2
Location		
Water Body		
Catchment		
Hydrometric Area		
Organisation		
FSU Rating Classification		
Drainage works	year	
Contributing Catchment Area	km^2	40.466
Center Northing	m	291900
Center Easting	m	287570
Northing	m	291123
Easting	m	291933
A-Max series gap in years	year	
A-Max series number of years	year	
A-Max series number of usable years	year	
A-Max series end year	year	
A-Max series start year	year	
FARL		0.985
ALLUV		0.0317
PEAT		0
FOREST		0.0246
PASTURE		0.9508
S1085	m/km	6.58947
MSL	km	10.644
DRAIND	km/km^2	0.921
ALTBAR		61.3
NETLEN	km	37.27
T4		
T3		

SAAPE	mm	507.26
T2		
ARTDRAIN2		0.8848
ARTDRAIN		0.2211
TAYSLO		1.137436
STMFRQ		26
BFISOIL		0.697025616
SAAR	mm	855
RWSEG_CD		06_586
TOP_RWSEG		
Bankfull		
HGF	m^3/s	
MAF	m^3/s	
FAI		0.1504
FLATWET		0.61
URBEXT		0
HGF/QMED		
centroidx3857		-742029.77790173
centroidy3857		7145668.06940731
x3857		-735092.258818523
y3857		7143979.06261373

Pivotal site

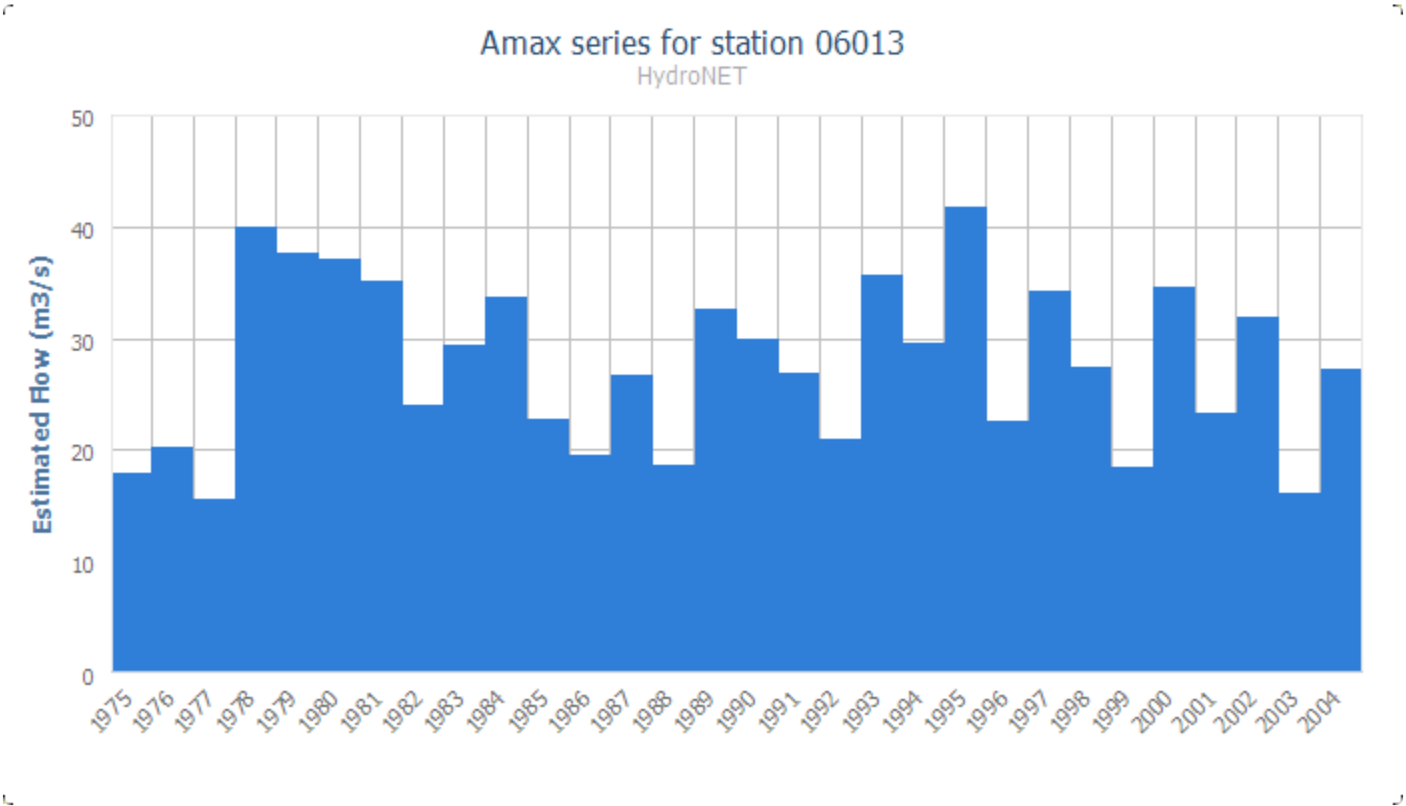
Attributes

Name	Unit	Value
Coordinate [X]		-714002.56465469
Coordinate [Y]		7142901.9394013
Station Number		06013
Location		CHARLEVILLE
Water Body		DEE
Catchment		Glyde & Dee
Hydrometric Area		6
Organisation		OPW
FSU Rating Classification		A1
Drainage works	year	1950-57
Contributing Catchment Area	km^2	309.1472
Center Northing	m	287060
Center Easting	m	287730
Northing	m	290750
Easting	m	304411
A-Max series gap in years	year	0
A-Max series number of years	year	30
A-Max series number of usable years	year	30
A-Max series end year	year	2004
A-Max series start year	year	1975
FARL		0.971
ALLUV		0.0523
PEAT		0.0001
FOREST		0.0244
PASTURE		0
S1085	m/km	2.58328
MSL	km	53.967
DRAIND	km/km^2	1.117
ALTBAR		0
NETLEN	km	345.391
T4		0.01187019679232
T3		0.019151845261223
SAAPE	mm	506.39
T2		0.15721341210169
ARTDRAIN2		0.782
ARTDRAIN		0.1688
TAYSLO		0.205344
STMFRQ		275
BFISOIL		0.6165
SAAR	mm	873.08
RWSEG_CD		06_49
TOP_RWSEG		06_804
Bankfull		1.62 from survey
HGF	m^3/s	36
MAF	m^3/s	28.2
FAI		0.16
FLATWET		0.6
URBEXT		0.009
HGF/QMED		1.3153087321885
x3857		-714002.56465469
y3857		7142901.9394013

centroidx3857		-742512.229174255
centroidy3857		7139058.32890722
Distance	km	6.62732440045657

Map

Amax Series Chart



QMED Estimates

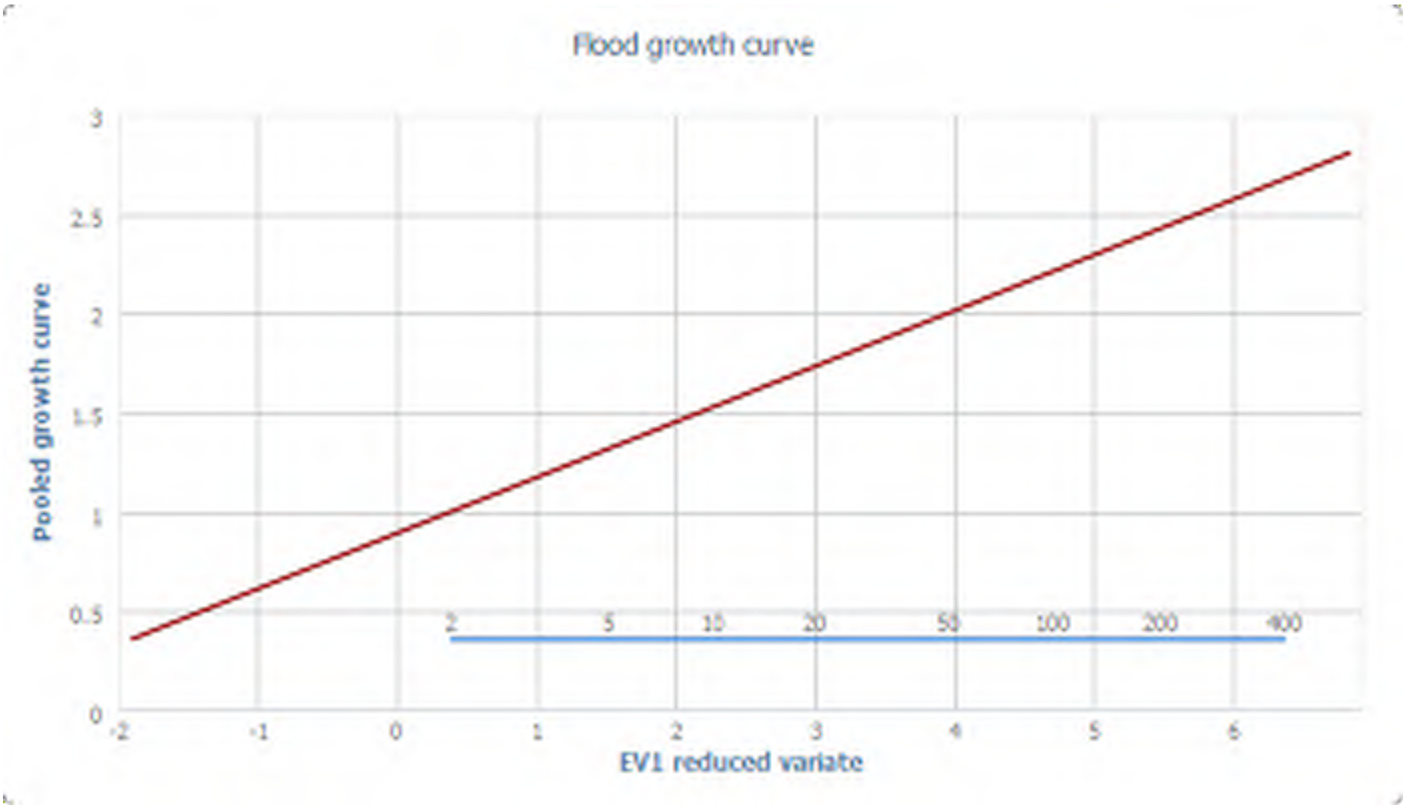
Subject rural QMED	6.44
Subject urban QMED	6.44
Pivotal gauged QMED	27.36
Pivotal adjustment factor QMED	0.64
Subject adjusted QMED	**4.11**

Pooling Group

Station	**Amax years**
16051 CLOBANNA	13
14009 CUSHINA	25
10021 COMMONS ROAD	24
09002 LUCAN	25
08002 NAUL	21
26058 BALLINRINK BR.	24
25040 ROSCREA	19
14007 DERRYBROCK	24
25023 MILLTOWN	33
26022 KILMORE	33

14013 BALLINACARRIG	49
07001 TREMBLESTOWN	18
06031 CURRALHIR	18
10022 CARRICKMINES	17
25025 BALLYHOONEY	31
06026 ACLINT	46
16001 ATHLUMMON	33
13002 FOULKS MILL	19
07003 CASTLERICKARD	46

Selected Flood Growth Curve



Pooled growth curve	EV1 reduced variate
0.36	-1.92
0.41	-1.76
0.43	-1.67
0.45	-1.61
0.46	-1.55
0.47	-1.51
0.48	-1.47
0.49	-1.44
0.5	-1.41
0.51	-1.38
0.52	-1.36
0.52	-1.34
0.53	-1.31
0.54	-1.29
0.54	-1.27
0.55	-1.25
0.55	-1.24
0.56	-1.22
0.56	-1.2
0.57	-1.19
0.57	-1.17
0.57	-1.16
0.58	-1.14
0.58	-1.13
0.59	-1.11
0.59	-1.1
0.59	-1.09
0.6	-1.08
0.6	-1.06

0.6	-1.05
0.61	-1.04
0.61	-1.03
0.61	-1.02
0.62	-1.01
0.62	-1
0.62	-0.99
0.62	-0.98
0.63	-0.96
0.63	-0.95
0.63	-0.94
0.64	-0.94
0.64	-0.93
0.64	-0.92
0.64	-0.91
0.65	-0.9
0.65	-0.89
0.65	-0.88
0.65	-0.87
0.66	-0.86
0.66	-0.85
0.66	-0.84
0.66	-0.84
0.67	-0.83
0.67	-0.82
0.67	-0.81
0.67	-0.8
0.67	-0.8
0.68	-0.79
0.68	-0.78
0.68	-0.77
0.68	-0.76
0.69	-0.76
0.69	-0.75
0.69	-0.74
0.69	-0.73
0.69	-0.73
0.7	-0.72
0.7	-0.71
0.7	-0.7
0.7	-0.7
0.7	-0.69
0.71	-0.68
0.71	-0.68
0.71	-0.67
0.71	-0.66
0.71	-0.66
0.72	-0.65
0.72	-0.64
0.72	-0.63
0.72	-0.63
0.72	-0.62
0.73	-0.61
0.73	-0.61
0.73	-0.6
0.73	-0.59
0.73	-0.59

0.73	-0.58
0.74	-0.58
0.74	-0.57
0.74	-0.56
0.74	-0.56
0.74	-0.55
0.75	-0.54
0.75	-0.54
0.75	-0.53
0.75	-0.52
0.75	-0.52
0.75	-0.51
0.76	-0.51
0.76	-0.5
0.76	-0.49
0.76	-0.49
0.76	-0.48
0.76	-0.48
0.77	-0.47
0.77	-0.46
0.77	-0.46
0.77	-0.45
0.77	-0.45
0.77	-0.44
0.78	-0.43
0.78	-0.43
0.78	-0.42
0.78	-0.42
0.78	-0.41
0.78	-0.41
0.79	-0.4
0.79	-0.39
0.79	-0.39
0.79	-0.38
0.79	-0.38
0.79	-0.37
0.79	-0.37
0.8	-0.36
0.8	-0.35
0.8	-0.35
0.8	-0.34
0.8	-0.34
0.8	-0.33
0.81	-0.33
0.81	-0.32
0.81	-0.32
0.81	-0.31
0.81	-0.3
0.81	-0.3
0.82	-0.29
0.82	-0.29
0.82	-0.28
0.82	-0.28
0.82	-0.27
0.82	-0.27
0.82	-0.26
0.83	-0.25

0.83	-0.25
0.83	-0.24
0.83	-0.24
0.83	-0.23
0.83	-0.23
0.84	-0.22
0.84	-0.22
0.84	-0.21
0.84	-0.21
0.84	-0.2
0.84	-0.2
0.84	-0.19
0.85	-0.18
0.85	-0.18
0.85	-0.17
0.85	-0.17
0.85	-0.16
0.85	-0.16
0.85	-0.15
0.86	-0.15
0.86	-0.14
0.86	-0.14
0.86	-0.13
0.86	-0.13
0.86	-0.12
0.86	-0.12
0.87	-0.11
0.87	-0.11
0.87	-0.1
0.87	-0.09
0.87	-0.09
0.87	-0.08
0.88	-0.08
0.88	-0.07
0.88	-0.07
0.88	-0.06
0.88	-0.06
0.88	-0.05
0.88	-0.05
0.89	-0.04
0.89	-0.04
0.89	-0.03
0.89	-0.03
0.89	-0.02
0.89	-0.02
0.89	-0.01
0.9	-0.01
0.9	0
0.9	0.01
0.9	0.01
0.9	0.02
0.9	0.02
0.9	0.03
0.91	0.03
0.91	0.04
0.91	0.04
0.91	0.05

0.91	0.05
0.91	0.06
0.91	0.06
0.92	0.07
0.92	0.07
0.92	0.08
0.92	0.08
0.92	0.09
0.92	0.09
0.93	0.1
0.93	0.1
0.93	0.11
0.93	0.12
0.93	0.12
0.93	0.13
0.93	0.13
0.94	0.14
0.94	0.14
0.94	0.15
0.94	0.15
0.94	0.16
0.94	0.16
0.94	0.17
0.95	0.17
0.95	0.18
0.95	0.18
0.95	0.19
0.95	0.2
0.95	0.2
0.95	0.21
0.96	0.21
0.96	0.22
0.96	0.22
0.96	0.23
0.96	0.23
0.96	0.24
0.97	0.24
0.97	0.25
0.97	0.25
0.97	0.26
0.97	0.26
0.97	0.27
0.97	0.28
0.98	0.28
0.98	0.29
0.98	0.29
0.98	0.3
0.98	0.3
0.98	0.31
0.99	0.31
0.99	0.32
0.99	0.33
0.99	0.33
0.99	0.34
0.99	0.34
0.99	0.35
1	0.35

1	0.36
1	0.36
1	0.37
1	0.37
1	0.38
1.01	0.39
1.01	0.39
1.01	0.4
1.01	0.4
1.01	0.41
1.01	0.41
1.01	0.42
1.02	0.43
1.02	0.43
1.02	0.44
1.02	0.44
1.02	0.45
1.02	0.45
1.03	0.46
1.03	0.47
1.03	0.47
1.03	0.48
1.03	0.48
1.03	0.49
1.04	0.49
1.04	0.5
1.04	0.51
1.04	0.51
1.04	0.52
1.04	0.52
1.05	0.53
1.05	0.54
1.05	0.54
1.05	0.55
1.05	0.55
1.05	0.56
1.06	0.57
1.06	0.57
1.06	0.58
1.06	0.58
1.06	0.59
1.06	0.6
1.07	0.6
1.07	0.61
1.07	0.61
1.07	0.62
1.07	0.63
1.07	0.63
1.08	0.64
1.08	0.64
1.08	0.65
1.08	0.66
1.08	0.66
1.08	0.67
1.09	0.68
1.09	0.68
1.09	0.69

1.09	0.7
1.09	0.7
1.1	0.71
1.1	0.71
1.1	0.72
1.1	0.73
1.1	0.73
1.1	0.74
1.11	0.75
1.11	0.75
1.11	0.76
1.11	0.77
1.11	0.77
1.12	0.78
1.12	0.79
1.12	0.79
1.12	0.8
1.12	0.81
1.13	0.81
1.13	0.82
1.13	0.83
1.13	0.83
1.13	0.84
1.13	0.85
1.14	0.85
1.14	0.86
1.14	0.87
1.14	0.88
1.14	0.88
1.15	0.89
1.15	0.9
1.15	0.9
1.15	0.91
1.15	0.92
1.16	0.93
1.16	0.93
1.16	0.94
1.16	0.95
1.16	0.95
1.17	0.96
1.17	0.97
1.17	0.98
1.17	0.98
1.18	0.99
1.18	1
1.18	1.01
1.18	1.01
1.18	1.02
1.19	1.03
1.19	1.04
1.19	1.05
1.19	1.05
1.19	1.06
1.2	1.07
1.2	1.08
1.2	1.09
1.2	1.09

1.21	1.1
1.21	1.11
1.21	1.12
1.21	1.13
1.21	1.13
1.22	1.14
1.22	1.15
1.22	1.16
1.22	1.17
1.23	1.18
1.23	1.18
1.23	1.19
1.23	1.2
1.24	1.21
1.24	1.22
1.24	1.23
1.24	1.24
1.25	1.25
1.25	1.25
1.25	1.26
1.25	1.27
1.26	1.28
1.26	1.29
1.26	1.3
1.26	1.31
1.27	1.32
1.27	1.33
1.27	1.34
1.27	1.35
1.28	1.36
1.28	1.37
1.28	1.38
1.29	1.39
1.29	1.4
1.29	1.41
1.29	1.42
1.3	1.43
1.3	1.44
1.3	1.45
1.31	1.46
1.31	1.47
1.31	1.48
1.31	1.49
1.32	1.5
1.32	1.51
1.32	1.52
1.33	1.53
1.33	1.54
1.33	1.56
1.34	1.57
1.34	1.58
1.34	1.59
1.35	1.6
1.35	1.61
1.35	1.63
1.36	1.64
1.36	1.65

1.36	1.66
1.37	1.67
1.37	1.69
1.37	1.7
1.38	1.71
1.38	1.72
1.38	1.74
1.39	1.75
1.39	1.76
1.4	1.78
1.4	1.79
1.4	1.81
1.41	1.82
1.41	1.83
1.41	1.85
1.42	1.86
1.42	1.88
1.43	1.89
1.43	1.91
1.44	1.92
1.44	1.94
1.44	1.95
1.45	1.97
1.45	1.98
1.46	2
1.46	2.02
1.47	2.03
1.47	2.05
1.48	2.07
1.48	2.09
1.49	2.1
1.49	2.12
1.5	2.14
1.5	2.16
1.51	2.18
1.51	2.2
1.52	2.22
1.52	2.24
1.53	2.26
1.53	2.28
1.54	2.3
1.55	2.32
1.55	2.34
1.56	2.36
1.57	2.39
1.57	2.41
1.58	2.43
1.59	2.46
1.59	2.48
1.6	2.51
1.61	2.53
1.61	2.56
1.62	2.59
1.63	2.61
1.64	2.64
1.65	2.67
1.65	2.7

1.66	2.73
1.67	2.77
1.68	2.8
1.69	2.83
1.7	2.87
1.71	2.91
1.72	2.94
1.73	2.98
1.74	3.02
1.76	3.07
1.77	3.11
1.78	3.16
1.8	3.21
1.81	3.26
1.82	3.31
1.84	3.37
1.86	3.43
1.87	3.49
1.89	3.56
1.91	3.63
1.94	3.71
1.96	3.79
1.98	3.88
2.01	3.98
2.04	4.09
2.08	4.22
2.12	4.36
2.17	4.53
2.22	4.73
2.29	4.98
2.38	5.31
2.52	5.8
2.81	6.83

Adopted Growth Factors

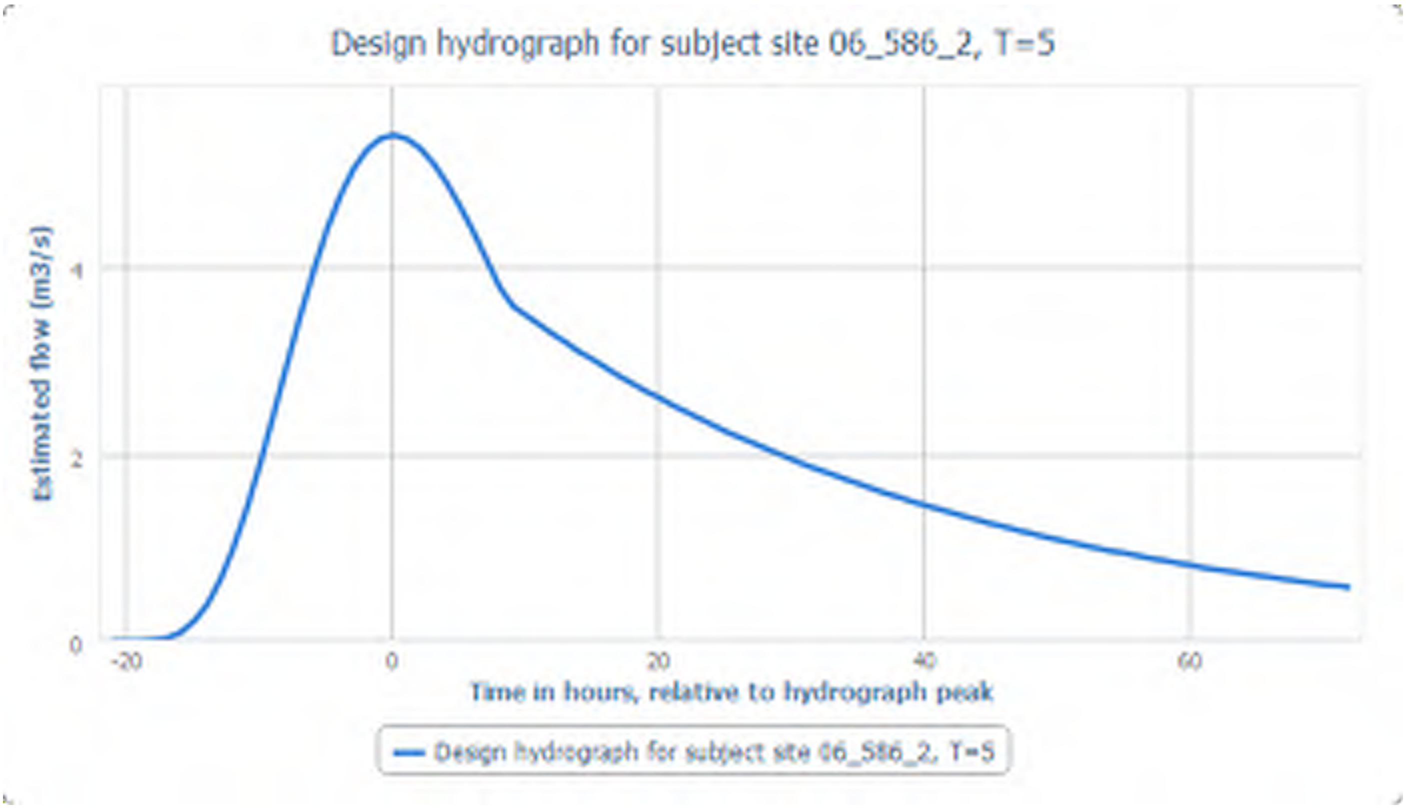
Return Period	Growth Factor	Design Peak Flow (m^3/s)
1.3	0.79	3.24
2	1	4.11
5	1.32	5.42
10	1.53	6.28
20	1.73	7.1
30	1.84	7.55
50	1.99	8.17
100	2.19	8.99
200	2.38	9.77
500	2.64	10.84
1000	2.83	11.62

