ATTACHMENT G

AMENDED STORMWATER MANAGEMENT PLAN



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VantageYatala

SITE BASED STORMWATER MANAGEMENT PLAN

VANTAGE YATALA – STAGE 2 DEVELOPMENT APPLICATION FOR RECONFIGURING A LOT

ADDRESS
60 Stapylton Jacobs Well Road, Stapylton

REAL PROPERTY DESCRIPTION
Lot 501 on SP295994

PREPARED FOR
Frasers Property (Australia) Pty Ltd

May 2022 (Rev. 5)

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project coordination
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landscape + urban design
engineering services
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No.	Author	Reviewer	Date
INTERNAL DRAFT	Ian Grieves	Mitchell Gassman	18 November 2020
1.	Ian Grieves	Mitchell Gassman	18 November 2020
2.	Ian Grieves	Mitchell Gassman	12 February 2021
3.	Ian Grieves	Mitchell Gassman	30 March 2021
4.	Ian Grieves	Mitchell Gassman	8 November 2021
5.	Mitchell Gassman	Mitchell Gassman	31 May 2022

Approval for Issue

Rev. No.	Name	Position	Signature	Date
5.	Mitchell Gassman	Civil Project Engineer RPEQ 16939		31 May 2022

Final Distribution

FPI Queensland Pty. Ltd. (Client)	1 electronic copy
City of Gold Coast Council (Assessment Manager)	1 electronic copy
GDP File	1 electronic copy

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1.0 INTRODUCTION

Gassman Development Perspectives (GDP) has been engaged by Frasers Property (Australia) Pty Ltd (Client) to prepare a Site Based Stormwater Management Plan over land situated at 60 Stapylton Jacobs Well Road, Stapylton (Lot 501 on SP295994) being the 'subject site'.

This report has been prepared for submission to City of Gold Coast Council (Council) as part of a Development Application for Reconfiguring a Lot to facilitate Stage 2 of the *Vantage Yatala* industrial development with the intent of investigating and addressing the stormwater quantity and stormwater quality requirements for the proposed development in accordance with the applicable State and Local Government standards.

Stormwater quantity is addressed through pre and post development scenarios modelled in XPSTORM software utilising temporal pattern inputs from the Australian Rainfall & Runoff (AR&R) Data Hub and the AR&R Storm Generator.

A strategy for managing post development peak flows discharging from the site and the required attenuation measures are provided to demonstrate that any increase in peak flows can be managed within the subject site as not to measurably impact neighbouring properties.

Stormwater quality analysis is also undertaken through the use of MUSIC software to confirm the adequacy of proposed Stormwater Quality Improvement Devices (SQIDs) required to meet the State Planning Policy's (SPP 2017) Water Quality Objectives (WQOs) and the pollutant removal targets set by City of Gold Coast Council.

Revision 5 Updates:

Revision 5 of this report has been prepared based on the requirement to modify the common lot boundary between approved lots 201 and lots 203 and 203 for a specific industrial use over Lot 201. Due to this increase in area to Lot 201 to accommodate the specific land use minor amendments are required to the catchment mapping for both stormwater quality and quantity purposes are documented within this revision of the management plan. It is noted that as the changes to the lot boundaries are so minor in nature it has not altered the configuration of the regional bioretention basin approved under Revision 3 of the SWMP per Council's Decision Notice for COM/2020/262 dated 30 April 2021.

Following the fixing of the Lot 201 lot boundaries for a specific user this revision of the report acknowledges the ROL change proposal to dedicate the previous easement allocation for inter-allotment stormwater drainage along the Lot 201 boundary as part of the Lot 901 drainage reserve providing a secondary vehicular access location to the lot for maintenance purposes. The details of this along with the work required at the Stage 1 interface at Fairway Street to facility the new pipe and overland flow path are contained within ***Appendix N***.

2.0 SITE CHARACTERISTICS

2.1 LOCATION

The subject site is located within the City of Gold Coast Council local government boundaries.

The subject site is bounded by Stapylton Jacobs Well Road and existing industrial uses to the north, Christensen Road and existing industrial uses to the west and City of Gold Coast Council's land fill facility to the east.

The site has recently been cleared of all vegetation under existing Operational Works approval obtained from Council.