Hydrograph Width Estimation Summary

Name	Value
Pivotal site	25014 "MILLBROOK"
Adjustment type	The user adopted the original PCD hydrograph
Transfer type	The user adjusted the subject site estimate with the pivotal site deformation factor
Deformation factor	1
Custom deformation factor	1
Accepted n	7.26695762596078
Accepted Tr	21.2204124967609
Accepted C	34.2624691275923

Hydrograph Plots

Return Period: 5

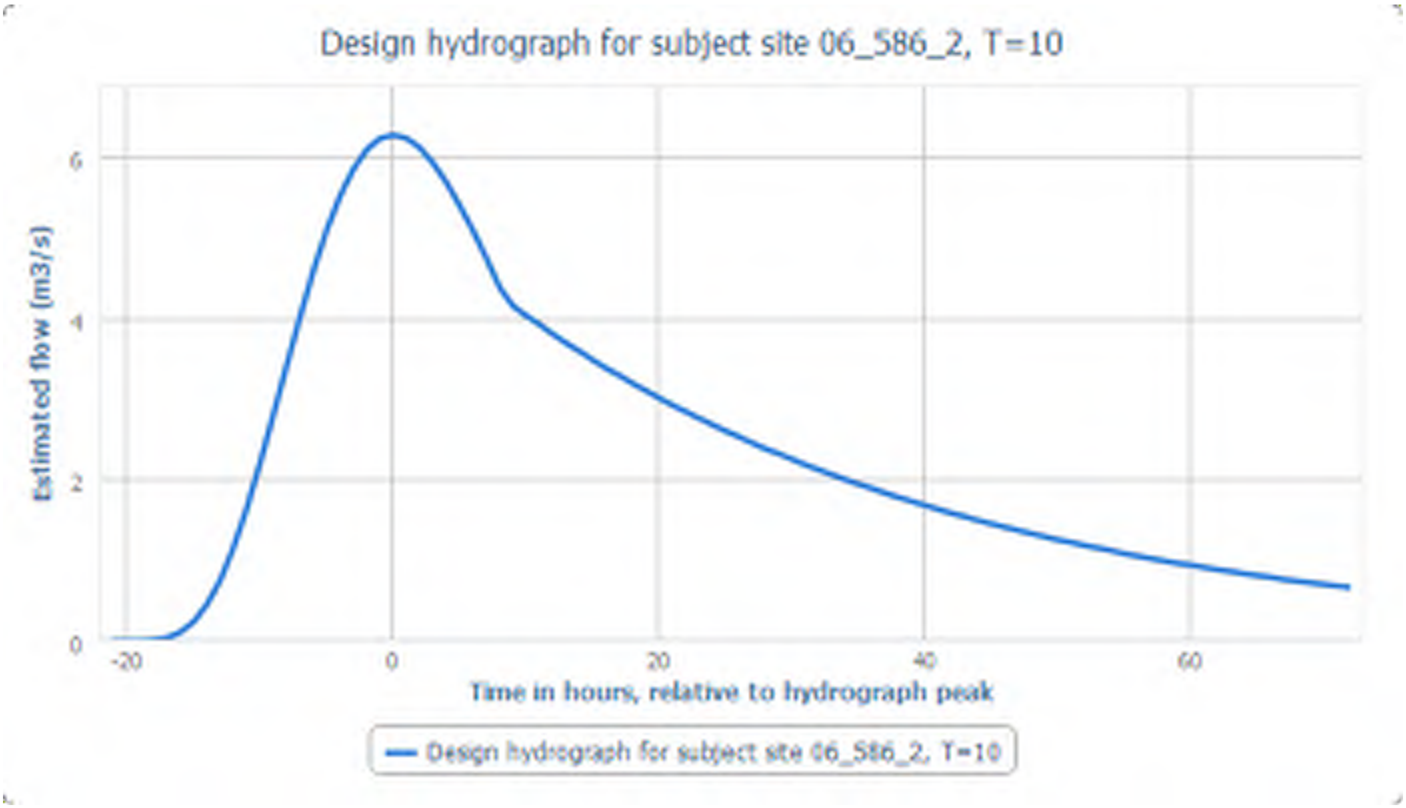


Hours relative to hydrograph peak	Estimated flow (m3/s)
-21.22	0
-21	0
-20	0
-19	0
-18	0.01
-17	0.03
-16	0.09
-15	0.21
-14	0.39
-13	0.66
-12	1.01
-11	1.43
-10	1.91
-9	2.43
-8	2.96
-7	3.48
-6	3.96
-5	4.4
-4	4.76
-3	5.05
-2	5.25
-1	5.37
0	5.41
1	5.37
2	5.27
3	5.11
4	4.9
5	4.65
6	4.38

7	4.08
8	3.78
9	3.58
10	3.48
11	3.38
12	3.28
13	3.19
14	3.09
15	3.01
16	2.92
17	2.83
18	2.75
19	2.67
20	2.6
21	2.52
22	2.45
23	2.38
24	2.31
25	2.24
26	2.18
27	2.12
28	2.06
29	2
30	1.94
31	1.88
32	1.83
33	1.78
34	1.73
35	1.68
36	1.63
37	1.58
38	1.54
39	1.49
40	1.45
41	1.41
42	1.37
43	1.33
44	1.29
45	1.25
46	1.22
47	1.18
48	1.15
49	1.11
50	1.08
51	1.05
52	1.02
53	0.99
54	0.96
55	0.94
56	0.91
57	0.88
58	0.86
59	0.83
60	0.81
61	0.78
62	0.76
63	0.74

64	0.72
65	0.7
66	0.68
67	0.66
68	0.64
69	0.62
70	0.6
71	0.59
72	0.57

Return Period: 10

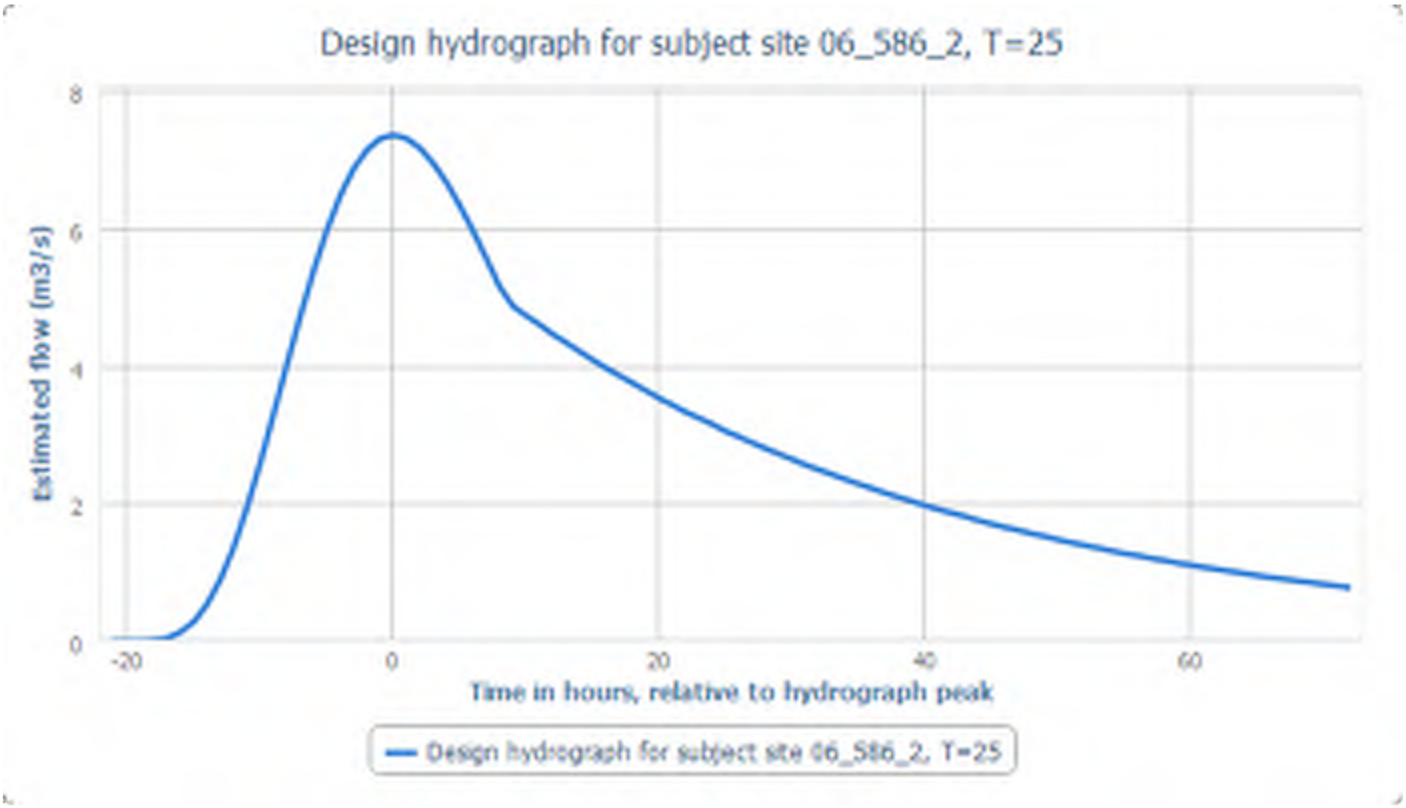


Hours relative to hydrograph peak	Estimated flow (m3/s)
-21.22	0
-21	0
-20	0
-19	0
-18	0.01
-17	0.04
-16	0.11
-15	0.24
-14	0.46
-13	0.76
-12	1.17
-11	1.66
-10	2.22
-9	2.82
-8	3.43
-7	4.03
-6	4.6
-5	5.1
-4	5.52
-3	5.85
-2	6.09
-1	6.23
0	6.27
1	6.23
2	6.11
3	5.92
4	5.68
5	5.39
6	5.08
7	4.74
8	4.38

9	4.15
10	4.03
11	3.92
12	3.8
13	3.69
14	3.59
15	3.48
16	3.38
17	3.29
18	3.19
19	3.1
20	3.01
21	2.92
22	2.84
23	2.76
24	2.68
25	2.6
26	2.53
27	2.45
28	2.38
29	2.32
30	2.25
31	2.18
32	2.12
33	2.06
34	2
35	1.94
36	1.89
37	1.83
38	1.78
39	1.73
40	1.68
41	1.63
42	1.58
43	1.54
44	1.49
45	1.45
46	1.41
47	1.37
48	1.33
49	1.29
50	1.25
51	1.22
52	1.18
53	1.15
54	1.12
55	1.08
56	1.05
57	1.02
58	0.99
59	0.96
60	0.94
61	0.91
62	0.88
63	0.86
64	0.83
65	0.81

66	0.79
67	0.76
68	0.74
69	0.72
70	0.7
71	0.68
72	0.66

Return Period: 25

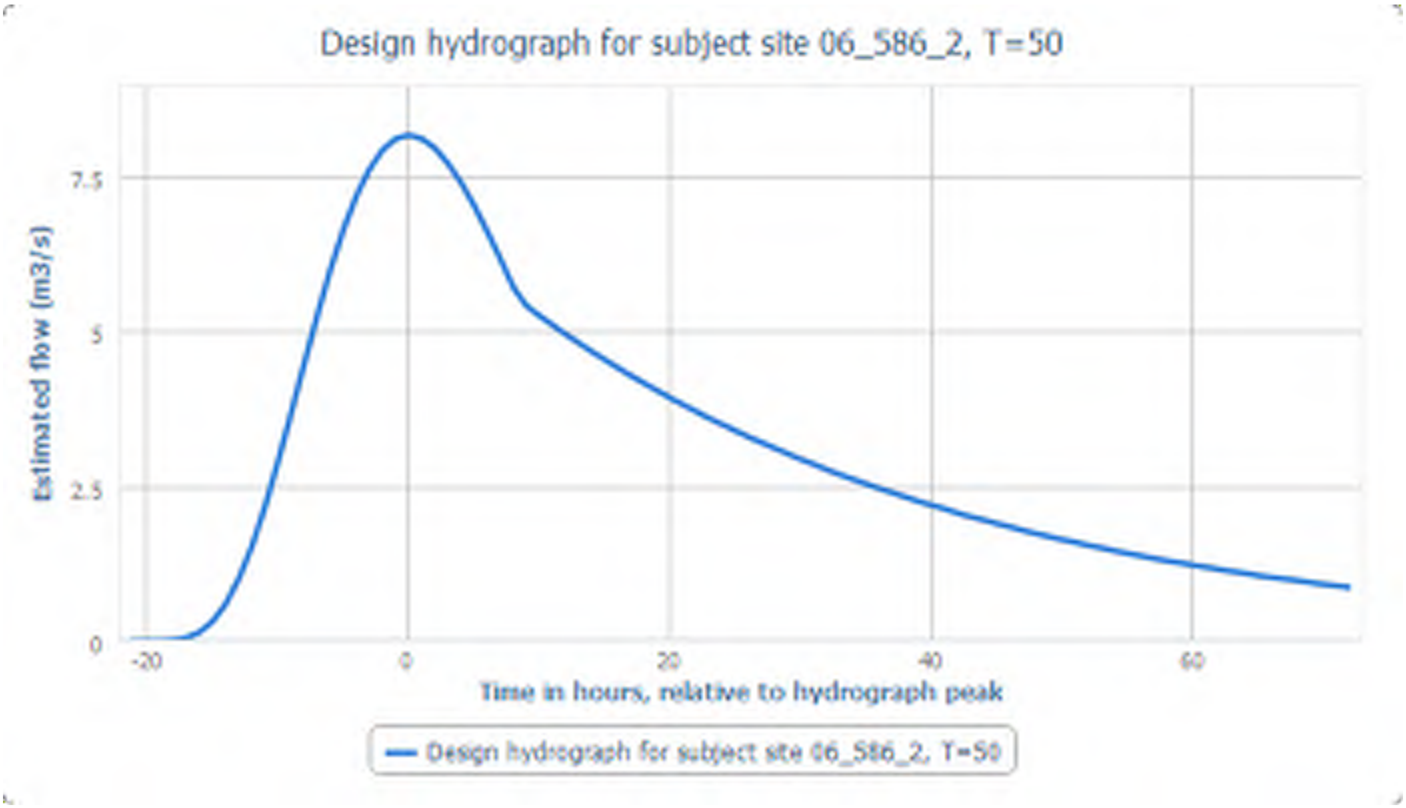


Hours relative to hydrograph peak	Estimated flow (m3/s)
-21.22	0
-21	0
-20	0
-19	0
-18	0.01
-17	0.04
-16	0.13
-15	0.28
-14	0.54
-13	0.9
-12	1.37
-11	1.95
-10	2.6
-9	3.31
-8	4.03
-7	4.73
-6	5.39
-5	5.98
-4	6.48
-3	6.87
-2	7.14
-1	7.31
0	7.36
1	7.31
2	7.17
3	6.95
4	6.67
5	6.33
6	5.96
7	5.56
8	5.15

9	4.87
10	4.73
11	4.6
12	4.46
13	4.34
14	4.21
15	4.09
16	3.97
17	3.86
18	3.75
19	3.64
20	3.53
21	3.43
22	3.33
23	3.24
24	3.15
25	3.05
26	2.97
27	2.88
28	2.8
29	2.72
30	2.64
31	2.56
32	2.49
33	2.42
34	2.35
35	2.28
36	2.22
37	2.15
38	2.09
39	2.03
40	1.97
41	1.91
42	1.86
43	1.81
44	1.75
45	1.7
46	1.65
47	1.61
48	1.56
49	1.52
50	1.47
51	1.43
52	1.39
53	1.35
54	1.31
55	1.27
56	1.24
57	1.2
58	1.17
59	1.13
60	1.1
61	1.07
62	1.04
63	1.01
64	0.98
65	0.95

66	0.92
67	0.9
68	0.87
69	0.85
70	0.82
71	0.8
72	0.77

Return Period: 50

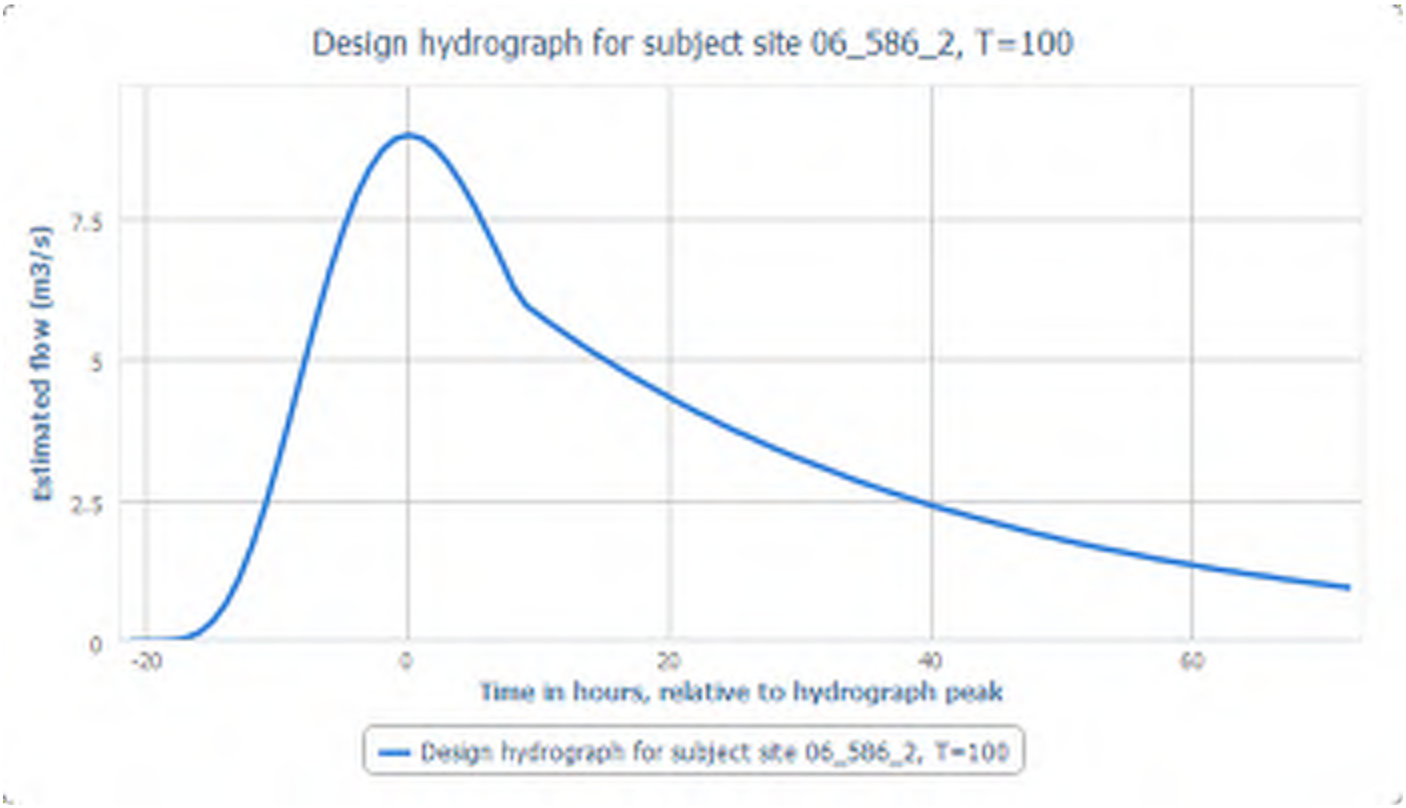


Hours relative to hydrograph peak	Estimated flow (m3/s)
-21.22	0
-21	0
-20	0
-19	0
-18	0.01
-17	0.05
-16	0.14
-15	0.31
-14	0.59
-13	1
-12	1.52
-11	2.16
-10	2.89
-9	3.67
-8	4.47
-7	5.25
-6	5.99
-5	6.64
-4	7.19
-3	7.62
-2	7.93
-1	8.11
0	8.17
1	8.11
2	7.96
3	7.71
4	7.4
5	7.03
6	6.61
7	6.17
8	5.71

9	5.41
10	5.25
11	5.1
12	4.95
13	4.81
14	4.67
15	4.54
16	4.41
17	4.28
18	4.16
19	4.04
20	3.92
21	3.81
22	3.7
23	3.59
24	3.49
25	3.39
26	3.29
27	3.2
28	3.11
29	3.02
30	2.93
31	2.85
32	2.76
33	2.68
34	2.61
35	2.53
36	2.46
37	2.39
38	2.32
39	2.25
40	2.19
41	2.13
42	2.06
43	2
44	1.95
45	1.89
46	1.84
47	1.78
48	1.73
49	1.68
50	1.63
51	1.59
52	1.54
53	1.5
54	1.45
55	1.41
56	1.37
57	1.33
58	1.29
59	1.26
60	1.22
61	1.19
62	1.15
63	1.12
64	1.09
65	1.05

66	1.02
67	1
68	0.97
69	0.94
70	0.91
71	0.89
72	0.86

Return Period: 100

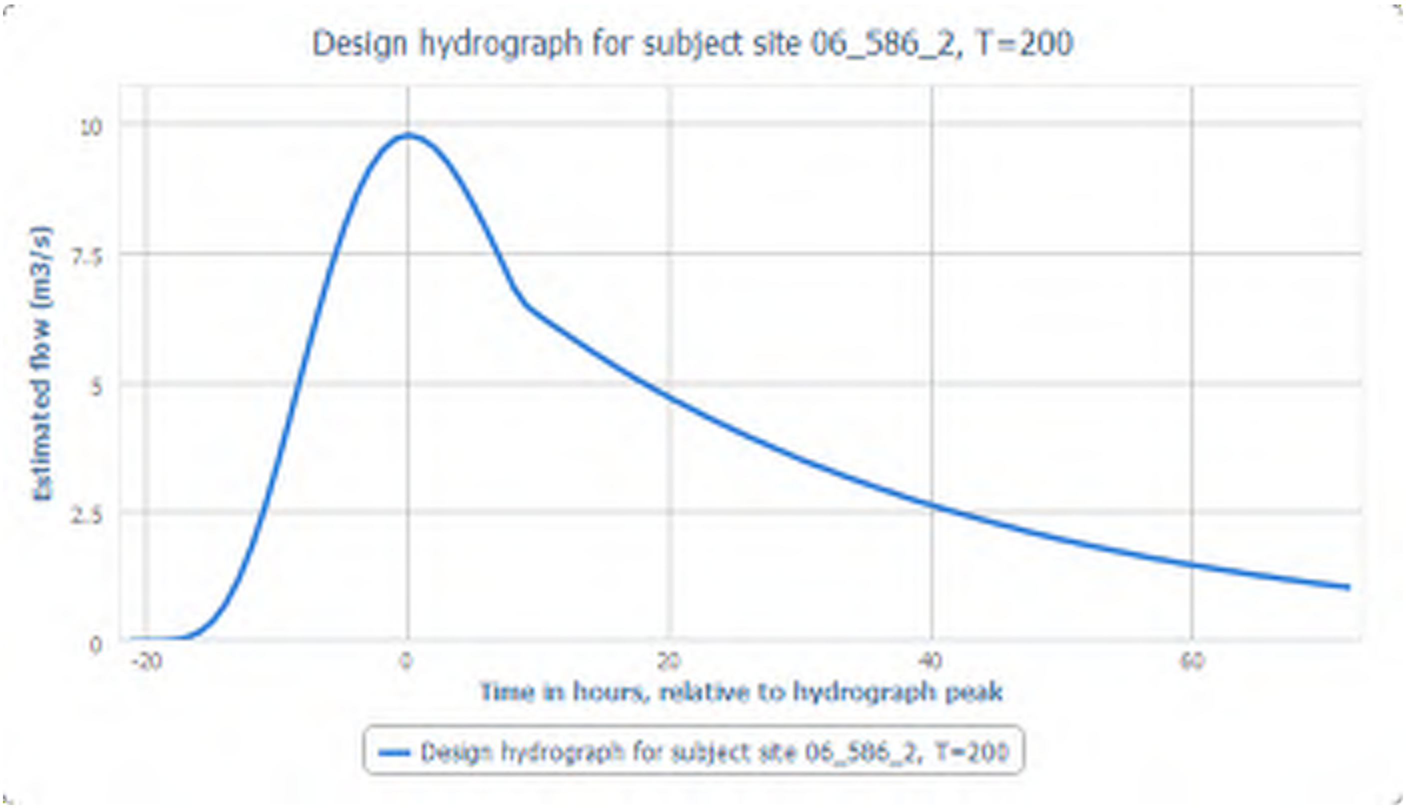


Hours relative to hydrograph peak	Estimated flow (m3/s)
-21.22	0
-21	0
-20	0
-19	0
-18	0.01
-17	0.05
-16	0.15
-15	0.34
-14	0.65
-13	1.09
-12	1.67
-11	2.37
-10	3.17
-9	4.03
-8	4.91
-7	5.77
-6	6.58
-5	7.29
-4	7.9
-3	8.37
-2	8.71
-1	8.91
0	8.97
1	8.91
2	8.74
3	8.47
4	8.12
5	7.72
6	7.26
7	6.78
8	6.27

9	5.94
10	5.77
11	5.6
12	5.44
13	5.28
14	5.13
15	4.99
16	4.84
17	4.7
18	4.57
19	4.44
20	4.31
21	4.18
22	4.06
23	3.95
24	3.83
25	3.72
26	3.62
27	3.51
28	3.41
29	3.31
30	3.22
31	3.13
32	3.04
33	2.95
34	2.86
35	2.78
36	2.7
37	2.62
38	2.55
39	2.47
40	2.4
41	2.33
42	2.27
43	2.2
44	2.14
45	2.08
46	2.02
47	1.96
48	1.9
49	1.85
50	1.79
51	1.74
52	1.69
53	1.64
54	1.6
55	1.55
56	1.51
57	1.46
58	1.42
59	1.38
60	1.34
61	1.3
62	1.26
63	1.23
64	1.19
65	1.16

66	1.13
67	1.09
68	1.06
69	1.03
70	1
71	0.97
72	0.94

Return Period: 200



Hours relative to hydrograph peak	Estimated flow (m3/s)
-21.22	0
-21	0
-20	0
-19	0
-18	0.01
-17	0.06
-16	0.17
-15	0.37
-14	0.71
-13	1.19
-12	1.82
-11	2.58
-10	3.45
-9	4.39
-8	5.35
-7	6.28
-6	7.16
-5	7.94
-4	8.6
-3	9.12
-2	9.48
-1	9.7
0	9.77
1	9.7
2	9.52
3	9.23
4	8.85
5	8.4
6	7.91
7	7.38
8	6.83

9	6.47
10	6.28
11	6.1
12	5.93
13	5.76
14	5.59
15	5.43
16	5.27
17	5.12
18	4.97
19	4.83
20	4.69
21	4.56
22	4.43
23	4.3
24	4.18
25	4.06
26	3.94
27	3.83
28	3.72
29	3.61
30	3.5
31	3.4
32	3.31
33	3.21
34	3.12
35	3.03
36	2.94
37	2.86
38	2.77
39	2.69
40	2.62
41	2.54
42	2.47
43	2.4
44	2.33
45	2.26
46	2.2
47	2.13
48	2.07
49	2.01
50	1.95
51	1.9
52	1.84
53	1.79
54	1.74
55	1.69
56	1.64
57	1.59
58	1.55
59	1.5
60	1.46
61	1.42
62	1.38
63	1.34
64	1.3
65	1.26

66	1.23
67	1.19
68	1.16
69	1.12
70	1.09
71	1.06
72	1.03

IBIDEM Plots and Tables

No IBIDEM plots were saved by the user.

Audit Trail Report #11397 (19.153 N52 Ardee Catchment E)

User ID:	warren.vokes@rod.ie
Name:	Vokes, Warren
Company:	
Address:	
Report date & time:	09-11-2020 11:50
Start of Calculation:	09-11-2020 12:33

Decisions made by the user:

Decision	**User comment**	**System information**	**Date**
2.1 Subject site accepted	N/A	Location 06_586_2	09-11-2020 12:34
2.4 Pivotal site accepted	Reason for accepting: Pivotal Site is directly downstream of subject site Reason for ignoring warnings:	Station: 06013 CHARLEVILLE The user has been notified that 43 candidates where either hydrologically or geographically closer to the subject site than the chosen pivotal site. The user has accepted to reject these sites in preference of the chosen pivotal site.	09-11-2020 12:35
2.8 QMED data transfer performed	N/A		09-11-2020 12:35

2.10 Pooling stations excluded	N/A	The following stations were excluded: Station: 09035, Atribute: urbext, Reason: Significantly greater urban extent	09-11-2020 12:37
2.11 Pooling group accepted	N/A	Pooled group accepted with the following stations: [16051, 14009, 10021, 09002, 08002, 26058, 25040, 14007, 25023, 26022, 14013, 07001, 06031, 10022, 25025, 06026, 16001, 13002, 07003] and distribution: EV1	09-11-2020 12:37
2.13 Module 2 finalized	N/A	Finished pooled analysis with the following distribution selected: EV1.	09-11-2020 12:37
3.1 Hydrograph pivotal site rejected	General agreement between rising and falling limbs with parametric model.	Station: 25014 MILLBROOK	09-11-2020 12:38
3.3 Proceeded from hydrograph display	N/A		09-11-2020 12:38
3.3 Proceeded from hydrograph display	N/A		09-11-2020 12:38
3.4 Hydrograph inspected and adjusted	N/A	The user adopted the original PCD hydrograph	09-11-2020 12:39
3.5 Hydrograph transferred to subject site	N/A	The user adjusted the subject site estimate with n = 7.26695762596078, Tr = 21.2204124967609, C = 34.2624691275923	09-11-2020 12:39

Flood Estimation Report #11399 (19.153 N52 Ardee Catchment F)

Generated 09-11-2020 11:50

Subject site

Attributes

Name	Unit	Value
Coordinate [X]		-732025.064471295
Coordinate [Y]		7141842.2733152
Distance	km	250.344431929876
Station Number		06_566_5
Location		
Water Body		
Catchment		
Hydrometric Area		
Organisation		
FSU Rating Classification		
Drainage works	year	
Contributing Catchment Area	km^2	50.657
Center Northing	m	291900
Center Easting	m	288780
Northing	m	289899
Easting	m	293771
A-Max series gap in years	year	
A-Max series number of years	year	
A-Max series number of usable years	year	
A-Max series end year	year	
A-Max series start year	year	
FARL		0.988
ALLUV		0.0256
PEAT		0
FOREST		0.0306
PASTURE		0.9379
S1085	m/km	4.46224
MSL	km	13.22
DRAIND	km/km^2	1.073
ALTBAR		55.5
NETLEN	km	54.343
T4		
T3		

SAAPE	mm	508.35
T2		
ARTDRAIN2		0.8588
ARTDRAIN		0.2786
TAYSLO		0.415557
STMFRQ		46
BFISOIL		0.694066566
SAAR	mm	844.01
RWSEG_CD		06_566
TOP_RWSEG		
Bankfull		
HGF	m^3/s	
MAF	m^3/s	
FAI		0.2114
FLATWET		0.61
URBEXT		0
HGF/QMED		
centroidx3857		-740192.150893922
centroidy3857		7145620.10280734
x3857		-732025.064471295
y3857		7141842.2733152

Pivotal site

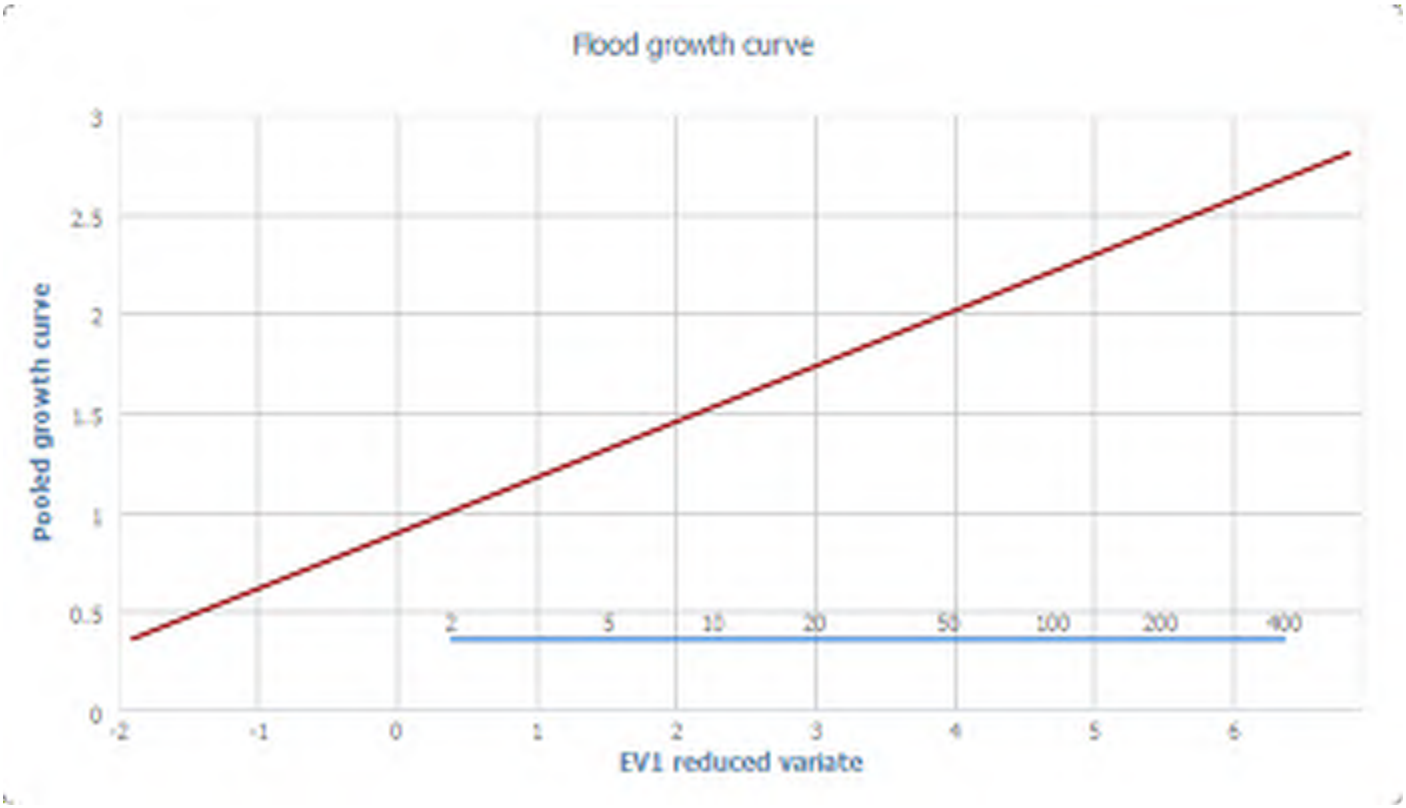
Attributes

Name	Unit	Value
Coordinate [X]		-714002.56465469
Coordinate [Y]		7142901.9394013
Station Number		06013
Location		CHARLEVILLE
Water Body		DEE
Catchment		Glyde & Dee
Hydrometric Area		6
Organisation		OPW
FSU Rating Classification		A1
Drainage works	year	1950-57
Contributing Catchment Area	km^2	309.1472
Center Northing	m	287060
Center Easting	m	287730
Northing	m	290750
Easting	m	304411
A-Max series gap in years	year	0
A-Max series number of years	year	30
A-Max series number of usable years	year	30
A-Max series end year	year	2004
A-Max series start year	year	1975
FARL		0.971
ALLUV		0.0523
PEAT		0.0001
FOREST		0.0244
PASTURE		0
S1085	m/km	2.58328
MSL	km	53.967
DRAIND	km/km^2	1.117
ALTBAR		0
NETLEN	km	345.391
T4		0.01187019679232
T3		0.019151845261223
SAAPE	mm	506.39
T2		0.15721341210169
ARTDRAIN2		0.782
ARTDRAIN		0.1688
TAYSLO		0.205344
STMFRQ		275
BFISOIL		0.6165
SAAR	mm	873.08
RWSEG_CD		06_49
TOP_RWSEG		06_804
Bankfull		1.62 from survey
HGF	m^3/s	36
MAF	m^3/s	28.2
FAI		0.16
FLATWET		0.6
URBEXT		0.009
HGF/QMED		1.3153087321885
x3857		-714002.56465469
y3857		7142901.9394013

centroidx3857		-742512.229174255
centroidy3857		7139058.32890722
Distance	km	6.95985918990112

Map

Amax Series Chart



QMED Estimates

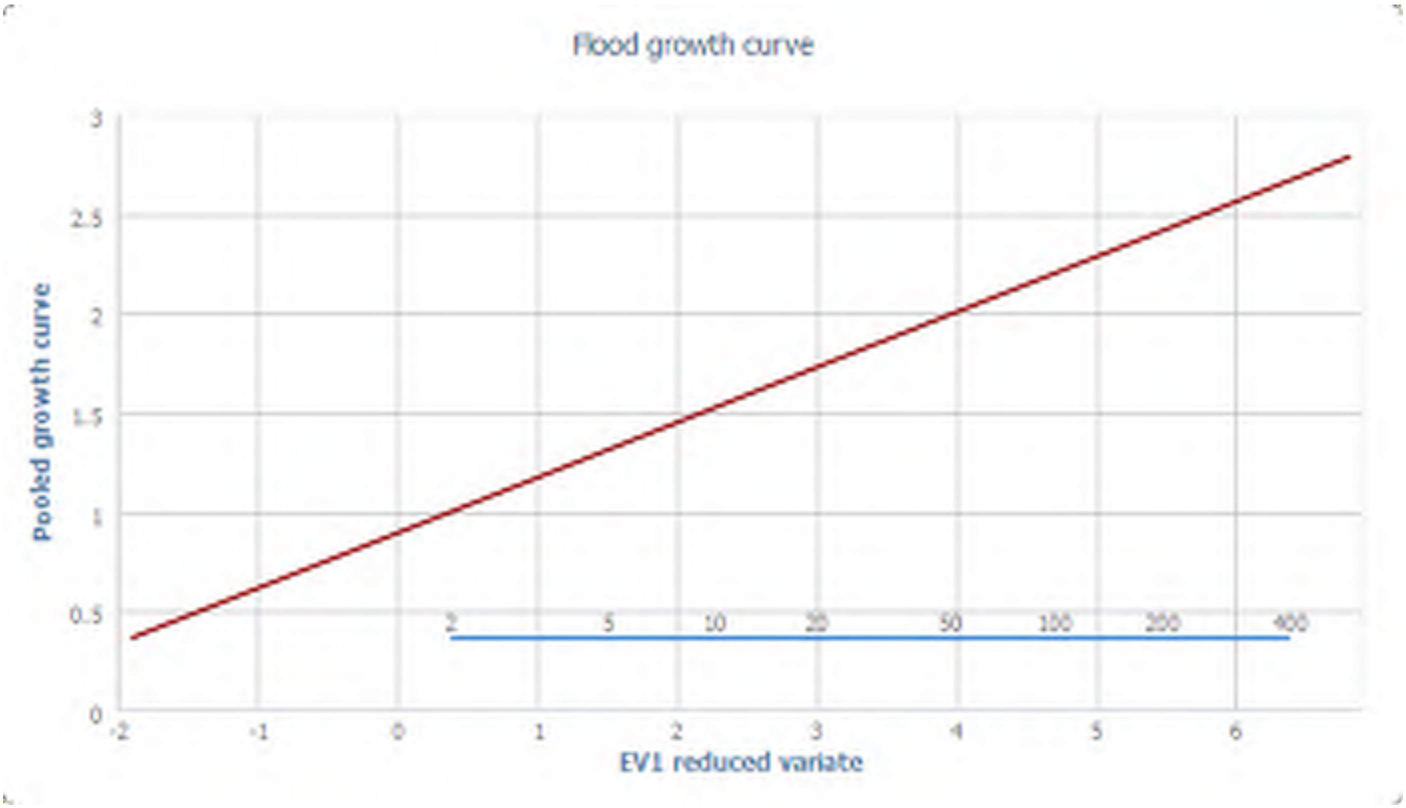
Subject rural QMED	7.7
Subject urban QMED	7.7
Pivotal gauged QMED	27.36
Pivotal adjustment factor QMED	0.64
Subject adjusted QMED	**4.91**

Pooling Group

Station	**Amax years**
14009 CUSHINA	25
16051 CLOBANNA	13
10021 COMMONS ROAD	24
09002 LUCAN	25
14007 DERRYBROCK	24
08002 NAUL	21
25023 MILLTOWN	33
14013 BALLINACARRIG	49
26022 KILMORE	33
26058 BALLINRINK BR.	24

07001 TREMBLESTOWN	18
25025 BALLYHOONEY	31
07003 CASTLERICKARD	46
06026 ACLINT	46
25040 ROSCREA	19
16001 ATHLUMMON	33
06031 CURRALHIR	18
14011 RATHANGAN	25

Selected Flood Growth Curve



Pooled growth curve	EV1 reduced variate
0.37	-1.92
0.41	-1.76
0.44	-1.67
0.45	-1.6
0.47	-1.55
0.48	-1.51
0.49	-1.47
0.5	-1.44
0.51	-1.41
0.52	-1.38
0.52	-1.35
0.53	-1.33
0.53	-1.31
0.54	-1.29
0.55	-1.27
0.55	-1.25
0.56	-1.23
0.56	-1.21
0.57	-1.2
0.57	-1.18
0.57	-1.16
0.58	-1.15
0.58	-1.14
0.59	-1.12
0.59	-1.11
0.59	-1.09
0.6	-1.08
0.6	-1.07
0.6	-1.06

0.61	-1.04
0.61	-1.03
0.61	-1.02
0.62	-1.01
0.62	-1
0.62	-0.99
0.63	-0.98
0.63	-0.97
0.63	-0.96
0.64	-0.95
0.64	-0.94
0.64	-0.93
0.64	-0.92
0.65	-0.91
0.65	-0.9
0.65	-0.89
0.65	-0.88
0.66	-0.87
0.66	-0.86
0.66	-0.85
0.66	-0.84
0.67	-0.84
0.67	-0.83
0.67	-0.82
0.67	-0.81
0.68	-0.8
0.68	-0.79
0.68	-0.79
0.68	-0.78
0.68	-0.77
0.69	-0.76
0.69	-0.75
0.69	-0.75
0.69	-0.74
0.7	-0.73
0.7	-0.72
0.7	-0.72
0.7	-0.71
0.7	-0.7
0.71	-0.69
0.71	-0.69
0.71	-0.68
0.71	-0.67
0.71	-0.66
0.72	-0.66
0.72	-0.65
0.72	-0.64
0.72	-0.64
0.72	-0.63
0.73	-0.62
0.73	-0.62
0.73	-0.61
0.73	-0.6
0.73	-0.6
0.73	-0.59
0.74	-0.58
0.74	-0.58

0.74	-0.57
0.74	-0.56
0.74	-0.56
0.75	-0.55
0.75	-0.54
0.75	-0.54
0.75	-0.53
0.75	-0.52
0.75	-0.52
0.76	-0.51
0.76	-0.51
0.76	-0.5
0.76	-0.49
0.76	-0.49
0.76	-0.48
0.77	-0.48
0.77	-0.47
0.77	-0.46
0.77	-0.46
0.77	-0.45
0.77	-0.44
0.78	-0.44
0.78	-0.43
0.78	-0.43
0.78	-0.42
0.78	-0.41
0.78	-0.41
0.79	-0.4
0.79	-0.4
0.79	-0.39
0.79	-0.39
0.79	-0.38
0.79	-0.37
0.8	-0.37
0.8	-0.36
0.8	-0.36
0.8	-0.35
0.8	-0.35
0.8	-0.34
0.81	-0.33
0.81	-0.33
0.81	-0.32
0.81	-0.32
0.81	-0.31
0.81	-0.31
0.81	-0.3
0.82	-0.29
0.82	-0.29
0.82	-0.28
0.82	-0.28
0.82	-0.27
0.82	-0.27
0.83	-0.26
0.83	-0.25
0.83	-0.25
0.83	-0.24
0.83	-0.24

0.83	-0.23
0.84	-0.23
0.84	-0.22
0.84	-0.22
0.84	-0.21
0.84	-0.21
0.84	-0.2
0.84	-0.19
0.85	-0.19
0.85	-0.18
0.85	-0.18
0.85	-0.17
0.85	-0.17
0.85	-0.16
0.85	-0.16
0.86	-0.15
0.86	-0.15
0.86	-0.14
0.86	-0.13
0.86	-0.13
0.86	-0.12
0.87	-0.12
0.87	-0.11
0.87	-0.11
0.87	-0.1
0.87	-0.1
0.87	-0.09
0.87	-0.09
0.88	-0.08
0.88	-0.08
0.88	-0.07
0.88	-0.06
0.88	-0.06
0.88	-0.05
0.88	-0.05
0.89	-0.04
0.89	-0.04
0.89	-0.03
0.89	-0.03
0.89	-0.02
0.89	-0.02
0.9	-0.01
0.9	-0.01
0.9	0
0.9	0.01
0.9	0.01
0.9	0.02
0.9	0.02
0.91	0.03
0.91	0.03
0.91	0.04
0.91	0.04
0.91	0.05
0.91	0.05
0.91	0.06
0.92	0.06
0.92	0.07

0.92	0.08
0.92	0.08
0.92	0.09
0.92	0.09
0.93	0.1
0.93	0.1
0.93	0.11
0.93	0.11
0.93	0.12
0.93	0.12
0.93	0.13
0.94	0.13
0.94	0.14
0.94	0.15
0.94	0.15
0.94	0.16
0.94	0.16
0.94	0.17
0.95	0.17
0.95	0.18
0.95	0.18
0.95	0.19
0.95	0.19
0.95	0.2
0.96	0.21
0.96	0.21
0.96	0.22
0.96	0.22
0.96	0.23
0.96	0.23
0.96	0.24
0.97	0.24
0.97	0.25
0.97	0.25
0.97	0.26
0.97	0.27
0.97	0.27
0.98	0.28
0.98	0.28
0.98	0.29
0.98	0.29
0.98	0.3
0.98	0.3
0.98	0.31
0.99	0.32
0.99	0.32
0.99	0.33
0.99	0.33
0.99	0.34
0.99	0.34
1	0.35
1	0.36
1	0.36
1	0.37
1	0.37
1	0.38
1	0.38

1.01	0.39
1.01	0.4
1.01	0.4
1.01	0.41
1.01	0.41
1.01	0.42
1.02	0.42
1.02	0.43
1.02	0.44
1.02	0.44
1.02	0.45
1.02	0.45
1.03	0.46
1.03	0.46
1.03	0.47
1.03	0.48
1.03	0.48
1.03	0.49
1.04	0.49
1.04	0.5
1.04	0.51
1.04	0.51
1.04	0.52
1.04	0.52
1.05	0.53
1.05	0.54
1.05	0.54
1.05	0.55
1.05	0.55
1.05	0.56
1.06	0.57
1.06	0.57
1.06	0.58
1.06	0.59
1.06	0.59
1.06	0.6
1.07	0.6
1.07	0.61
1.07	0.62
1.07	0.62
1.07	0.63
1.07	0.64
1.08	0.64
1.08	0.65
1.08	0.65
1.08	0.66
1.08	0.67
1.09	0.67
1.09	0.68
1.09	0.69
1.09	0.69
1.09	0.7
1.09	0.71
1.1	0.71
1.1	0.72
1.1	0.73
1.1	0.73