Figure 2.1.1: Site Locality Plan, Source: QLD Globe 2020

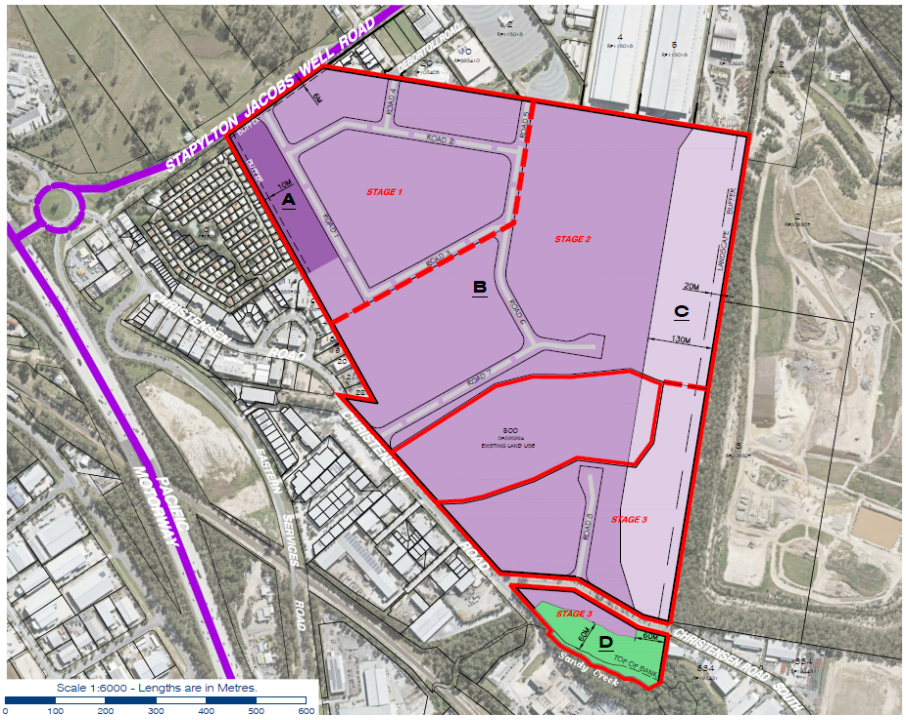


Figure 2.1.2: Vantage Yatala Staging Plan, Source: CoGC Prelim Approval

2.2 SITE AREA

The current area of the site is 64.239 Ha of which Stage 2 makes up 32.235Ha (refer Figure 2.1.2 above). Refer to ***Appendix J*** for the proposed Reconfiguration of a Lot (ROL) plan.

2.3 EXISTING TOPOGRAPHY AND SITE DRAINAGE

Along the south-eastern boundary of the subject site is the existing high point of 29.23m AHD with a ridge line extending through to the properties' northern boundary. This existing topography defines the existing catchments of the site and current stormwater discharge locations along the northern and eastern boundaries. These low points are visible within ***Appendix A – Site Survey Plan*** of the report with the pre development catchments defined within ***Appendix B – Pre and Post Development Catchment Plans.***

2.4 EXISTING LAND USAGE

The subject land is vacant following the clearing of all vegetation in 2019.

2.5 PLANNING PROVISIONS AND PROPOSED DEVELOPMENT

The subject site is zoned "Low Impact Industry, Future Precinct" and "Medium Impact Industry, Future Precinct" under Council's current City Plan for which Stage 2 sits wholly within the "Medium Impact Industry, Future Precinct". The current proposal involves creating further industrial lots behind approved Stage 1 within the subject site which will require large scale bulk earthworks necessary to facilitate clear and flat earthwork pads suitable for this land use.

2.6 FLOODING

The subject site is located within the extent of the Flood Overlay as defined in Council's City Plan Interactive Mapping – Version 5, 6 and 7 (refer ***Figure 2.6*** below).

As part of Stage 1 of the development compensatory earthworks within private property located off Yellowwood Road to the north was undertaken in 2019 to balance flood storage where fill within the subject site is proposed below the Designated Flood Level of RL8.60m AHD (Q_{100}) utilising CoGC City Plan v5 which was current at the time of the existing approval.

As shown within ***Figure 2.6*** below, the extent of Stage 2 development proposed as part of this application is not subject to any mapped flooding and as such no compensatory works are proposed or required to facilitate the development.