1.1	0.74
1.11	0.75
1.11	0.75
1.11	0.76
1.11	0.77
1.11	0.77
1.11	0.78
1.12	0.79
1.12	0.79
1.12	0.8
1.12	0.81
1.12	0.81
1.13	0.82
1.13	0.83
1.13	0.83
1.13	0.84
1.13	0.85
1.14	0.86
1.14	0.86
1.14	0.87
1.14	0.88
1.14	0.88
1.15	0.89
1.15	0.9
1.15	0.91
1.15	0.91
1.15	0.92
1.16	0.93
1.16	0.94
1.16	0.94
1.16	0.95
1.16	0.96
1.17	0.97
1.17	0.97
1.17	0.98
1.17	0.99
1.17	1
1.18	1
1.18	1.01
1.18	1.02
1.18	1.03
1.19	1.04
1.19	1.04
1.19	1.05
1.19	1.06
1.19	1.07
1.2	1.08
1.2	1.08
1.2	1.09
1.2	1.1
1.21	1.11
1.21	1.12
1.21	1.13
1.21	1.13
1.22	1.14
1.22	1.15
1.22	1.16

1.22	1.17
1.23	1.18
1.23	1.19
1.23	1.19
1.23	1.2
1.23	1.21
1.24	1.22
1.24	1.23
1.24	1.24
1.24	1.25
1.25	1.26
1.25	1.27
1.25	1.28
1.26	1.29
1.26	1.29
1.26	1.3
1.26	1.31
1.27	1.32
1.27	1.33
1.27	1.34
1.27	1.35
1.28	1.36
1.28	1.37
1.28	1.38
1.29	1.39
1.29	1.4
1.29	1.41
1.29	1.42
1.3	1.43
1.3	1.44
1.3	1.46
1.31	1.47
1.31	1.48
1.31	1.49
1.31	1.5
1.32	1.51
1.32	1.52
1.32	1.53
1.33	1.54
1.33	1.55
1.33	1.57
1.34	1.58
1.34	1.59
1.34	1.6
1.35	1.61
1.35	1.63
1.35	1.64
1.36	1.65
1.36	1.66
1.36	1.68
1.37	1.69
1.37	1.7
1.37	1.71
1.38	1.73
1.38	1.74
1.39	1.75
1.39	1.77

1.39	1.78
1.4	1.8
1.4	1.81
1.41	1.82
1.41	1.84
1.41	1.85
1.42	1.87
1.42	1.88
1.43	1.9
1.43	1.91
1.43	1.93
1.44	1.95
1.44	1.96
1.45	1.98
1.45	1.99
1.46	2.01
1.46	2.03
1.47	2.04
1.47	2.06
1.48	2.08
1.48	2.1
1.49	2.12
1.49	2.13
1.5	2.15
1.5	2.17
1.51	2.19
1.51	2.21
1.52	2.23
1.52	2.25
1.53	2.27
1.54	2.3
1.54	2.32
1.55	2.34
1.55	2.36
1.56	2.39
1.57	2.41
1.57	2.43
1.58	2.46
1.59	2.48
1.6	2.51
1.6	2.54
1.61	2.56
1.62	2.59
1.63	2.62
1.63	2.65
1.64	2.68
1.65	2.71
1.66	2.74
1.67	2.78
1.68	2.81
1.69	2.85
1.7	2.88
1.71	2.92
1.72	2.96
1.73	3
1.74	3.05
1.76	3.09

1.77	3.14
1.78	3.18
1.8	3.24
1.81	3.29
1.83	3.35
1.84	3.41
1.86	3.47
1.88	3.54
1.9	3.61
1.92	3.69
1.95	3.77
1.97	3.86
2	3.96
2.03	4.07
2.06	4.2
2.1	4.34
2.15	4.51
2.21	4.71
2.27	4.96
2.37	5.29
2.5	5.78
2.79	6.81

Adopted Growth Factors

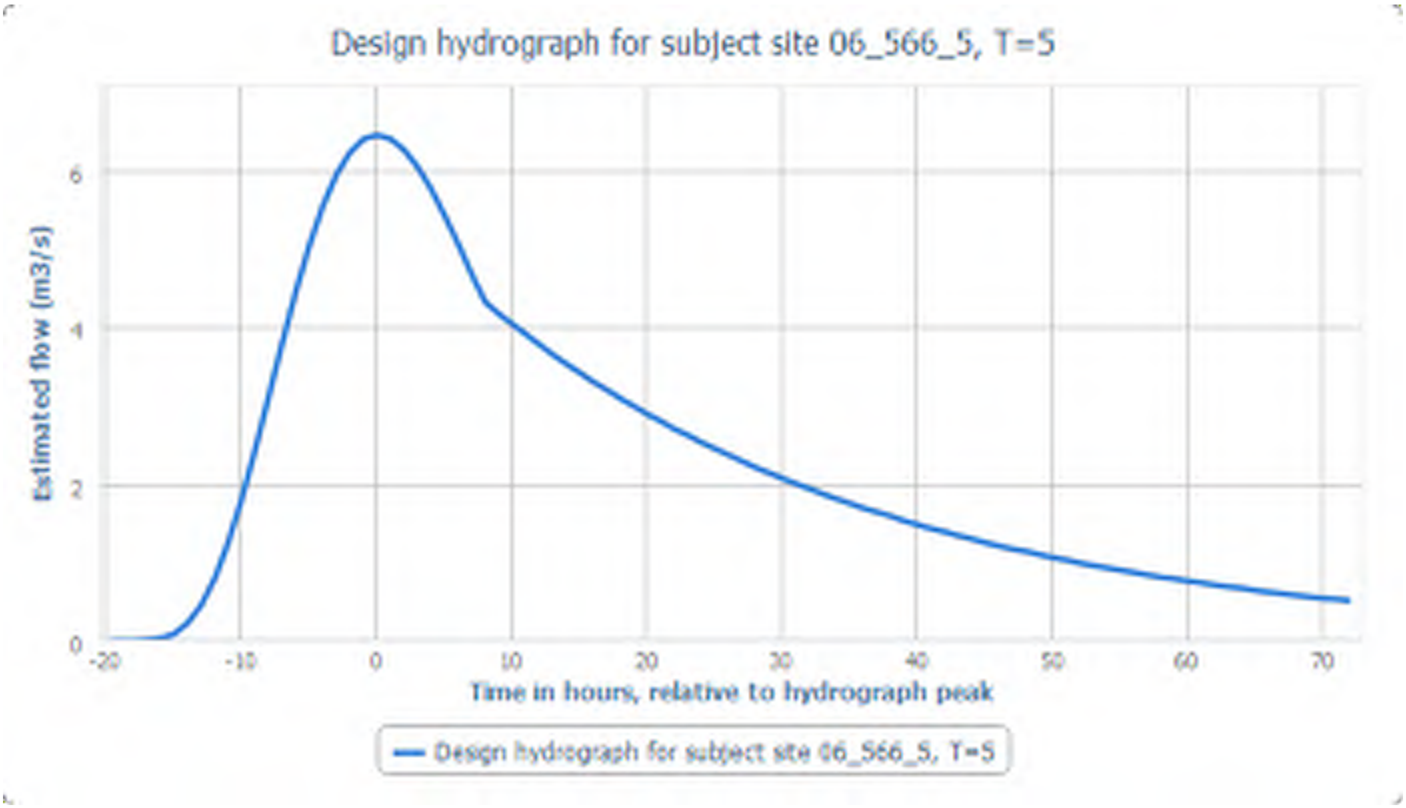
Return Period	Growth Factor	Design Peak Flow (m^3/s)
1.3	0.79	3.88
2	1	4.91
5	1.31	6.43
10	1.52	7.46
20	1.72	8.44
30	1.84	9.03
50	1.98	9.72
100	2.18	10.7
200	2.37	11.63
500	2.62	12.86
1000	2.82	13.84

Hydrograph Width Estimation Summary

Name	Value
Pivotal site	25014 "MILLBROOK"
Adjustment type	The user adopted the original PCD hydrograph
Transfer type	The user adjusted the subject site estimate with the pivotal site deformation factor
Deformation factor	1
Custom deformation factor	1
Accepted n	7.26695762596078
Accepted Tr	19.6550221036007
Accepted C	29.9464733004829

Hydrograph Plots

Return Period: 5

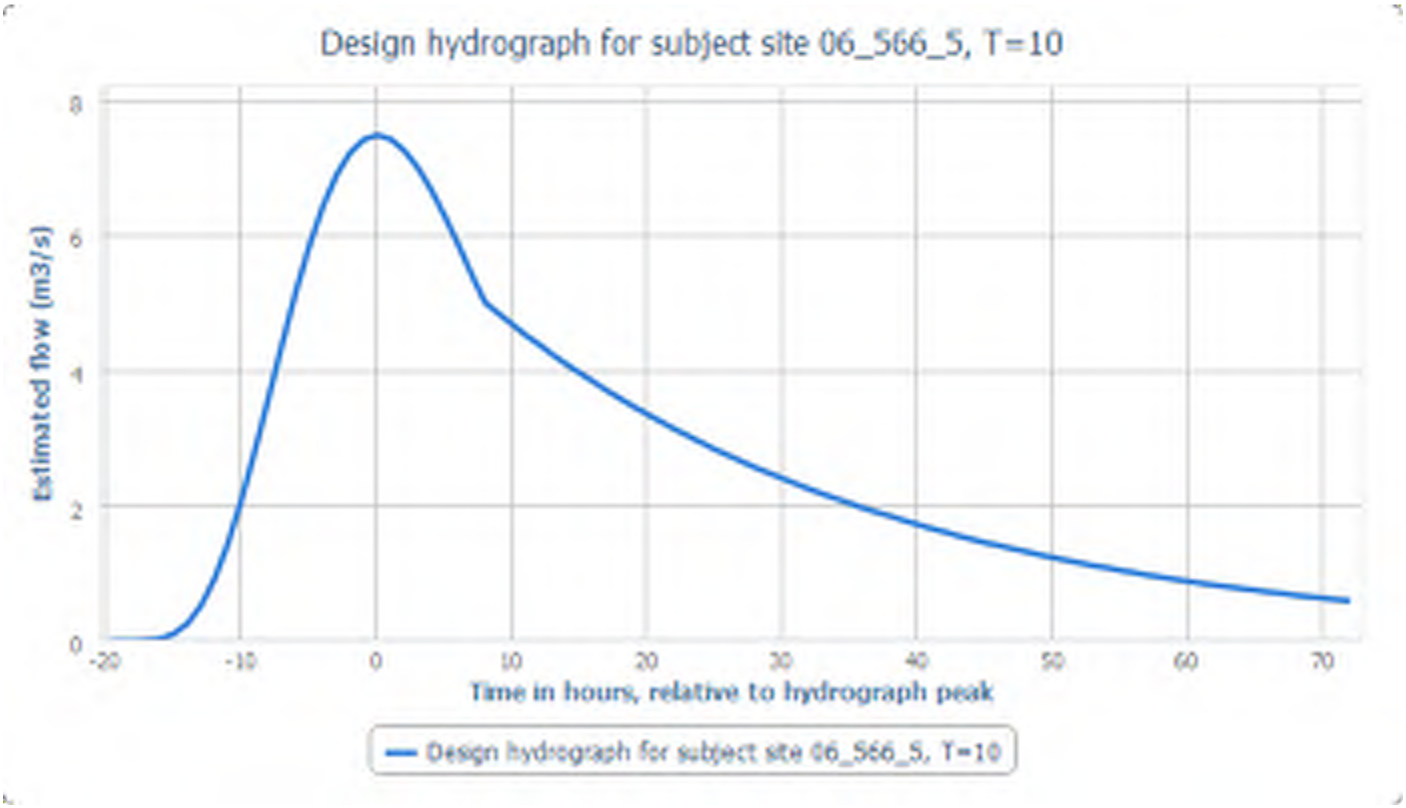


Hours relative to hydrograph peak	Estimated flow (m3/s)
-19.66	0
-19	0
-18	0
-17	0.01
-16	0.03
-15	0.09
-14	0.23
-13	0.46
-12	0.8
-11	1.26
-10	1.82
-9	2.45
-8	3.13
-7	3.81
-6	4.46
-5	5.05
-4	5.55
-3	5.95
-2	6.23
-1	6.4
0	6.45
1	6.4
2	6.26
3	6.04
4	5.76
5	5.42
6	5.06
7	4.67
8	4.32

9	4.17
10	4.04
11	3.91
12	3.78
13	3.65
14	3.53
15	3.42
16	3.3
17	3.2
18	3.09
19	2.99
20	2.89
21	2.8
22	2.7
23	2.62
24	2.53
25	2.45
26	2.37
27	2.29
28	2.21
29	2.14
30	2.07
31	2
32	1.94
33	1.87
34	1.81
35	1.75
36	1.69
37	1.64
38	1.59
39	1.53
40	1.48
41	1.43
42	1.39
43	1.34
44	1.3
45	1.25
46	1.21
47	1.17
48	1.14
49	1.1
50	1.06
51	1.03
52	0.99
53	0.96
54	0.93
55	0.9
56	0.87
57	0.84
58	0.81
59	0.79
60	0.76
61	0.74
62	0.71
63	0.69
64	0.67
65	0.64

66	0.62
67	0.6
68	0.58
69	0.56
70	0.54
71	0.53
72	0.51

Return Period: 10

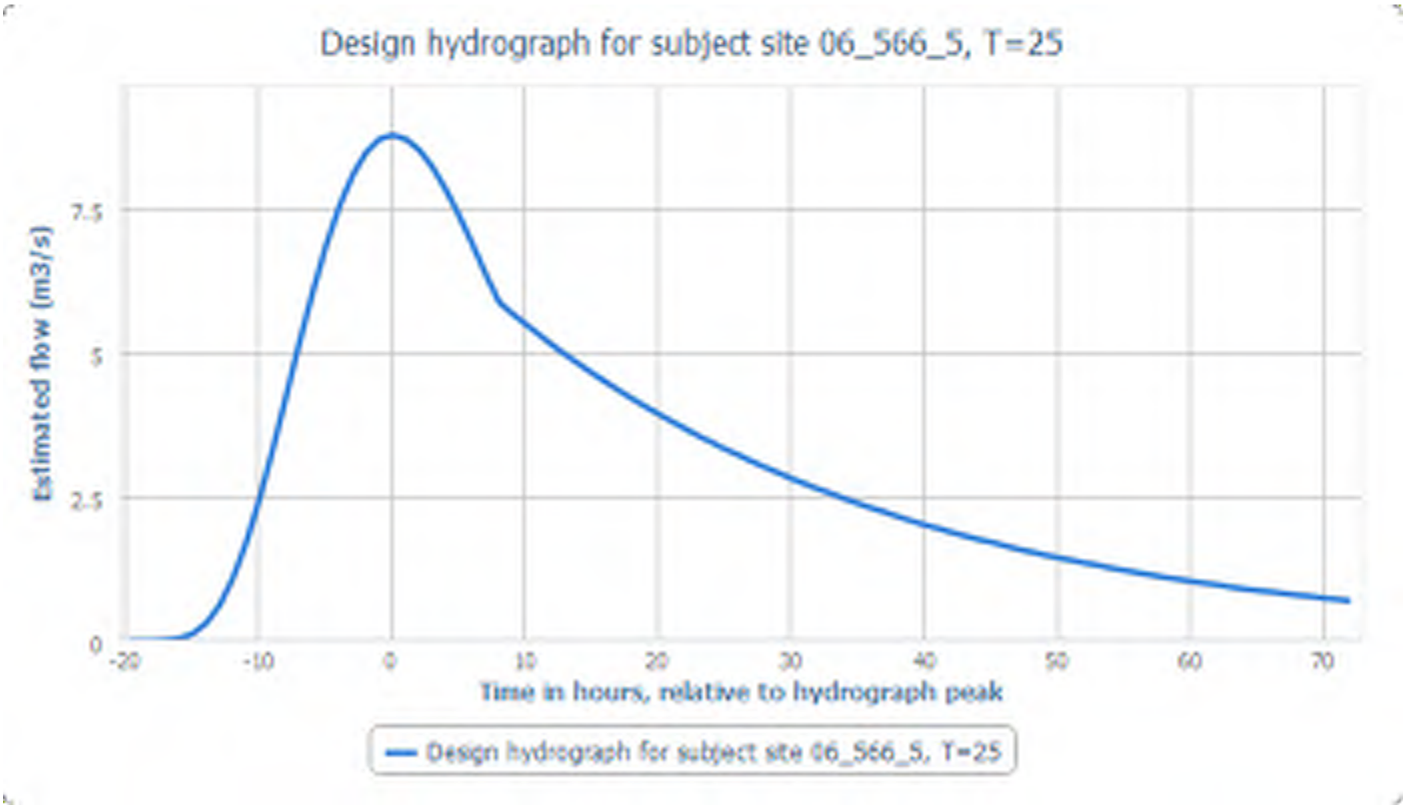


Hours relative to hydrograph peak	Estimated flow (m3/s)
-19.66	0
-19	0
-18	0
-17	0.01
-16	0.03
-15	0.11
-14	0.26
-13	0.53
-12	0.93
-11	1.46
-10	2.11
-9	2.84
-8	3.62
-7	4.41
-6	5.17
-5	5.85
-4	6.43
-3	6.89
-2	7.22
-1	7.41
0	7.48
1	7.42
2	7.25
3	7
4	6.67
5	6.28
6	5.86
7	5.41
8	5
9	4.84
10	4.68

11	4.52
12	4.38
13	4.23
14	4.09
15	3.96
16	3.83
17	3.7
18	3.58
19	3.46
20	3.35
21	3.24
22	3.13
23	3.03
24	2.93
25	2.83
26	2.74
27	2.65
28	2.56
29	2.48
30	2.4
31	2.32
32	2.24
33	2.17
34	2.1
35	2.03
36	1.96
37	1.9
38	1.84
39	1.78
40	1.72
41	1.66
42	1.61
43	1.55
44	1.5
45	1.45
46	1.41
47	1.36
48	1.32
49	1.27
50	1.23
51	1.19
52	1.15
53	1.11
54	1.08
55	1.04
56	1.01
57	0.97
58	0.94
59	0.91
60	0.88
61	0.85
62	0.82
63	0.8
64	0.77
65	0.75
66	0.72
67	0.7

68	0.67
69	0.65
70	0.63
71	0.61
72	0.59

Return Period: 25

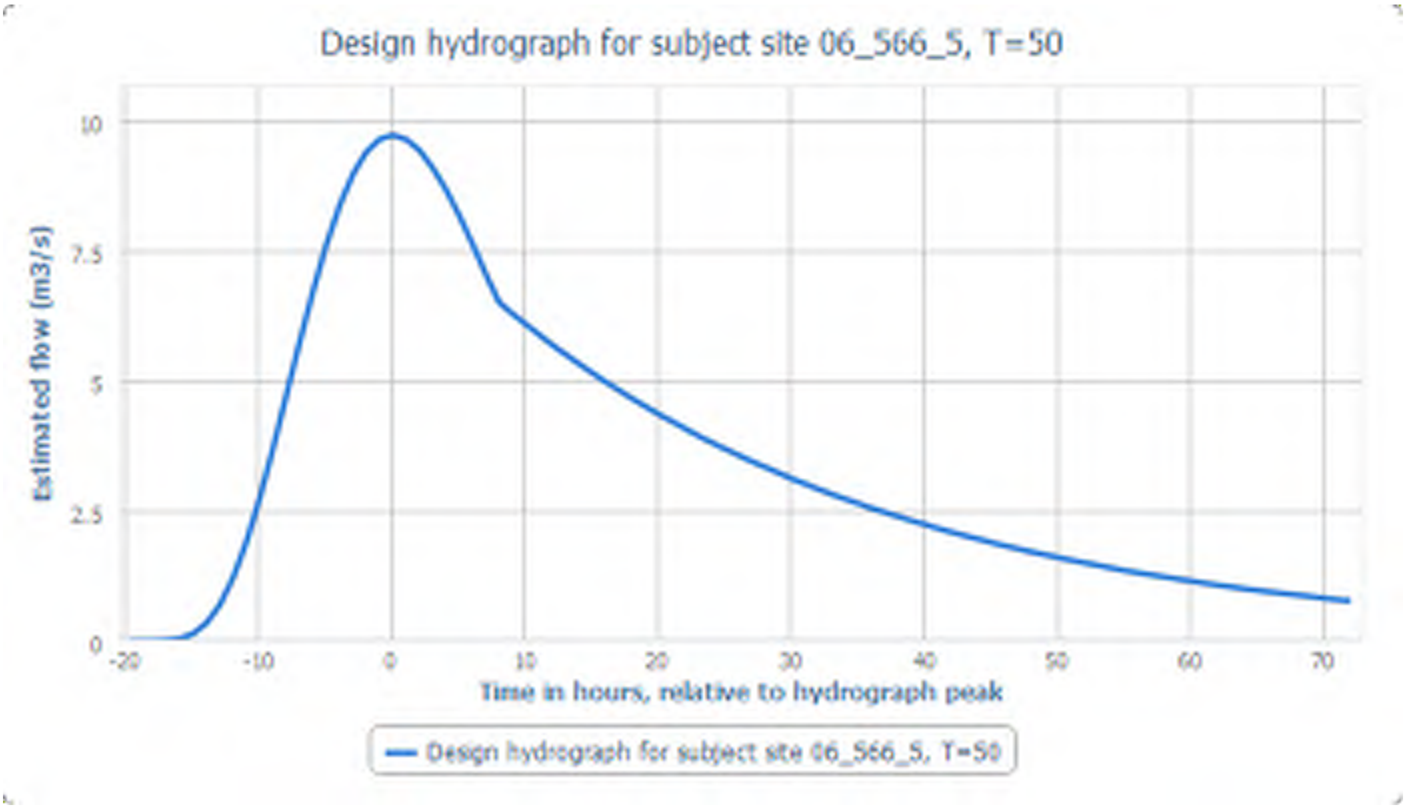


Hours relative to hydrograph peak	Estimated flow (m3/s)
-19.66	0
-19	0
-18	0
-17	0.01
-16	0.04
-15	0.13
-14	0.31
-13	0.62
-12	1.09
-11	1.71
-10	2.47
-9	3.33
-8	4.25
-7	5.18
-6	6.06
-5	6.86
-4	7.54
-3	8.08
-2	8.47
-1	8.7
0	8.77
1	8.7
2	8.51
3	8.21
4	7.82
5	7.37
6	6.87
7	6.35
8	5.87
9	5.67
10	5.49

11	5.31
12	5.13
13	4.96
14	4.8
15	4.64
16	4.49
17	4.34
18	4.2
19	4.06
20	3.93
21	3.8
22	3.68
23	3.55
24	3.44
25	3.32
26	3.22
27	3.11
28	3.01
29	2.91
30	2.81
31	2.72
32	2.63
33	2.55
34	2.46
35	2.38
36	2.3
37	2.23
38	2.15
39	2.08
40	2.01
41	1.95
42	1.88
43	1.82
44	1.76
45	1.71
46	1.65
47	1.59
48	1.54
49	1.49
50	1.44
51	1.4
52	1.35
53	1.31
54	1.26
55	1.22
56	1.18
57	1.14
58	1.1
59	1.07
60	1.03
61	1
62	0.97
63	0.93
64	0.9
65	0.87
66	0.85
67	0.82

68	0.79
69	0.77
70	0.74
71	0.72
72	0.69

Return Period: 50

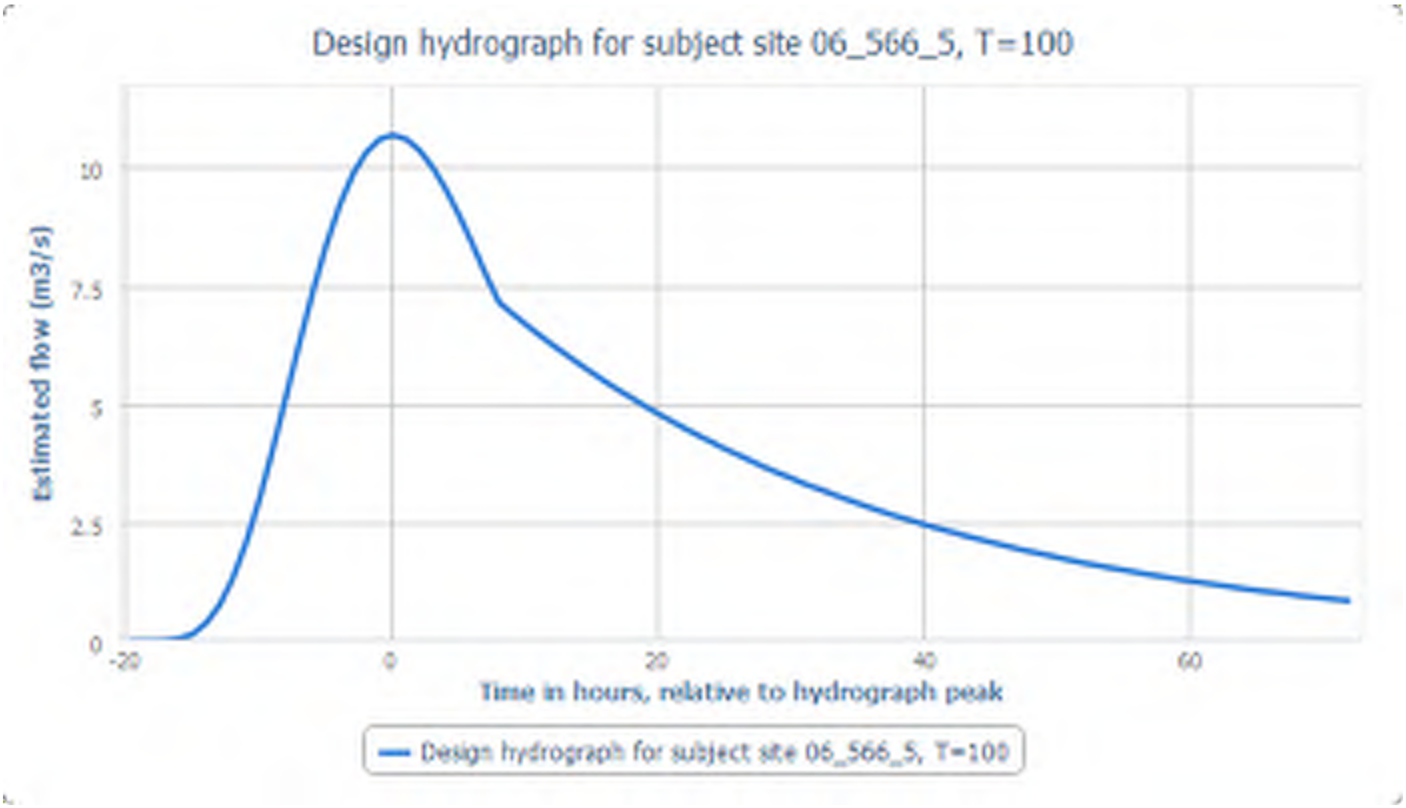


Hours relative to hydrograph peak	Estimated flow (m3/s)
-19.66	0
-19	0
-18	0
-17	0.01
-16	0.04
-15	0.14
-14	0.34
-13	0.69
-12	1.21
-11	1.9
-10	2.74
-9	3.7
-8	4.72
-7	5.74
-6	6.72
-5	7.61
-4	8.37
-3	8.97
-2	9.4
-1	9.65
0	9.73
1	9.65
2	9.44
3	9.1
4	8.68
5	8.18
6	7.63
7	7.05
8	6.51
9	6.29
10	6.09

11	5.89
12	5.69
13	5.51
14	5.33
15	5.15
16	4.98
17	4.82
18	4.66
19	4.51
20	4.36
21	4.22
22	4.08
23	3.94
24	3.81
25	3.69
26	3.57
27	3.45
28	3.34
29	3.23
30	3.12
31	3.02
32	2.92
33	2.82
34	2.73
35	2.64
36	2.55
37	2.47
38	2.39
39	2.31
40	2.24
41	2.16
42	2.09
43	2.02
44	1.96
45	1.89
46	1.83
47	1.77
48	1.71
49	1.66
50	1.6
51	1.55
52	1.5
53	1.45
54	1.4
55	1.35
56	1.31
57	1.27
58	1.23
59	1.19
60	1.15
61	1.11
62	1.07
63	1.04
64	1
65	0.97
66	0.94
67	0.91

68	0.88
69	0.85
70	0.82
71	0.79
72	0.77

Return Period: 100

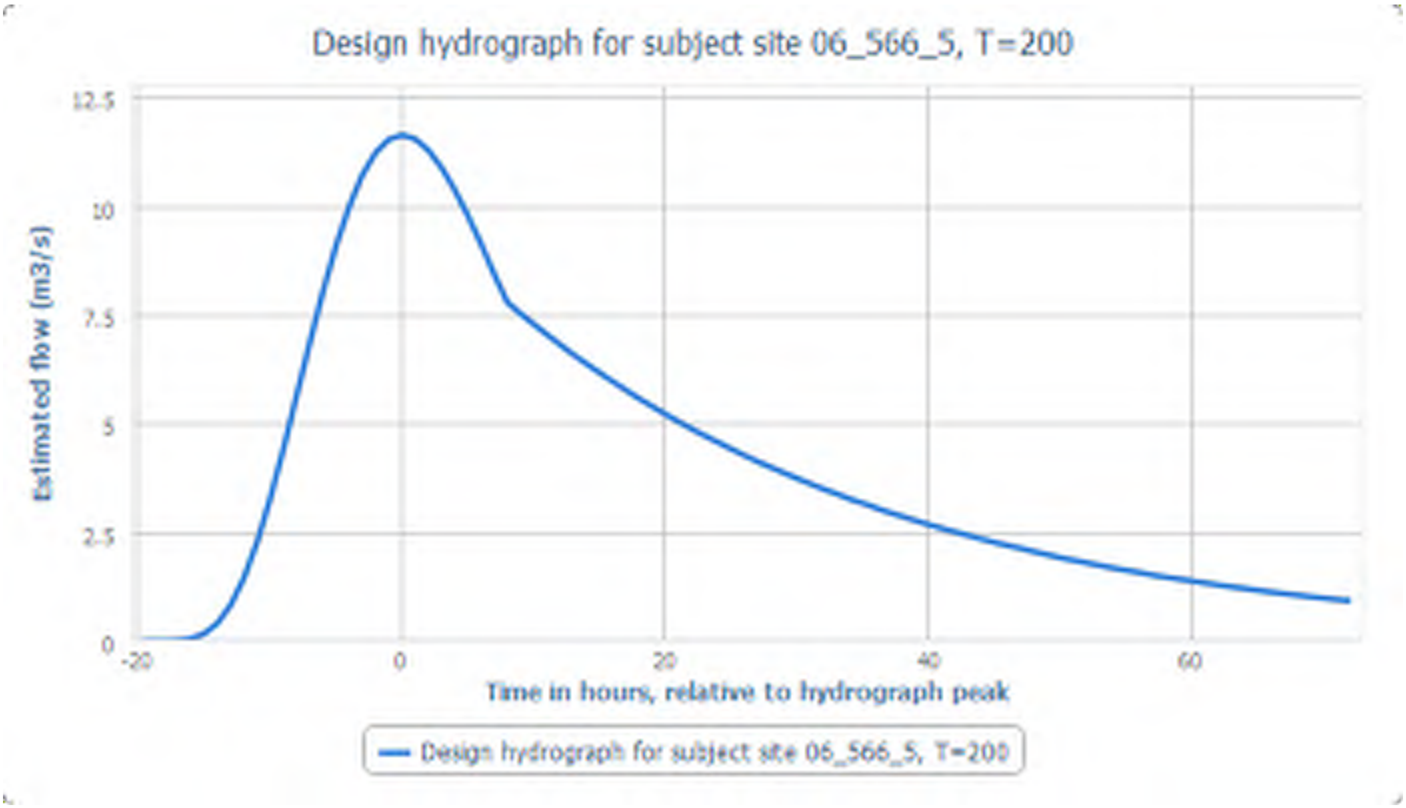


Hours relative to hydrograph peak	Estimated flow (m3/s)
-19.66	0
-19	0
-18	0
-17	0.01
-16	0.05
-15	0.15
-14	0.38
-13	0.76
-12	1.33
-11	2.09
-10	3.01
-9	4.06
-8	5.18
-7	6.3
-6	7.38
-5	8.36
-4	9.19
-3	9.85
-2	10.31
-1	10.59
0	10.68
1	10.6
2	10.36
3	10
4	9.53
5	8.98
6	8.37
7	7.73
8	7.14
9	6.91
10	6.68

11	6.46
12	6.25
13	6.05
14	5.85
15	5.66
16	5.47
17	5.29
18	5.12
19	4.95
20	4.79
21	4.63
22	4.48
23	4.33
24	4.19
25	4.05
26	3.92
27	3.79
28	3.66
29	3.54
30	3.43
31	3.31
32	3.21
33	3.1
34	3
35	2.9
36	2.8
37	2.71
38	2.62
39	2.54
40	2.45
41	2.37
42	2.3
43	2.22
44	2.15
45	2.08
46	2.01
47	1.94
48	1.88
49	1.82
50	1.76
51	1.7
52	1.64
53	1.59
54	1.54
55	1.49
56	1.44
57	1.39
58	1.35
59	1.3
60	1.26
61	1.22
62	1.18
63	1.14
64	1.1
65	1.06
66	1.03
67	1

68	0.96
69	0.93
70	0.9
71	0.87
72	0.84

Return Period: 200



Hours relative to hydrograph peak	Estimated flow (m3/s)
-19.66	0
-19	0
-18	0
-17	0.01
-16	0.05
-15	0.17
-14	0.41
-13	0.83
-12	1.45
-11	2.27
-10	3.28
-9	4.42
-8	5.64
-7	6.86
-6	8.04
-5	9.1
-4	10
-3	10.72
-2	11.23
-1	11.53
0	11.63
1	11.54
2	11.28
3	10.88
4	10.37
5	9.77
6	9.12
7	8.42
8	7.78
9	7.52
10	7.28

11	7.04
12	6.81
13	6.58
14	6.37
15	6.16
16	5.96
17	5.76
18	5.57
19	5.39
20	5.21
21	5.04
22	4.87
23	4.71
24	4.56
25	4.41
26	4.26
27	4.12
28	3.99
29	3.86
30	3.73
31	3.61
32	3.49
33	3.38
34	3.26
35	3.16
36	3.05
37	2.95
38	2.86
39	2.76
40	2.67
41	2.58
42	2.5
43	2.42
44	2.34
45	2.26
46	2.19
47	2.12
48	2.05
49	1.98
50	1.91
51	1.85
52	1.79
53	1.73
54	1.67
55	1.62
56	1.57
57	1.51
58	1.46
59	1.42
60	1.37
61	1.33
62	1.28
63	1.24
64	1.2
65	1.16
66	1.12
67	1.08

68	1.05
69	1.01
70	0.98
71	0.95
72	0.92

IBIDEM Plots and Tables

No IBIDEM plots were saved by the user.

Audit Trail Report #11399 (19.153 N52 Ardee Catchment F)

User ID:	warren.vokes@rod.ie
Name:	Vokes, Warren
Company:	
Address:	
Report date & time:	09-11-2020 11:51
Start of Calculation:	09-11-2020 12:40

Decisions made by the user:

Decision	User comment	System information	Date
2.1 Subject site accepted	N/A	Location 06_566_5	09-11-2020 12:40
2.4 Pivotal site accepted	Reason for accepting: Pivotal site directly downstream of subject site Reason for ignoring warnings:	Station: 06013 CHARLEVILLE The user has been notified that 36 candidates where either hydrologically or geographically closer to the subject site than the chosen pivotal site. The user has accepted to reject these sites in preference of the chosen pivotal site.	09-11-2020 12:41
2.8 QMED data transfer performed	N/A		09-11-2020 12:41

2.10 Pooling stations excluded	N/A	The following stations were excluded: Station: 09035, Atribute: urbext, Reason: Urban parameter significantly higher	09-11-2020 12:42
2.11 Pooling group accepted	N/A	Pooled group accepted with the following stations: [14009, 16051, 10021, 09002, 14007, 08002, 25023, 14013, 26022, 26058, 07001, 25025, 07003, 06026, 25040, 16001, 06031, 14011] and distribution: EV1	09-11-2020 12:42
2.13 Module 2 finalized	N/A	Finished pooled analysis with the following distribution selected: EV1.	09-11-2020 12:43
3.1 Hydrograph pivotal site rejected	General agreement between rising and falling limbs with Parametric model	Station: 25014 MILLBROOK	09-11-2020 12:44
3.3 Proceeded from hydrograph display	N/A		09-11-2020 12:44
3.3 Proceeded from hydrograph display	N/A		09-11-2020 12:44
3.4 Hydrograph inspected and adjusted	N/A	The user adopted the original PCD hydrograph	09-11-2020 12:44
3.5 Hydrograph transferred to subject site	N/A	The user adjusted the subject site estimate with n = 7.26695762596078, Tr = 19.6550221036007, C = 29.9464733004829	09-11-2020 12:44

Flood Estimation Report #11400 (19.153 N52 Ardee Catchment G)

Generated 09-11-2020 11:50

Subject site

Attributes

Name	Unit	Value
Coordinate [X]		-729440.021688498
Coordinate [Y]		7143434.68713114
Distance	km	138.211761978252
Station Number		06_1016_1
Location		
Water Body		
Catchment		
Hydrometric Area		
Organisation		
FSU Rating Classification		
Drainage works	year	
Contributing Catchment Area	km^2	1.005
Center Northing	m	290940
Center Easting	m	294360
Northing	m	290869
Easting	m	295280
A-Max series gap in years	year	
A-Max series number of years	year	
A-Max series number of usable years	year	
A-Max series end year	year	
A-Max series start year	year	
FARL		1
ALLUV		0
PEAT		0
FOREST		0.0159
PASTURE		0.7653
S1085	m/km	0.1
MSL	km	2.044
DRAIND	km/km^2	2.669
ALTBAR		30.5
NETLEN	km	2.682
T4		
T3		

SAAPE	mm	514.73
T2		
ARTDRAIN2		0.7617
ARTDRAIN		0.4715
TAYSLO		0.146186
STMFRQ		3
BFISOIL		0.64445308
SAAR	mm	799.3
RWSEG_CD		06_1016
TOP_RWSEG		
Bankfull		
HGF	m^3/s	
MAF	m^3/s	
FAI		0.1905
FLATWET		0.6
URBEXT		0
HGF/QMED		
centroidx3857		-731069.473246808
centroidy3857		7143533.23870056
x3857		-729440.021688498
y3857		7143434.68713114

Pivotal site

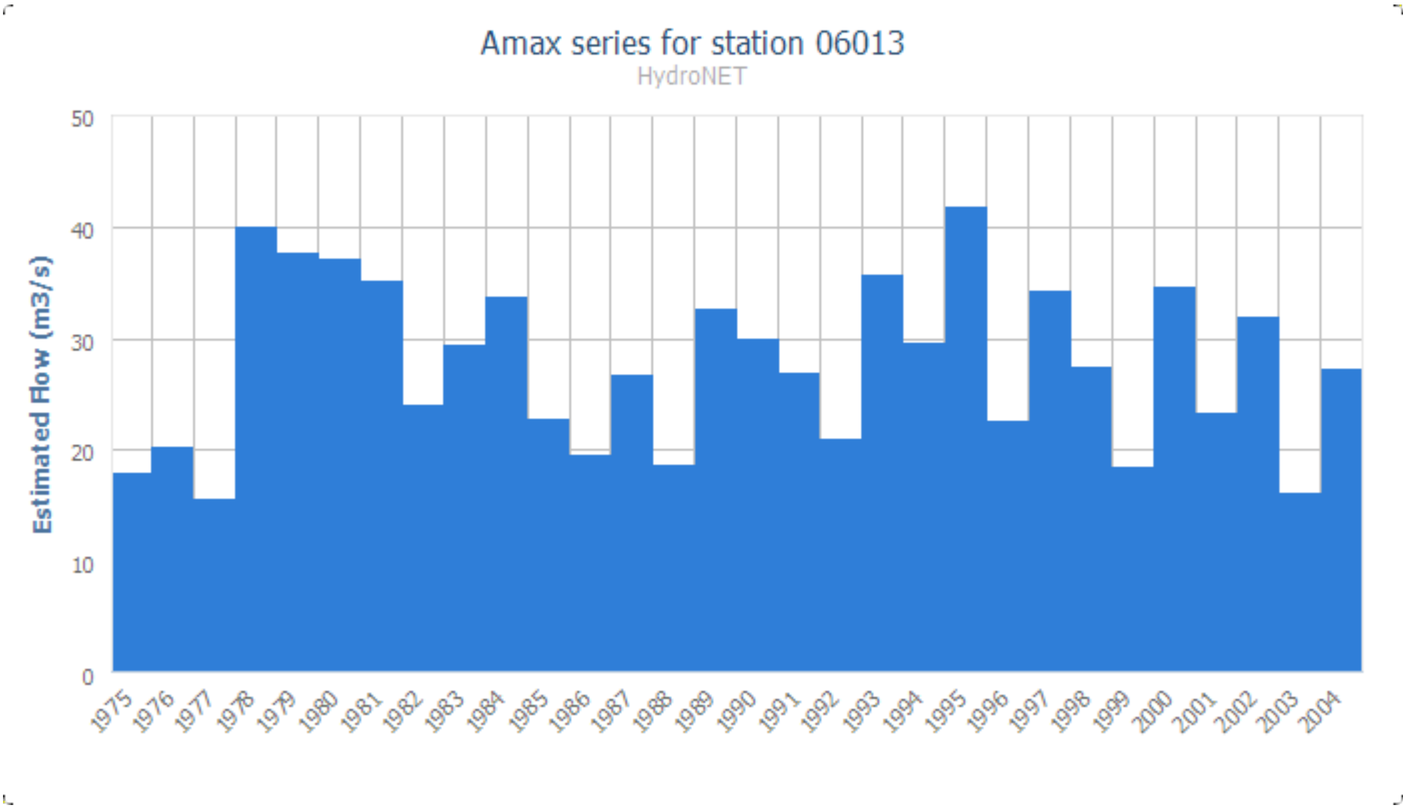
Attributes

Name	Unit	Value
Coordinate [X]		-714002.56465469
Coordinate [Y]		7142901.9394013
Station Number		06013
Location		CHARLEVILLE
Water Body		DEE
Catchment		Glyde & Dee
Hydrometric Area		6
Organisation		OPW
FSU Rating Classification		A1
Drainage works	year	1950-57
Contributing Catchment Area	km^2	309.1472
Center Northing	m	287060
Center Easting	m	287730
Northing	m	290750
Easting	m	304411
A-Max series gap in years	year	0
A-Max series number of years	year	30
A-Max series number of usable years	year	30
A-Max series end year	year	2004
A-Max series start year	year	1975
FARL		0.971
ALLUV		0.0523
PEAT		0.0001
FOREST		0.0244
PASTURE		0
S1085	m/km	2.58328
MSL	km	53.967
DRAIND	km/km^2	1.117
ALTBAR		0
NETLEN	km	345.391
T4		0.01187019679232
T3		0.019151845261223
SAAPE	mm	506.39
T2		0.15721341210169
ARTDRAIN2		0.782
ARTDRAIN		0.1688
TAYSLO		0.205344
STMFRQ		275
BFISOIL		0.6165
SAAR	mm	873.08
RWSEG_CD		06_49
TOP_RWSEG		06_804
Bankfull		1.62 from survey
HGF	m^3/s	36
MAF	m^3/s	28.2
FAI		0.16
FLATWET		0.6
URBEXT		0.009
HGF/QMED		1.3153087321885
x3857		-714002.56465469
y3857		7142901.9394013

centroidx3857		-742512.229174255
centroidy3857		7139058.32890722
Distance	km	12.2866383064581

Map

Amax Series Chart



QMED Estimates

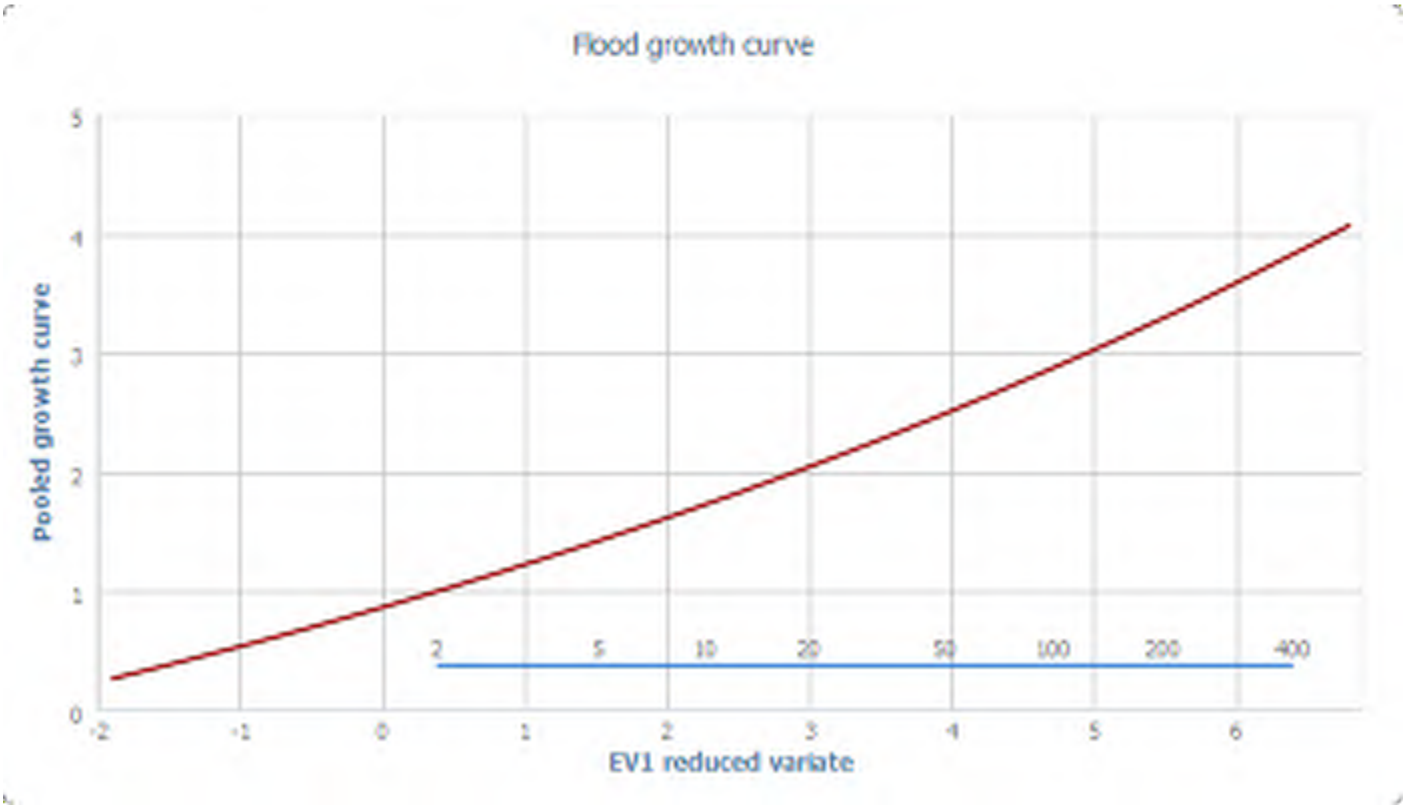
Subject rural QMED	0.13
Subject urban QMED	0.13
Pivotal gauged QMED	27.36
Pivotal adjustment factor QMED	0.64
Subject adjusted QMED	**0.08**

Pooling Group

Station	Amax years
09011 FRANKFORT (Post 21/08/19	16
10022 CARRICKMINES	17
08005 KINSALEY HALL	18
25034 ROCHFORT	26
08012 BALLYBOGHIL	19
10021 COMMONS ROAD	24
08002 NAUL	21
09002 LUCAN	25
09035 KILLEEN ROAD	9
16051 CLOBANNA	13

25040 ROSCREA	19
24022 HOSPITAL	20
06031 CURRALHIR	18
06030 BALLYGOLY	27
14009 CUSHINA	25
30020 BALLYHAUNIS	16
08009 BALHEARY	15
26022 KILMORE	33
06033 CONEYBURROW BR.	25
26058 BALLINRINK BR.	24
22009 WHITE BRIDGE	24
36031 LISDARN	30
08007 ASHBOURNE	15
13002 FOULKS MILL	19

Selected Flood Growth Curve



Pooled growth curve	EV1 reduced variate
0.27	-1.92
0.32	-1.75
0.34	-1.66
0.36	-1.6
0.38	-1.55
0.39	-1.5
0.4	-1.47
0.41	-1.43
0.42	-1.4
0.43	-1.37
0.44	-1.35
0.44	-1.33
0.45	-1.3
0.46	-1.28
0.46	-1.26
0.47	-1.24
0.47	-1.22
0.48	-1.21
0.48	-1.19
0.49	-1.17
0.49	-1.16
0.5	-1.14
0.5	-1.13
0.51	-1.12
0.51	-1.1
0.52	-1.09
0.52	-1.08
0.52	-1.06
0.53	-1.05

0.53	-1.04
0.54	-1.03
0.54	-1.01
0.54	-1
0.55	-0.99
0.55	-0.98
0.55	-0.97
0.56	-0.96
0.56	-0.95
0.56	-0.94
0.57	-0.93
0.57	-0.92
0.57	-0.91
0.58	-0.9
0.58	-0.89
0.58	-0.88
0.58	-0.87
0.59	-0.86
0.59	-0.85
0.59	-0.85
0.6	-0.84
0.6	-0.83
0.6	-0.82
0.6	-0.81
0.61	-0.8
0.61	-0.79
0.61	-0.79
0.61	-0.78
0.62	-0.77
0.62	-0.76
0.62	-0.75
0.62	-0.75
0.63	-0.74
0.63	-0.73
0.63	-0.72
0.63	-0.71
0.64	-0.71
0.64	-0.7
0.64	-0.69
0.64	-0.68
0.65	-0.68
0.65	-0.67
0.65	-0.66
0.65	-0.66
0.66	-0.65
0.66	-0.64
0.66	-0.63
0.66	-0.63
0.67	-0.62
0.67	-0.61
0.67	-0.61
0.67	-0.6
0.67	-0.59
0.68	-0.59
0.68	-0.58
0.68	-0.57
0.68	-0.57

0.68	-0.56
0.69	-0.55
0.69	-0.55
0.69	-0.54
0.69	-0.53
0.7	-0.53
0.7	-0.52
0.7	-0.51
0.7	-0.51
0.7	-0.5
0.71	-0.5
0.71	-0.49
0.71	-0.48
0.71	-0.48
0.71	-0.47
0.72	-0.46
0.72	-0.46
0.72	-0.45
0.72	-0.45
0.72	-0.44
0.73	-0.43
0.73	-0.43
0.73	-0.42
0.73	-0.41
0.73	-0.41
0.74	-0.4
0.74	-0.4
0.74	-0.39
0.74	-0.39
0.74	-0.38
0.75	-0.37
0.75	-0.37
0.75	-0.36
0.75	-0.36
0.75	-0.35
0.76	-0.34
0.76	-0.34
0.76	-0.33
0.76	-0.33
0.76	-0.32
0.77	-0.31
0.77	-0.31
0.77	-0.3
0.77	-0.3
0.77	-0.29
0.78	-0.29
0.78	-0.28
0.78	-0.27
0.78	-0.27
0.78	-0.26
0.78	-0.26
0.79	-0.25
0.79	-0.25
0.79	-0.24
0.79	-0.24
0.79	-0.23
0.8	-0.22

0.8	-0.22
0.8	-0.21
0.8	-0.21
0.8	-0.2
0.81	-0.2
0.81	-0.19
0.81	-0.18
0.81	-0.18
0.81	-0.17
0.81	-0.17
0.82	-0.16
0.82	-0.16
0.82	-0.15
0.82	-0.15
0.82	-0.14
0.83	-0.14
0.83	-0.13
0.83	-0.12
0.83	-0.12
0.83	-0.11
0.84	-0.11
0.84	-0.1
0.84	-0.1
0.84	-0.09
0.84	-0.09
0.84	-0.08
0.85	-0.07
0.85	-0.07
0.85	-0.06
0.85	-0.06
0.85	-0.05
0.86	-0.05
0.86	-0.04
0.86	-0.04
0.86	-0.03
0.86	-0.03
0.87	-0.02
0.87	-0.01
0.87	-0.01
0.87	0
0.87	0
0.87	0.01
0.88	0.01
0.88	0.02
0.88	0.02
0.88	0.03
0.88	0.03
0.89	0.04
0.89	0.05
0.89	0.05
0.89	0.06
0.89	0.06
0.9	0.07
0.9	0.07
0.9	0.08
0.9	0.08
0.9	0.09

0.9	0.09
0.91	0.1
0.91	0.11
0.91	0.11
0.91	0.12
0.91	0.12
0.92	0.13
0.92	0.13
0.92	0.14
0.92	0.14
0.92	0.15
0.93	0.16
0.93	0.16
0.93	0.17
0.93	0.17
0.93	0.18
0.94	0.18
0.94	0.19
0.94	0.19
0.94	0.2
0.94	0.2
0.95	0.21
0.95	0.22
0.95	0.22
0.95	0.23
0.95	0.23
0.95	0.24
0.96	0.24
0.96	0.25
0.96	0.26
0.96	0.26
0.96	0.27
0.97	0.27
0.97	0.28
0.97	0.28
0.97	0.29
0.97	0.29
0.98	0.3
0.98	0.31
0.98	0.31
0.98	0.32
0.98	0.32
0.99	0.33
0.99	0.33
0.99	0.34
0.99	0.35
0.99	0.35
1	0.36
1	0.36
1	0.37
1	0.38
1.01	0.38
1.01	0.39
1.01	0.39
1.01	0.4
1.01	0.4
1.02	0.41

1.02	0.42
1.02	0.42
1.02	0.43
1.02	0.43
1.03	0.44
1.03	0.45
1.03	0.45
1.03	0.46
1.03	0.46
1.04	0.47
1.04	0.48
1.04	0.48
1.04	0.49
1.05	0.49
1.05	0.5
1.05	0.51
1.05	0.51
1.05	0.52
1.06	0.52
1.06	0.53
1.06	0.54
1.06	0.54
1.07	0.55
1.07	0.56
1.07	0.56
1.07	0.57
1.07	0.57
1.08	0.58
1.08	0.59
1.08	0.59
1.08	0.6
1.09	0.61
1.09	0.61
1.09	0.62
1.09	0.62
1.09	0.63
1.1	0.64
1.1	0.64
1.1	0.65
1.1	0.66
1.11	0.66
1.11	0.67
1.11	0.68
1.11	0.68
1.12	0.69
1.12	0.7
1.12	0.7
1.12	0.71
1.13	0.72
1.13	0.72
1.13	0.73
1.13	0.74
1.14	0.74
1.14	0.75
1.14	0.76
1.14	0.76
1.15	0.77

1.15	0.78
1.15	0.78
1.15	0.79
1.16	0.8
1.16	0.81
1.16	0.81
1.16	0.82
1.17	0.83
1.17	0.83
1.17	0.84
1.17	0.85
1.18	0.85
1.18	0.86
1.18	0.87
1.19	0.88
1.19	0.88
1.19	0.89
1.19	0.9
1.2	0.91
1.2	0.91
1.2	0.92
1.2	0.93
1.21	0.94
1.21	0.94
1.21	0.95
1.22	0.96
1.22	0.97
1.22	0.97
1.22	0.98
1.23	0.99
1.23	1
1.23	1.01
1.24	1.01
1.24	1.02
1.24	1.03
1.25	1.04
1.25	1.05
1.25	1.05
1.25	1.06
1.26	1.07
1.26	1.08
1.26	1.09
1.27	1.1
1.27	1.1
1.27	1.11
1.28	1.12
1.28	1.13
1.28	1.14
1.29	1.15
1.29	1.16
1.29	1.16
1.3	1.17
1.3	1.18
1.3	1.19
1.31	1.2
1.31	1.21
1.31	1.22

1.32	1.23
1.32	1.24
1.32	1.25
1.33	1.25
1.33	1.26
1.34	1.27
1.34	1.28
1.34	1.29
1.35	1.3
1.35	1.31
1.35	1.32
1.36	1.33
1.36	1.34
1.37	1.35
1.37	1.36
1.37	1.37
1.38	1.38
1.38	1.39
1.39	1.4
1.39	1.41
1.39	1.42
1.4	1.43
1.4	1.45
1.41	1.46
1.41	1.47
1.41	1.48
1.42	1.49
1.42	1.5
1.43	1.51
1.43	1.52
1.44	1.53
1.44	1.55
1.45	1.56
1.45	1.57
1.46	1.58
1.46	1.59
1.46	1.61
1.47	1.62
1.47	1.63
1.48	1.64
1.48	1.66
1.49	1.67
1.49	1.68
1.5	1.69
1.51	1.71
1.51	1.72
1.52	1.73
1.52	1.75
1.53	1.76
1.53	1.78
1.54	1.79
1.54	1.8
1.55	1.82
1.56	1.83
1.56	1.85
1.57	1.86
1.57	1.88

1.58	1.89
1.59	1.91
1.59	1.93
1.6	1.94
1.61	1.96
1.61	1.97
1.62	1.99
1.63	2.01
1.63	2.03
1.64	2.04
1.65	2.06
1.66	2.08
1.66	2.1
1.67	2.12
1.68	2.13
1.69	2.15
1.7	2.17
1.7	2.19
1.71	2.21
1.72	2.23
1.73	2.26
1.74	2.28
1.75	2.3
1.76	2.32
1.77	2.34
1.78	2.37
1.79	2.39
1.8	2.42
1.81	2.44
1.82	2.47
1.83	2.49
1.84	2.52
1.85	2.55
1.86	2.57
1.88	2.6
1.89	2.63
1.9	2.66
1.92	2.69
1.93	2.73
1.95	2.76
1.96	2.79
1.98	2.83
1.99	2.87
2.01	2.9
2.03	2.94
2.05	2.98
2.06	3.03
2.08	3.07
2.11	3.12
2.13	3.17
2.15	3.22
2.18	3.27
2.2	3.33
2.23	3.39
2.26	3.45
2.29	3.52
2.32	3.59

2.36	3.67
2.4	3.75
2.44	3.84
2.49	3.94
2.55	4.06
2.61	4.18
2.68	4.32
2.77	4.49
2.87	4.69
3	4.94
3.18	5.27
3.46	5.76
4.07	6.79

Adopted Growth Factors

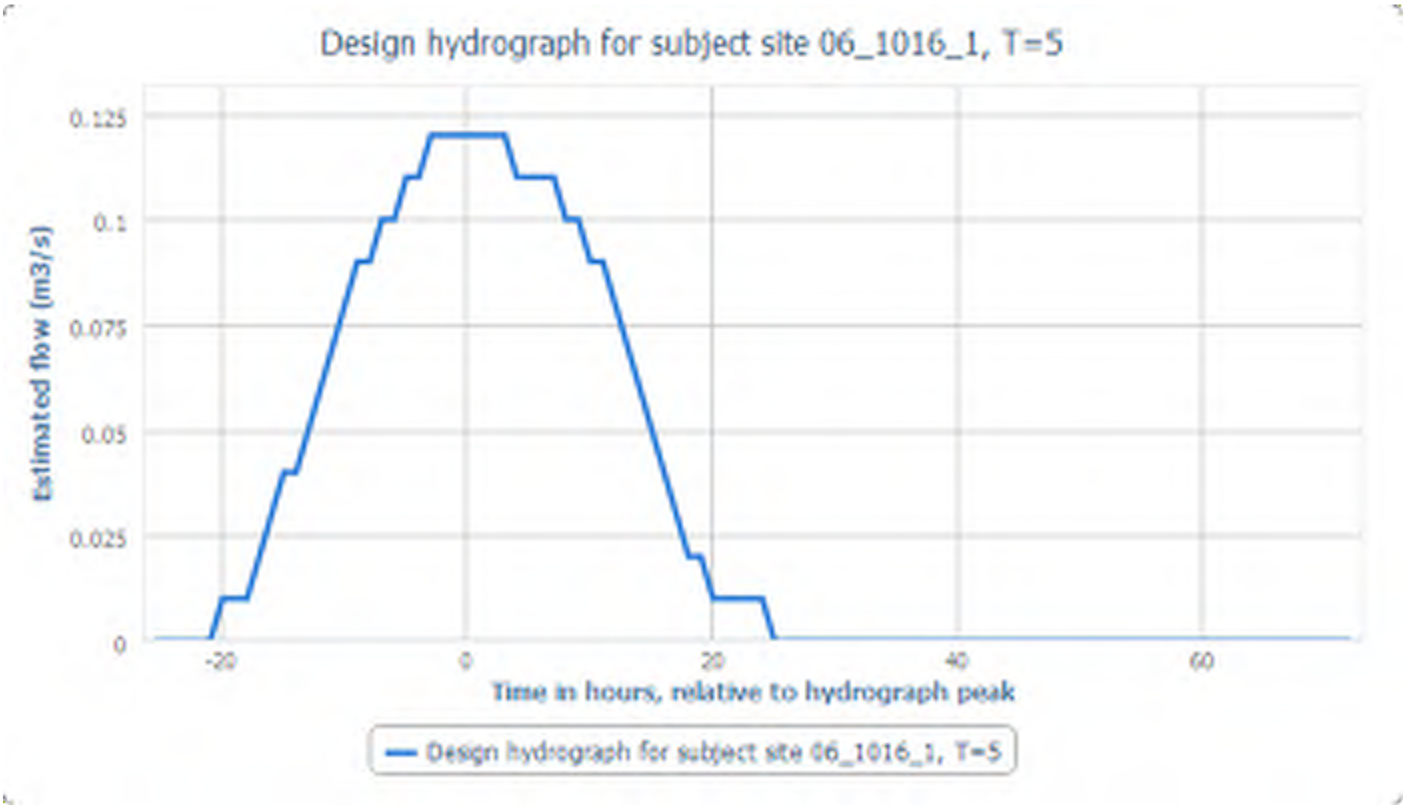
Return Period	Growth Factor	Design Peak Flow (m^3/s)
1.3	0.74	0.06
2	1	0.08
5	1.42	0.12
10	1.73	0.15
20	2.04	0.17
30	2.23	0.19
50	2.47	0.21
100	2.82	0.24
200	3.19	0.27
500	3.72	0.31
1000	4.15	0.35

Hydrograph Width Estimation Summary

Name	Value
Pivotal site	35001 "BALLYNACARROW"
Adjustment type	The user adopted the original PCD hydrograph
Transfer type	The user adjusted the subject site estimate with the pivotal site deformation factor
Deformation factor	1
Custom deformation factor	1
Accepted n	5.11517179272732
Accepted Tr	25.5082118985611
Accepted C	4.2934043970531

Hydrograph Plots

Return Period: 5

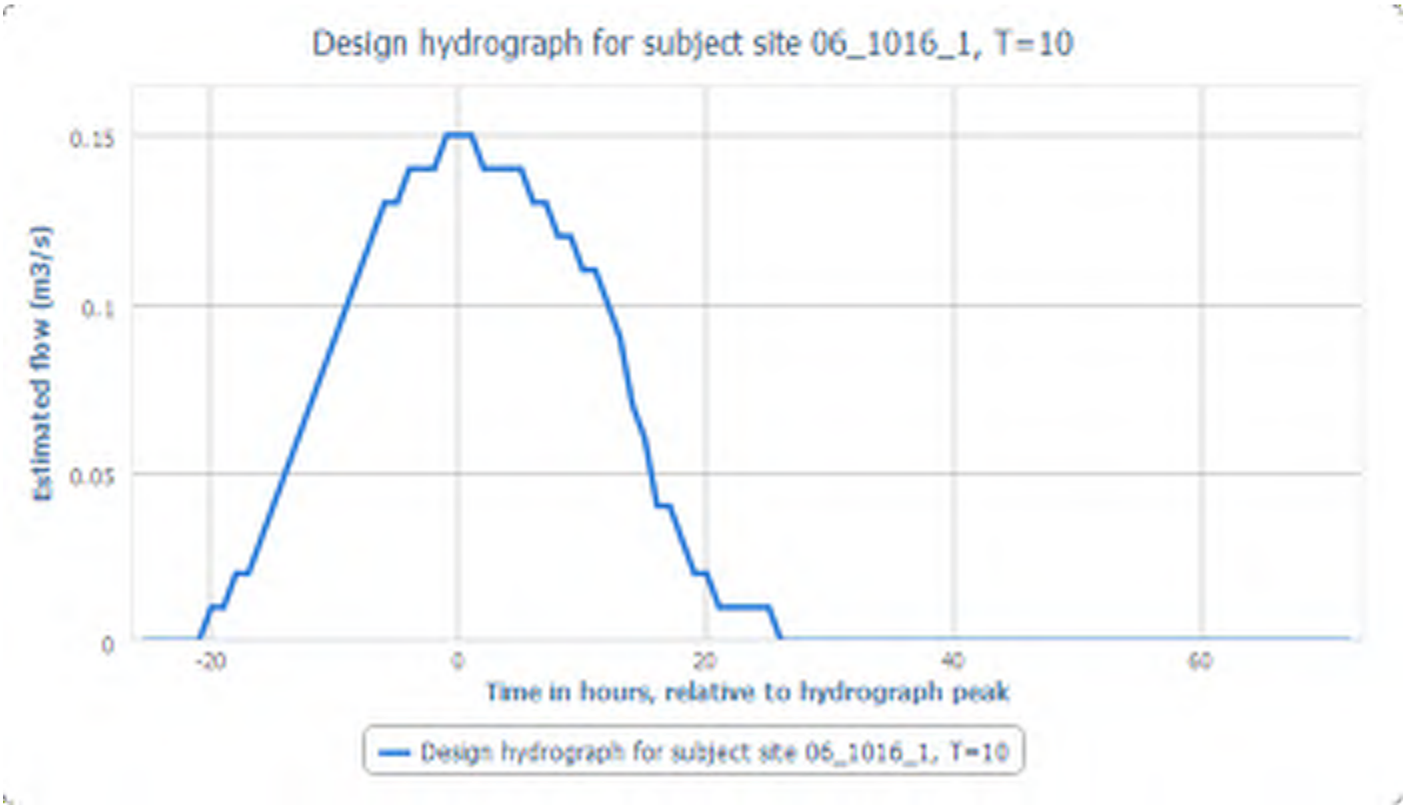


Hours relative to hydrograph peak	Estimated flow (m3/s)
-25.51	0
-25	0
-24	0
-23	0
-22	0
-21	0
-20	0.01
-19	0.01
-18	0.01
-17	0.02
-16	0.03
-15	0.04
-14	0.04
-13	0.05
-12	0.06
-11	0.07
-10	0.08
-9	0.09
-8	0.09
-7	0.1
-6	0.1
-5	0.11
-4	0.11
-3	0.12
-2	0.12
-1	0.12
0	0.12
1	0.12
2	0.12

3	0.12
4	0.11
5	0.11
6	0.11
7	0.11
8	0.1
9	0.1
10	0.09
11	0.09
12	0.08
13	0.07
14	0.06
15	0.05
16	0.04
17	0.03
18	0.02
19	0.02
20	0.01
21	0.01
22	0.01
23	0.01
24	0.01
25	0
26	0
27	0
28	0
29	0
30	0
31	0
32	0
33	0
34	0
35	0
36	0
37	0
38	0
39	0
40	0
41	0
42	0
43	0
44	0
45	0
46	0
47	0
48	0
49	0
50	0
51	0
52	0
53	0
54	0
55	0
56	0
57	0
58	0
59	0

60	0
61	0
62	0
63	0
64	0
65	0
66	0
67	0
68	0
69	0
70	0
71	0
72	0

Return Period: 10

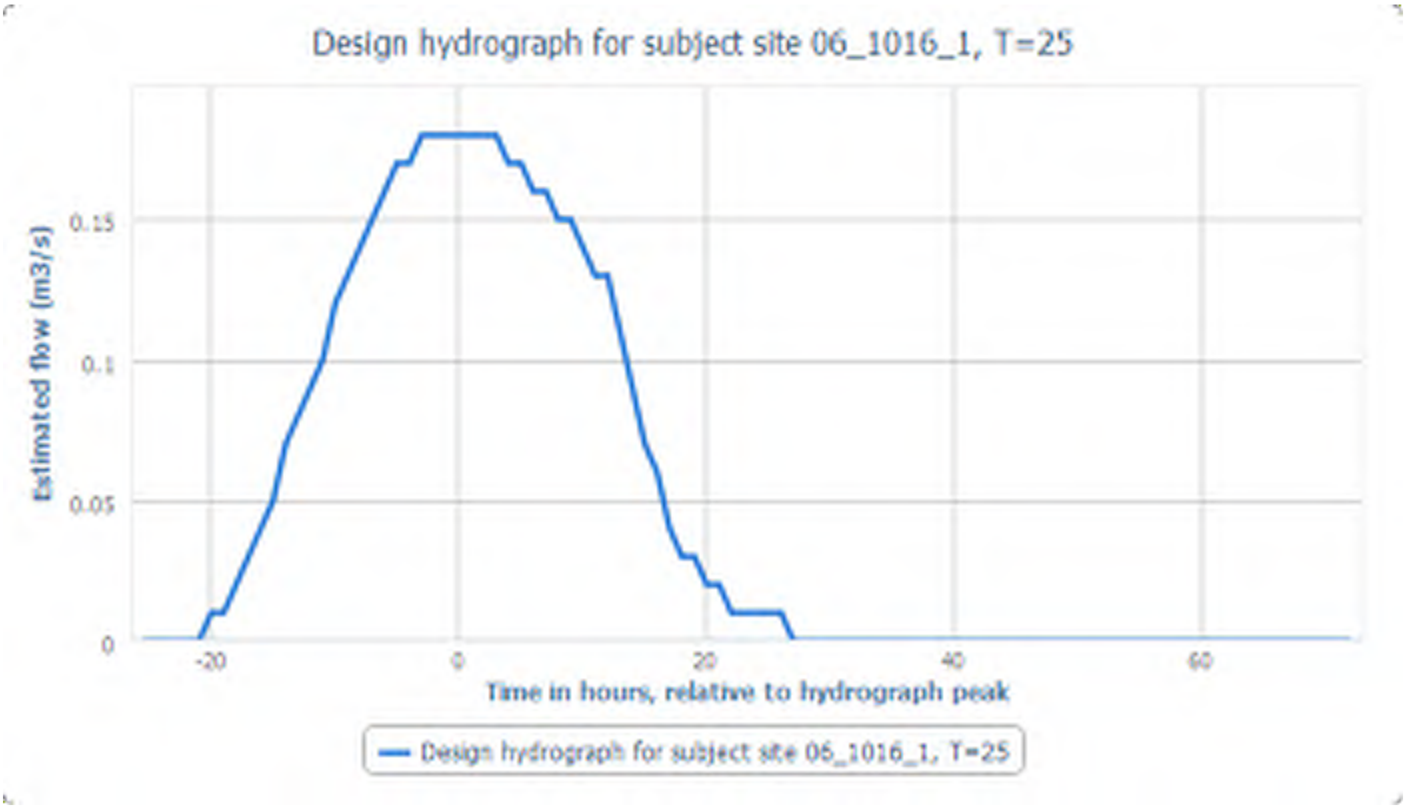


Hours relative to hydrograph peak	Estimated flow (m3/s)
-25.51	0
-25	0
-24	0
-23	0
-22	0
-21	0
-20	0.01
-19	0.01
-18	0.02
-17	0.02
-16	0.03
-15	0.04
-14	0.05
-13	0.06
-12	0.07
-11	0.08
-10	0.09
-9	0.1
-8	0.11
-7	0.12
-6	0.13
-5	0.13
-4	0.14
-3	0.14
-2	0.14
-1	0.15
0	0.15
1	0.15
2	0.14
3	0.14
4	0.14

5	0.14
6	0.13
7	0.13
8	0.12
9	0.12
10	0.11
11	0.11
12	0.1
13	0.09
14	0.07
15	0.06
16	0.04
17	0.04
18	0.03
19	0.02
20	0.02
21	0.01
22	0.01
23	0.01
24	0.01
25	0.01
26	0
27	0
28	0
29	0
30	0
31	0
32	0
33	0
34	0
35	0
36	0
37	0
38	0
39	0
40	0
41	0
42	0
43	0
44	0
45	0
46	0
47	0
48	0
49	0
50	0
51	0
52	0
53	0
54	0
55	0
56	0
57	0
58	0
59	0
60	0
61	0

62	0
63	0
64	0
65	0
66	0
67	0
68	0
69	0
70	0
71	0
72	0

Return Period: 25

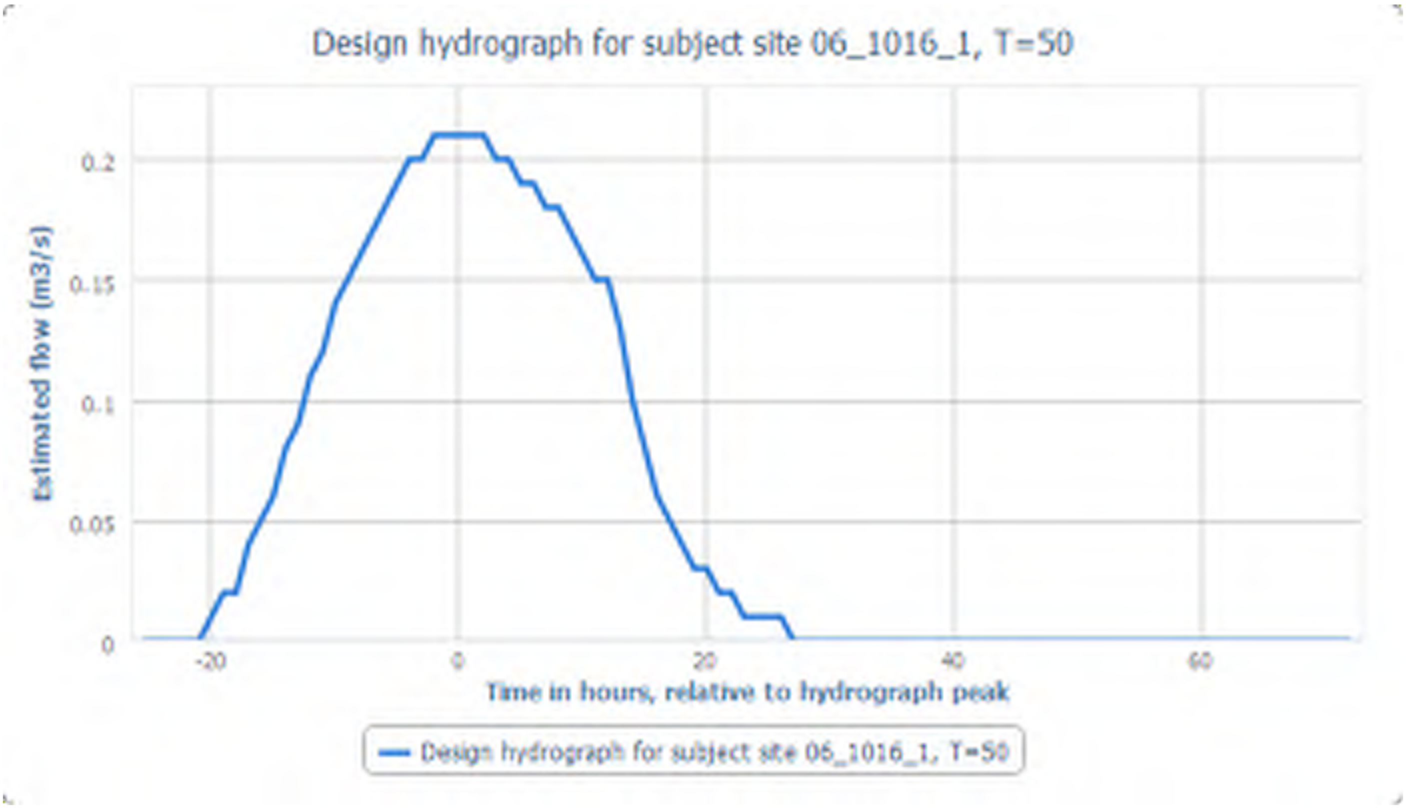


Hours relative to hydrograph peak	Estimated flow (m3/s)
-25.51	0
-25	0
-24	0
-23	0
-22	0
-21	0
-20	0.01
-19	0.01
-18	0.02
-17	0.03
-16	0.04
-15	0.05
-14	0.07
-13	0.08
-12	0.09
-11	0.1
-10	0.12
-9	0.13
-8	0.14
-7	0.15
-6	0.16
-5	0.17
-4	0.17
-3	0.18
-2	0.18
-1	0.18
0	0.18
1	0.18
2	0.18
3	0.18
4	0.17

5	0.17
6	0.16
7	0.16
8	0.15
9	0.15
10	0.14
11	0.13
12	0.13
13	0.11
14	0.09
15	0.07
16	0.06
17	0.04
18	0.03
19	0.03
20	0.02
21	0.02
22	0.01
23	0.01
24	0.01
25	0.01
26	0.01
27	0
28	0
29	0
30	0
31	0
32	0
33	0
34	0
35	0
36	0
37	0
38	0
39	0
40	0
41	0
42	0
43	0
44	0
45	0
46	0
47	0
48	0
49	0
50	0
51	0
52	0
53	0
54	0
55	0
56	0
57	0
58	0
59	0
60	0
61	0

62	0
63	0
64	0
65	0
66	0
67	0
68	0
69	0
70	0
71	0
72	0

Return Period: 50

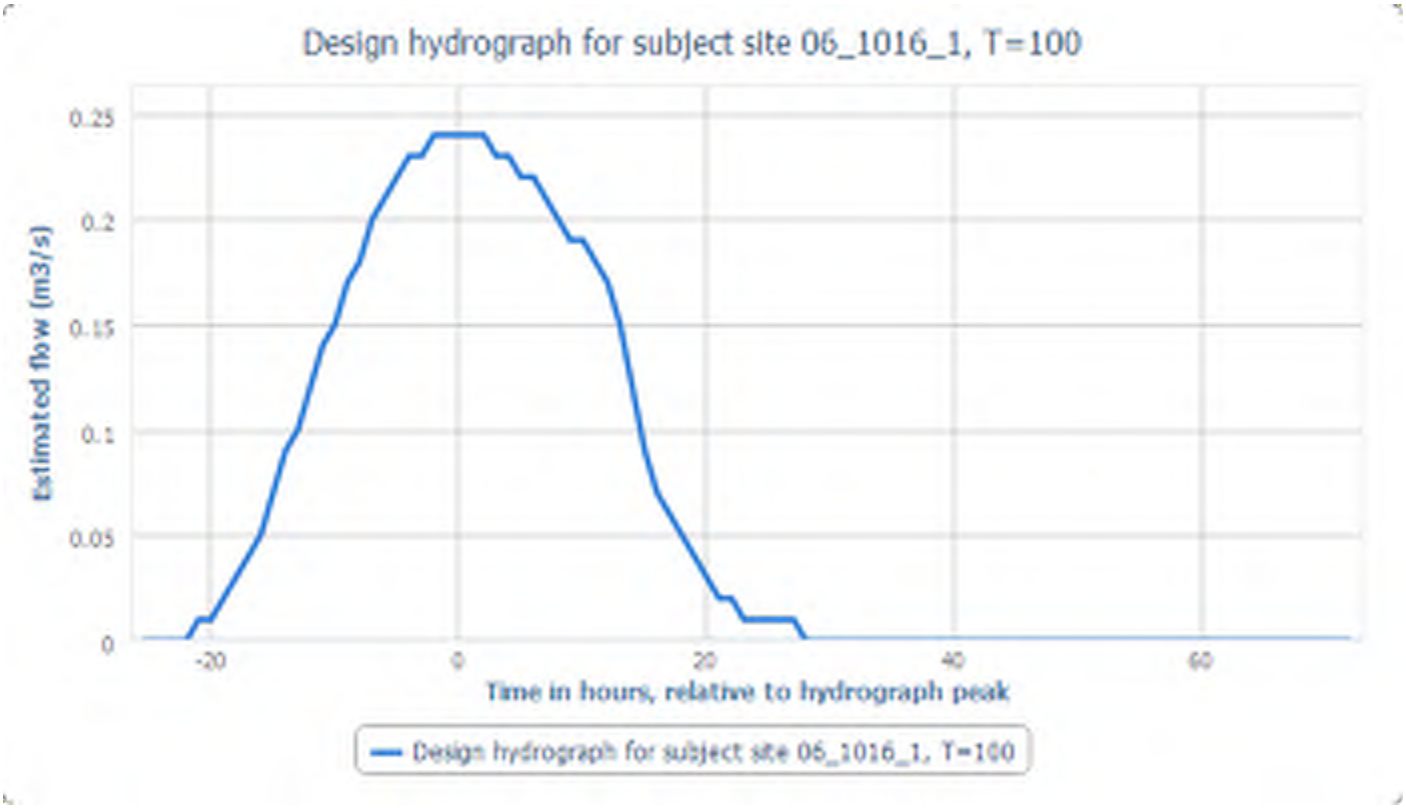


Hours relative to hydrograph peak	Estimated flow (m3/s)
-25.51	0
-25	0
-24	0
-23	0
-22	0
-21	0
-20	0.01
-19	0.02
-18	0.02
-17	0.04
-16	0.05
-15	0.06
-14	0.08
-13	0.09
-12	0.11
-11	0.12
-10	0.14
-9	0.15
-8	0.16
-7	0.17
-6	0.18
-5	0.19
-4	0.2
-3	0.2
-2	0.21
-1	0.21
0	0.21
1	0.21
2	0.21
3	0.2
4	0.2

5	0.19
6	0.19
7	0.18
8	0.18
9	0.17
10	0.16
11	0.15
12	0.15
13	0.13
14	0.1
15	0.08
16	0.06
17	0.05
18	0.04
19	0.03
20	0.03
21	0.02
22	0.02
23	0.01
24	0.01
25	0.01
26	0.01
27	0
28	0
29	0
30	0
31	0
32	0
33	0
34	0
35	0
36	0
37	0
38	0
39	0
40	0
41	0
42	0
43	0
44	0
45	0
46	0
47	0
48	0
49	0
50	0
51	0
52	0
53	0
54	0
55	0
56	0
57	0
58	0
59	0
60	0
61	0

62	0
63	0
64	0
65	0
66	0
67	0
68	0
69	0
70	0
71	0
72	0

Return Period: 100

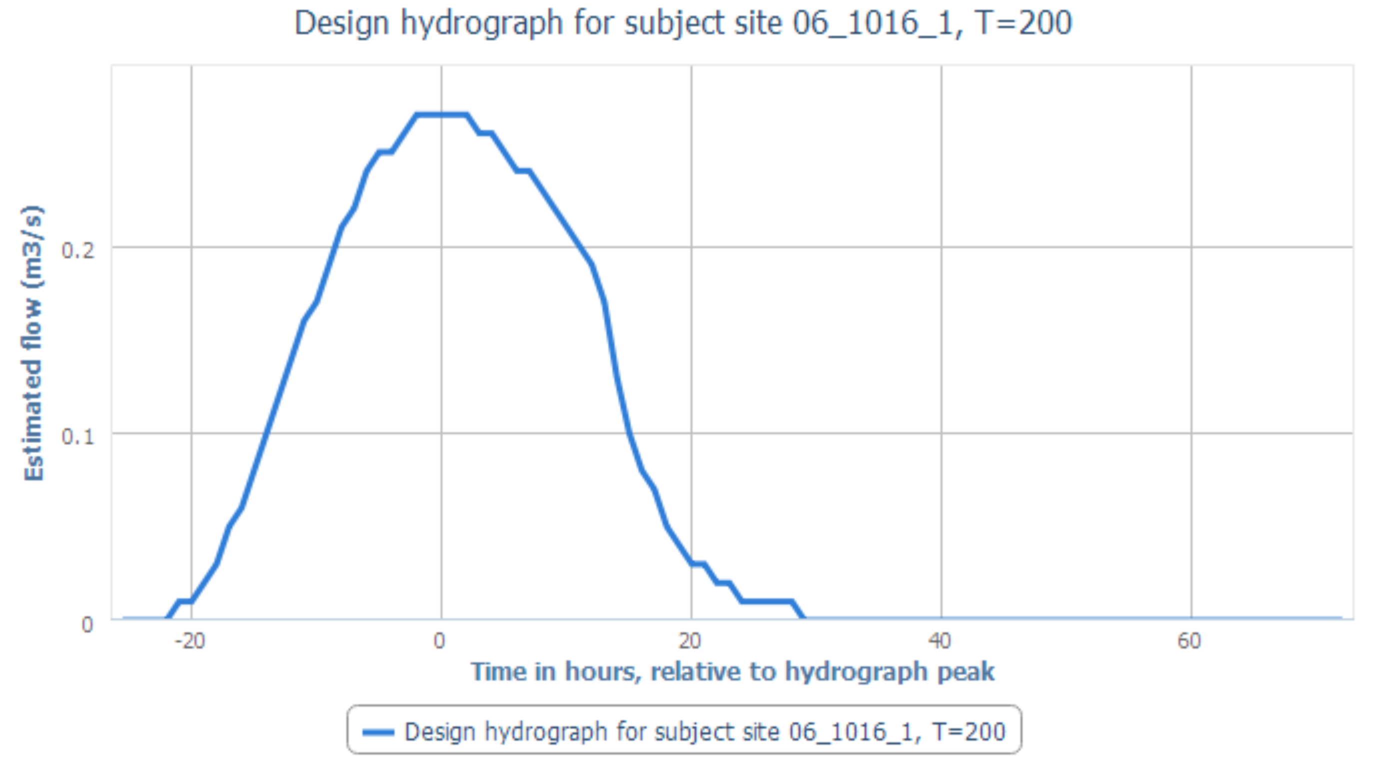


Hours relative to hydrograph peak	Estimated flow (m3/s)
-25.51	0
-25	0
-24	0
-23	0
-22	0
-21	0.01
-20	0.01
-19	0.02
-18	0.03
-17	0.04
-16	0.05
-15	0.07
-14	0.09
-13	0.1
-12	0.12
-11	0.14
-10	0.15
-9	0.17
-8	0.18
-7	0.2
-6	0.21
-5	0.22
-4	0.23
-3	0.23
-2	0.24
-1	0.24
0	0.24
1	0.24
2	0.24
3	0.23
4	0.23

5	0.22
6	0.22
7	0.21
8	0.2
9	0.19
10	0.19
11	0.18
12	0.17
13	0.15
14	0.12
15	0.09
16	0.07
17	0.06
18	0.05
19	0.04
20	0.03
21	0.02
22	0.02
23	0.01
24	0.01
25	0.01
26	0.01
27	0.01
28	0
29	0
30	0
31	0
32	0
33	0
34	0
35	0
36	0
37	0
38	0
39	0
40	0
41	0
42	0
43	0
44	0
45	0
46	0
47	0
48	0
49	0
50	0
51	0
52	0
53	0
54	0
55	0
56	0
57	0
58	0
59	0
60	0
61	0

62	0
63	0
64	0
65	0
66	0
67	0
68	0
69	0
70	0
71	0
72	0

Return Period: 200



Hours relative to hydrograph peak	Estimated flow (m3/s)
-25.51	0
-25	0
-24	0
-23	0
-22	0
-21	0.01
-20	0.01
-19	0.02
-18	0.03
-17	0.05
-16	0.06
-15	0.08
-14	0.1
-13	0.12
-12	0.14
-11	0.16
-10	0.17
-9	0.19
-8	0.21
-7	0.22
-6	0.24
-5	0.25
-4	0.25
-3	0.26
-2	0.27
-1	0.27
0	0.27
1	0.27
2	0.27
3	0.26
4	0.26

5	0.25
6	0.24
7	0.24
8	0.23
9	0.22
10	0.21
11	0.2
12	0.19
13	0.17
14	0.13
15	0.1
16	0.08
17	0.07
18	0.05
19	0.04
20	0.03
21	0.03
22	0.02
23	0.02
24	0.01
25	0.01
26	0.01
27	0.01
28	0.01
29	0
30	0
31	0
32	0
33	0
34	0
35	0
36	0
37	0
38	0
39	0
40	0
41	0
42	0
43	0
44	0
45	0
46	0
47	0
48	0
49	0
50	0
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52	0
53	0
54	0
55	0
56	0
57	0
58	0
59	0
60	0
61	0

62	0
63	0
64	0
65	0
66	0
67	0
68	0
69	0
70	0
71	0
72	0

IBIDEM Plots and Tables

No IBIDEM plots were saved by the user.

Audit Trail Report #11400 (19.153 N52 Ardee Catchment G)

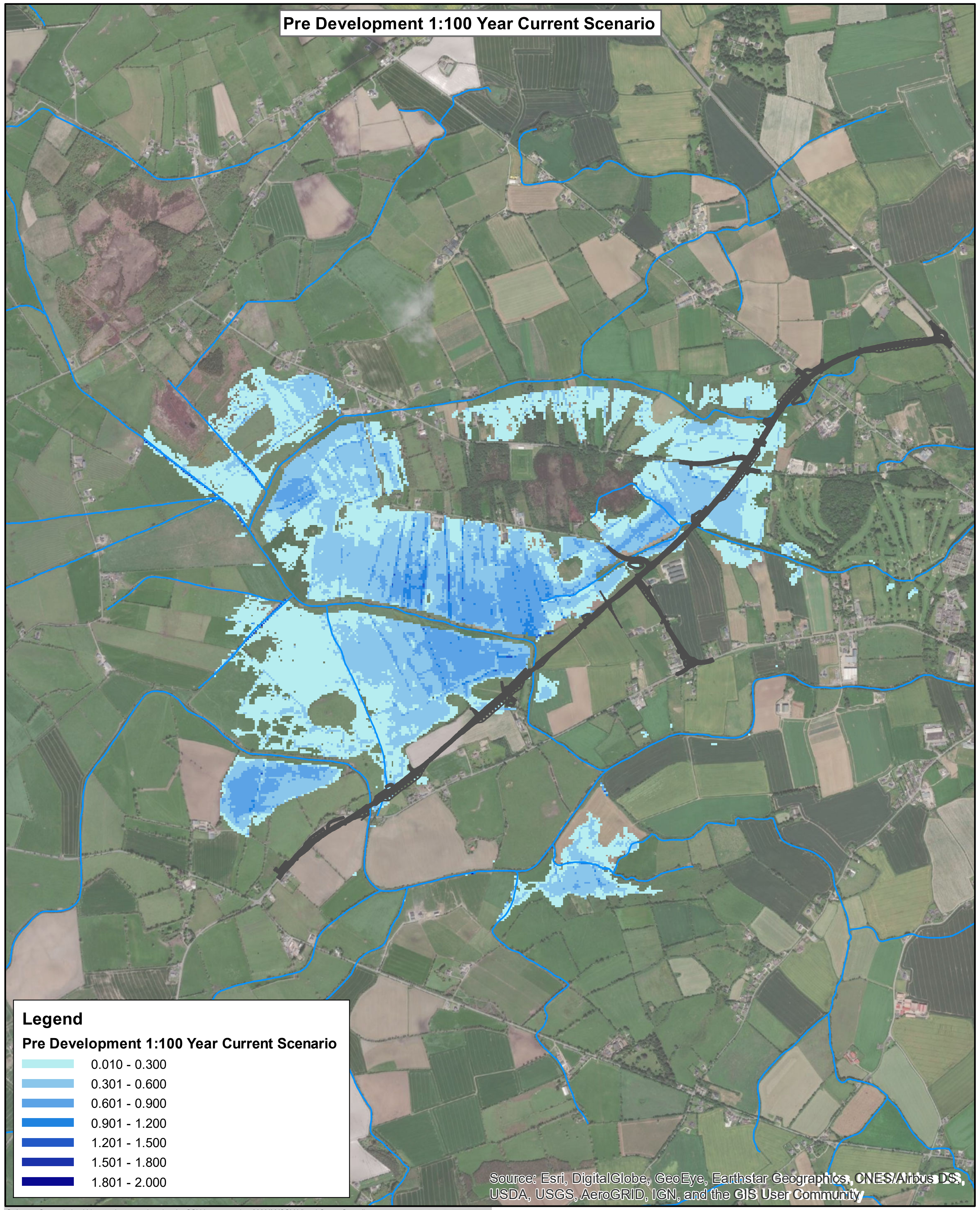
User ID:	warren.vokes@rod.ie
Name:	Vokes, Warren
Company:	
Address:	
Report date & time:	09-11-2020 11:51
Start of Calculation:	09-11-2020 12:44

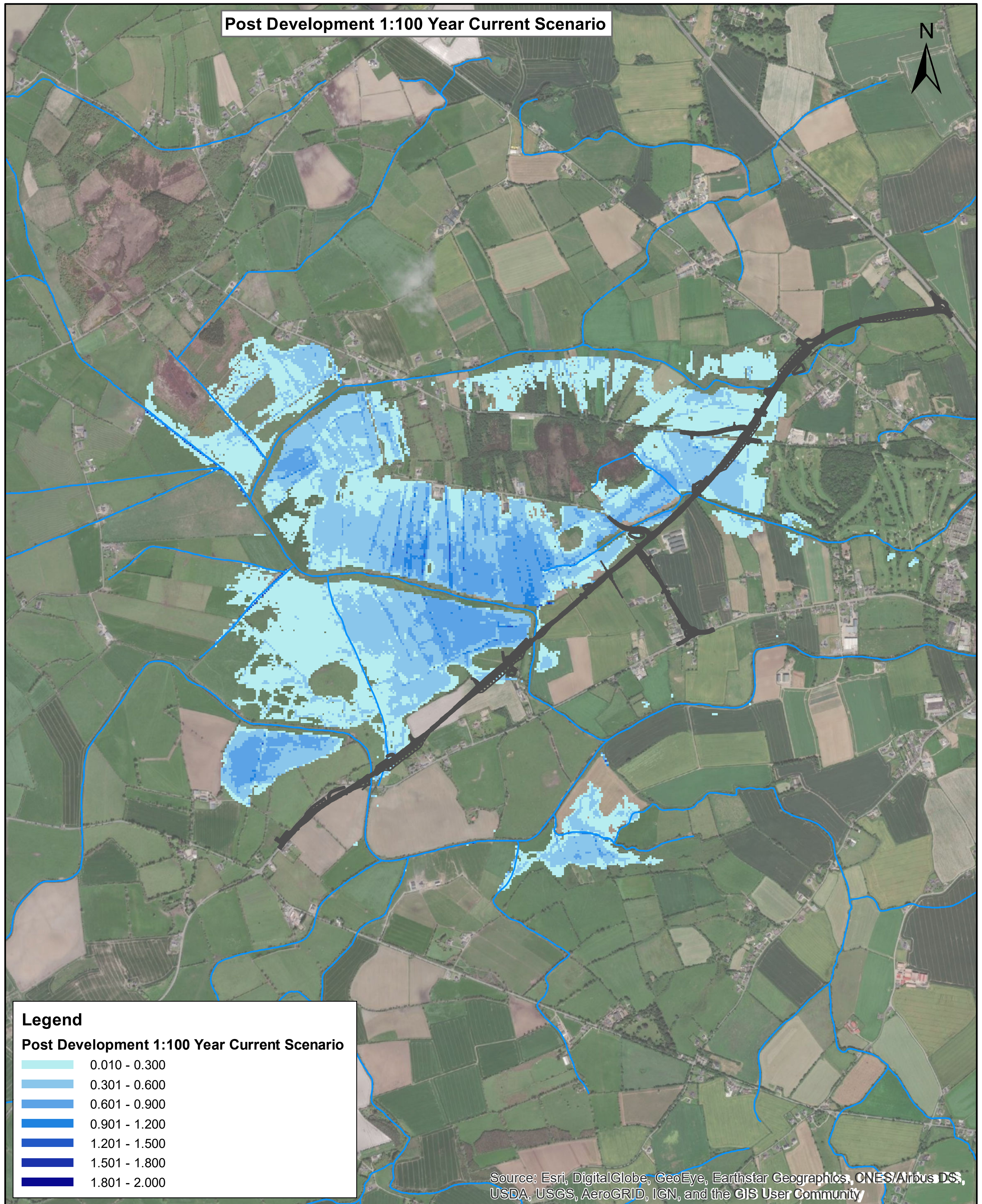
Decisions made by the user:

Decision	User comment	System information	Date
2.1 Subject site accepted	N/A	Location 06_1016_1	09-11-2020 12:45
2.2 Subject site with area < 25km2 accepted	N/A		09-11-2020 12:45
2.4 Pivotal site accepted	Reason for accepting: pivotal site is directly downstream of subject site Reason for ignoring warnings:	Station: 06013 CHARLEVILLE The user has been notified that 74 candidates where either hydrologically or geographically closer to the subject site than the chosen pivotal site. The user has accepted to reject these sites in preference of the chosen pivotal site.	09-11-2020 12:46
2.8 QMED data transfer performed	N/A		09-11-2020 12:46

2.11 Pooling group accepted	N/A	Pooled group accepted with the following stations: [09011, 10022, 08005, 25034, 08012, 10021, 08002, 09002, 09035, 16051, 25040, 24022, 06031, 06030, 14009, 30020, 08009, 26022, 06033, 26058, 22009, 36031, 08007, 13002] and distribution: GEV	09-11-2020 12:47
2.13 Module 2 finalized	N/A	Finished pooled analysis with the following distribution selected: GEV.	09-11-2020 12:47
3.1 Hydrograph pivotal site rejected	reasonable fit with pivotal site	Station: 35001 BALLYNACARROW	09-11-2020 12:48
3.3 Proceeded from hydrograph display	N/A		09-11-2020 12:48
3.3 Proceeded from hydrograph display	N/A		09-11-2020 12:48
3.4 Hydrograph inspected and adjusted	N/A	The user adopted the original PCD hydrograph	09-11-2020 12:48
3.5 Hydrograph transferred to subject site	N/A	The user adjusted the subject site estimate with n = 5.11517179272732, Tr = 25.5082118985611, C = 4.2934043970531	09-11-2020 12:49

APPENDIX E
FLOOD EXTENT DRAWINGS





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Civil - Structural - Transportation - Environmental

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www.rod.ie

Drawn	Designed	Checked	Approved	Suitability Code - Description
LA	WV	JPR	RJS	S0 - Work In Progress

Project Stage	Preliminary Design
Project Title	N52 ARDEE BYPASS
Drawing Title	Pre & Post Development Scenarios 1:100 Current Scenario (CS)

Drawing Number	Project	Originator	Volume	Location	Type	Role	Number
	N52A	ROD	EWE	SW_AE	DR	EN	30001

Scale (A1)	Date	Job No	Rev
1:25,000	November 2020	19.153	P0

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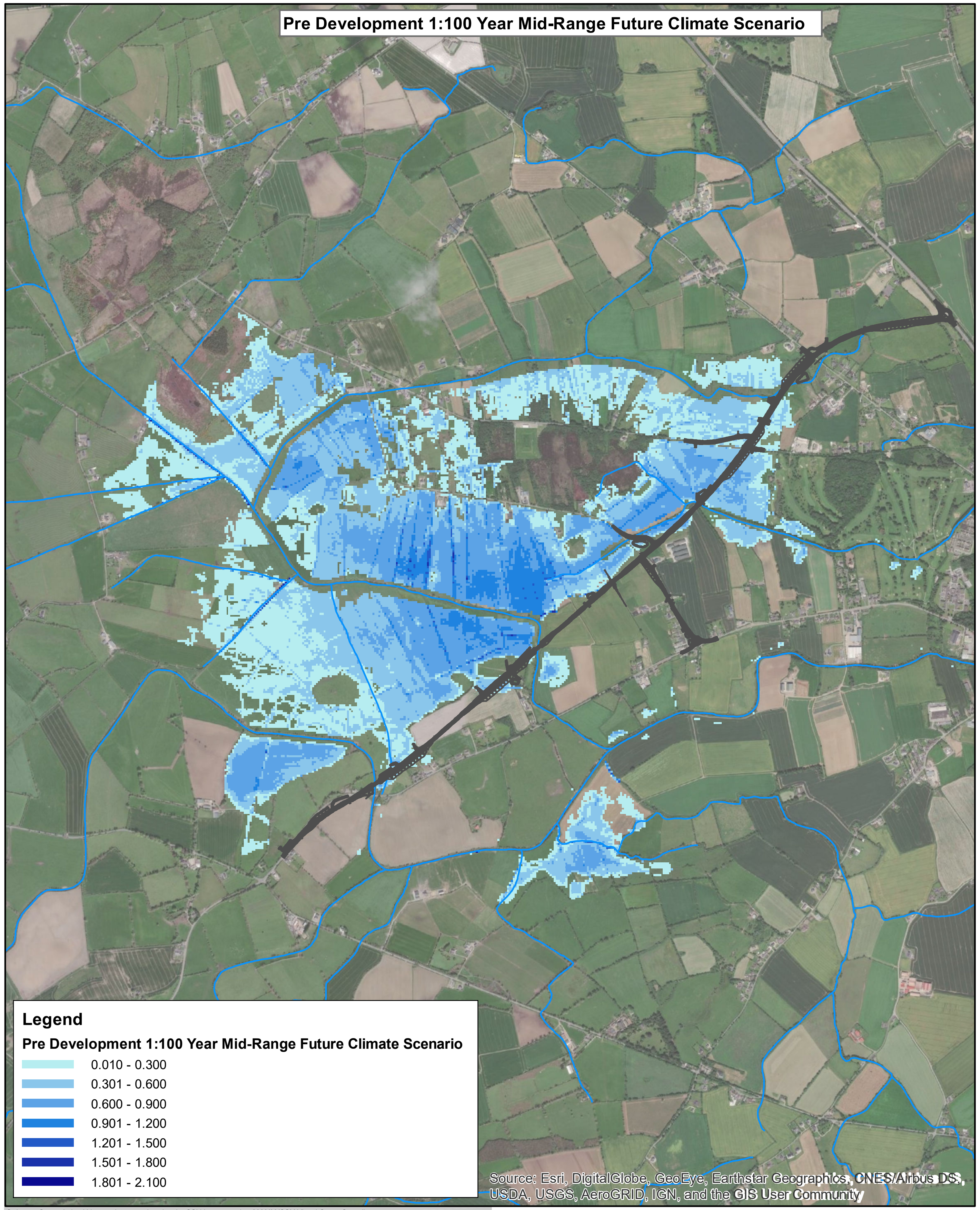

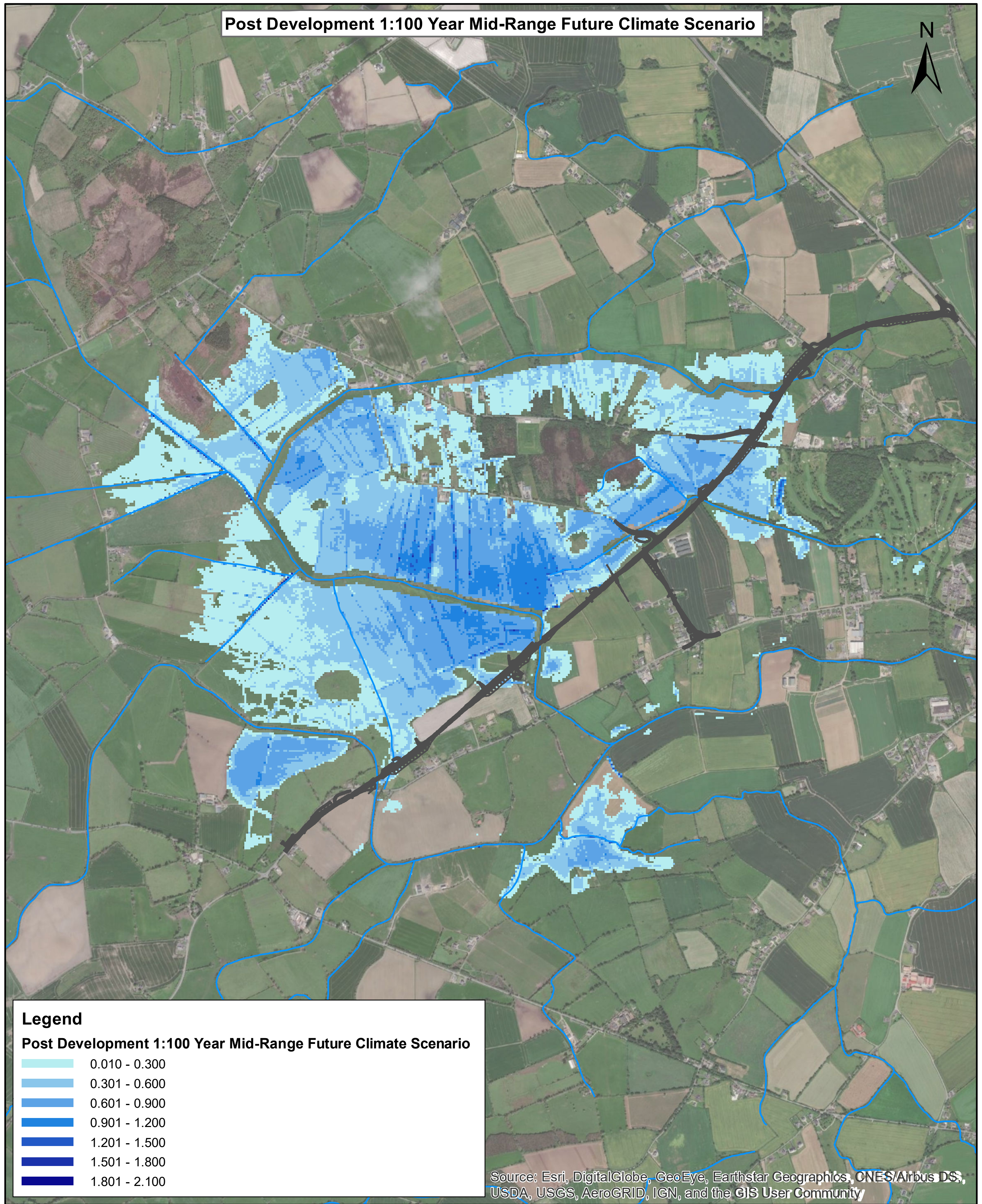

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LA	WV	JPR	RJS	S0 - Work In Progress

Project Stage	Preliminary Design
Project Title	N52 ARDEE BYPASS
Drawing Title	Pre & Post Development Scenarios 1:100 Year Mid-Range Future Climate Scenario (MRFS)

Drawing Number	Project	Originator	Volume	Location	Type	Role	Number
	N52A	ROD	EWE	SW_AE	DR	EN	30002

Scale (A1) 1:25,000 | Date: November 2020 | Job No: 19.153 | Rev: P0

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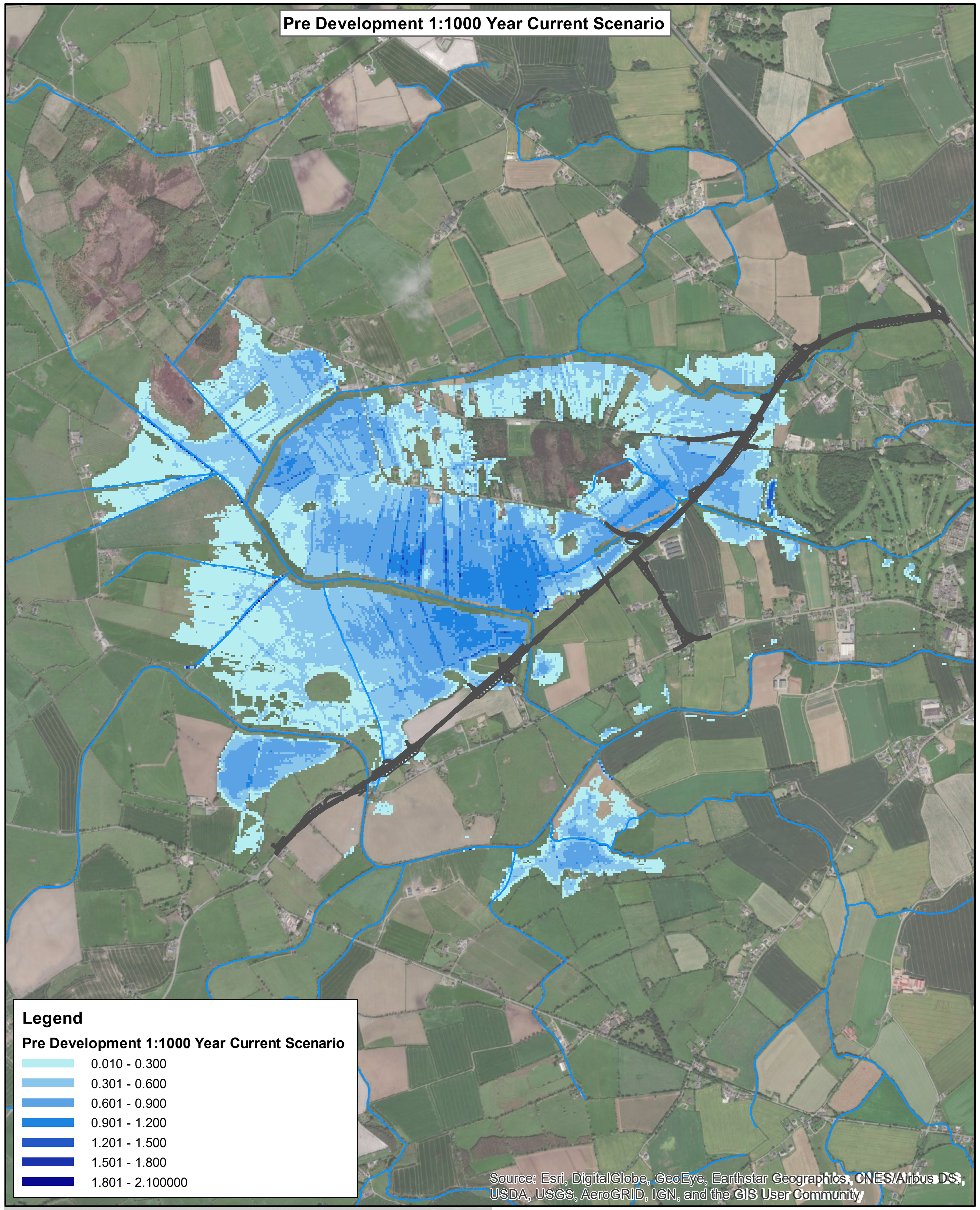

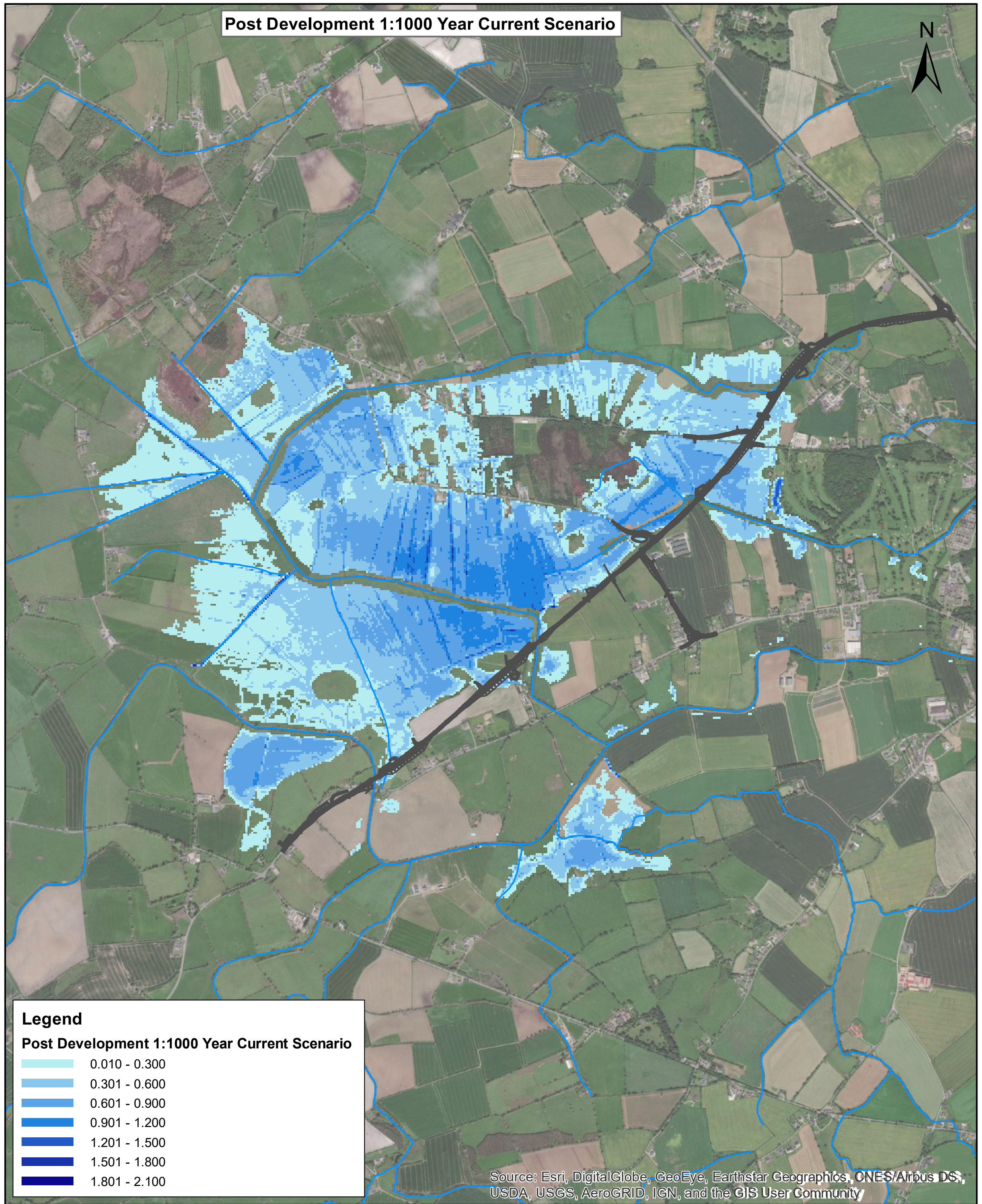

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Project Stage	Preliminary Design
Project Title	N52 ARDEE BYPASS
Drawing Title	Pre & Post Development Scenarios 1:1000 Year Current Scenario (CS)

Drawing Number	Project	Originator	Volume	Location	Type	Role	Number
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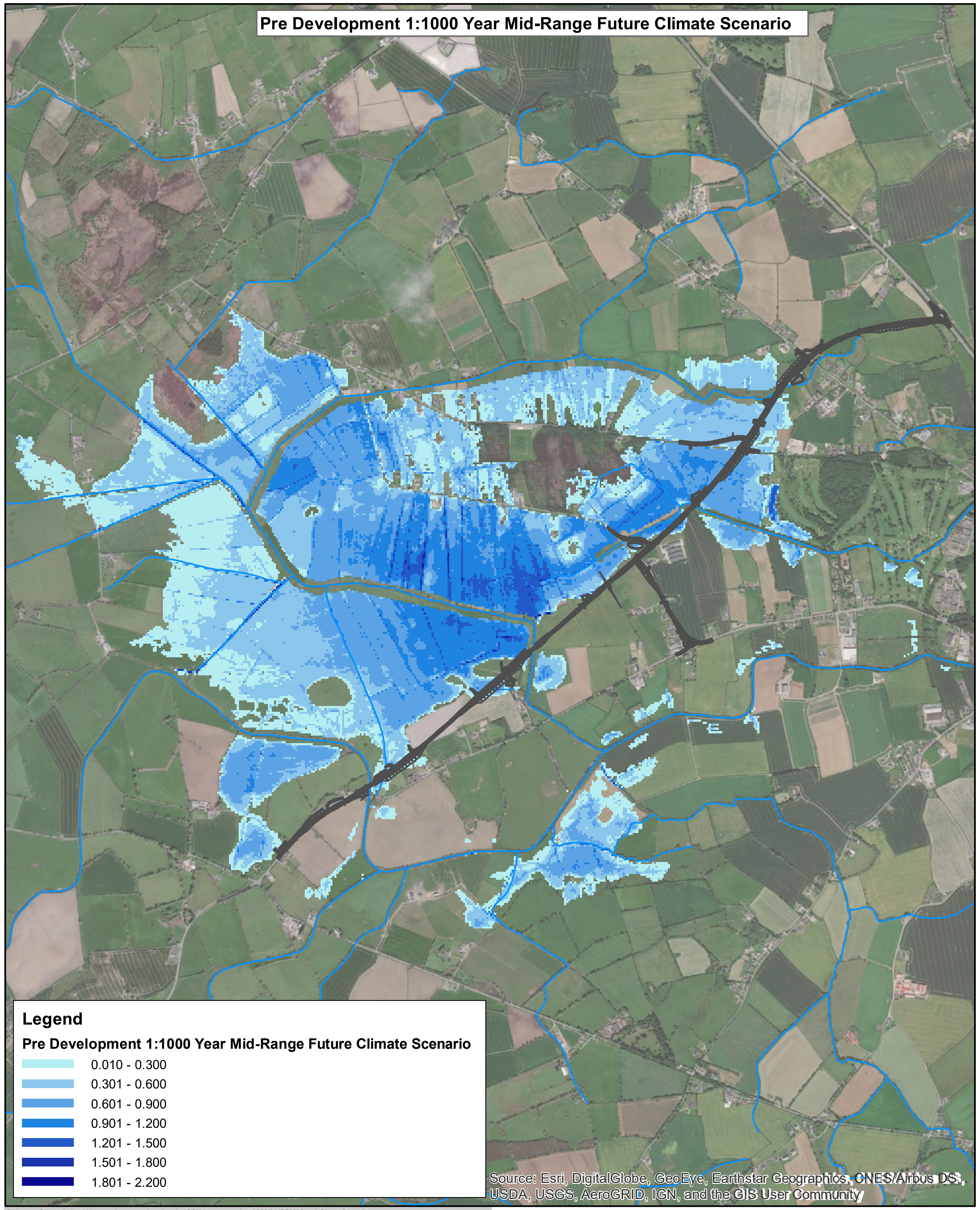

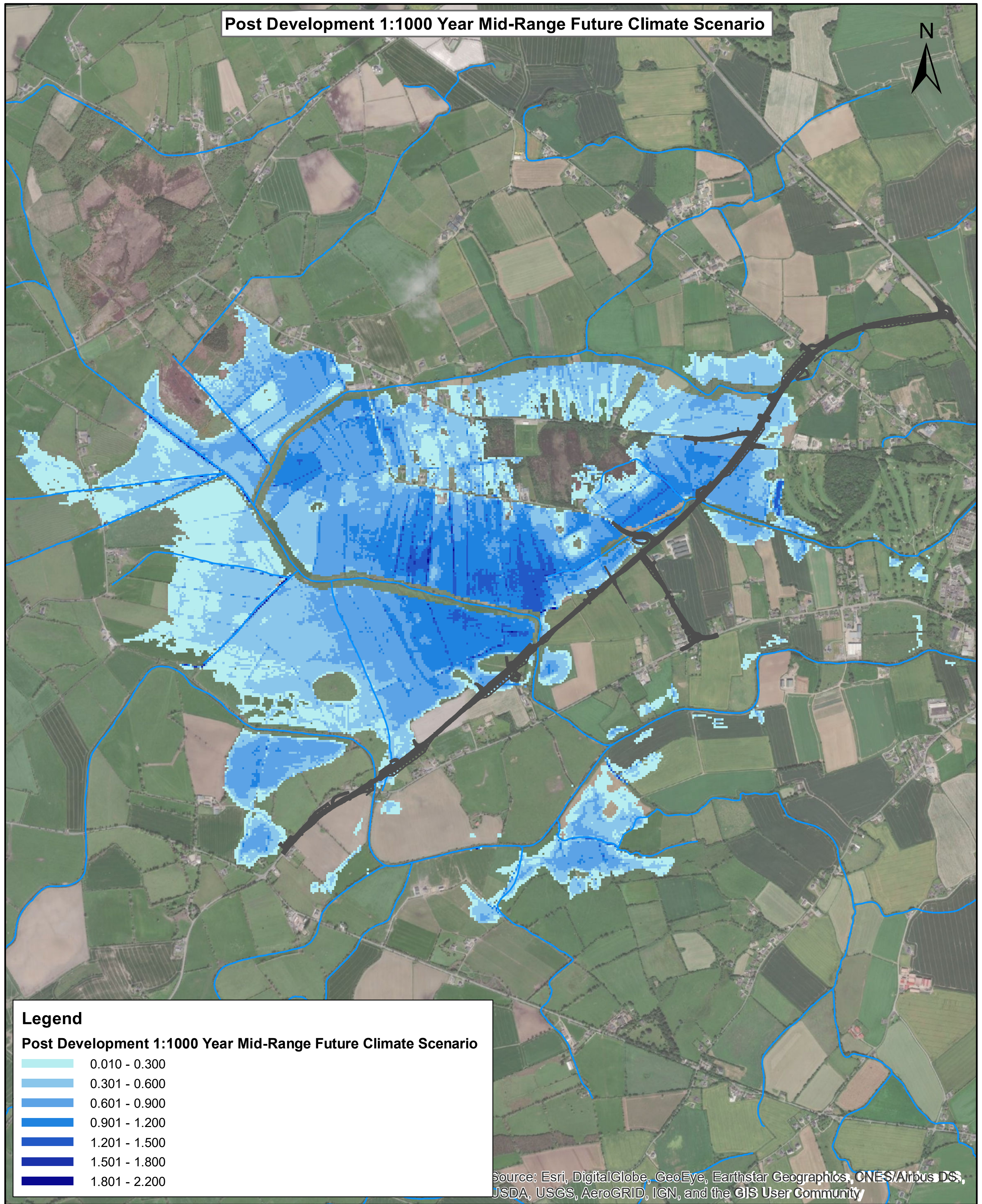

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LA	WV	JPR	RJS	S0 - Work In Progress

Project Stage	Preliminary Design
Project Title	N52 ARDEE BYPASS
Drawing Title	Pre & Post Development Scenarios 1:1000 Year Mid-Range Future Climate Scenario (MRFS)

Drawing Number	Project	Originator	Volume	Location	Type	Role	Number
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