Figure 2.6 Council Flood Mapping of Subject Site, Source: CoGC Interactive Mapping

3.0 CONVEYANCE MANAGEMENT AND PRE AND POST DEVELOPMENT CATCMENTS

3.1 LAWFUL POINT OF DISCHARGE

The *Queensland Urban Drainage Manual* (QUDM) 1992 edition *formerly* set criteria that defined a lawful point of discharge for a proposed development. The term described a two-point test. This criterion is obsolete.

The meaning defined in QUDM 2017 is different from the more general term 'lawful discharge of stormwater' because it *"requires the stormwater to be released at a location that is under the lawful control of the local government or other statutory authority from whom permission to discharge has been received."*

The revised criteria for determining a lawful point of discharge are: (taken from QUDM 2017)

i) Will the proposed development alter the sites stormwater discharge characteristics in a manner that may substantially damage a third party property?

ii) Is the location of the discharge from the development site under the lawful control of the local government or other statutory authority from whom permission to discharge has been received?

iii) An authority to discharge over affected properties will be necessary. In descending order of certainty, an authority may be in the form of: a) dedication of a drainage reserve or park, b) a registered easement for stormwater discharge / works or written discharge approval.

The subject development proposal for Stage 2 will utilise one (1) lawful point of discharge being the existing low point along the site's south-eastern common boundary shared with Council's land fill facility where the existing gully line conveying both internal and upstream external catchments through the subject site lawfully discharges.

3.2 PRE DEVELOPMENT CATCHMENTS

The existing natural slope currently dictates the overland flow and drainage pattern of the subject site as illustrated in the pre development stormwater catchment plan within ***Appendix B.*** The flow patterns generally follow the ridgeline falling towards the existing low points of the site.

3.3 POST DEVELOPMENT CATCHMENTS

The intent of the proposed bulk earthworks outlined within this Stormwater Management Plan is to generally follow the pre development conditions to ensure no worsening of stormwater impacts downstream both during and post the construction period.

Whilst the proposed bulk earthworks over the site generally flatten the existing steep grades of the land as part of creating the earthworked pads, the increase in impervious areas

associated with the proposed land use mean that a hydrologic review is required to determine the changes in discharge characteristics (i.e. peak flow, water quality) from the site and to identify suitable attenuation measures that need to be implemented to mitigate any potential downstream impacts.

The post development catchments are illustrated within the post development catchment plan included within ***Appendix B.*** As demonstrated within these plans, the LPoD for Stage 2 remains consistent in both the pre and post development scenarios.

3.4 EXTERNAL CATCHMENT CONVEYANCE

An assessment of the surrounding boundary conditions for Stage 2 via Lidar survey have identified a number of external catchments that run through the site that will need to managed and conveyed through the proposed development in the post-development scenario. These have been identified within the catchment mapping contained within ***Appendix B*** of the report and are summarised as follows:

- **CAT-X1** – Is an upstream catchment contained on the neighbouring northern allotment discharging into the Stage 2 extent falling to the natural low point of the site.
- **CAT-X2** – Discharges into the Stage 2 extent via an existing 750mm stormwater pipe and headwall located to the immediate west of proposed Lot 206.
- **CAT-6A** – Is an upstream catchment contained within 82 Christensen Road (Lot 55 on SP295994) that discharges into the Stage 2 extent via an existing dam weir directed into the proposed Common Property near the south-east boundary of the subject site.

A strategy for managing the conveyance of the external catchments through the subject site in a manner that still facilitates the intended Stage 2 development layout is shown within ***Appendix N***.

4.0 HYDROLOGICAL ASSESSMENT

4.1 TEMPORAL PATTERNS AND RAINFALL DATA

Rainfall data for use in XPSTORM software has been sourced from the Australian Rainfall & Runoff 2016 Storm Generator and the AR&R Data Hub. This application generates rainfall data for the various design storm hydrographs which have been utilised in the below modelling of stormwater runoff from the subject site.

Appendix H contains a copy of the Intensity-Frequency-Duration (IFD) data sourced from the Bureau of Meteorology (BoM) utilised for the hydraulic analysis and sediment basin sizing.

Appendix I contains a copy of the AR&R Data Hub rainfall data utilised for the XPSTORM hydrological analysis. It is noted that the predicted climate change factors, and pre-burst losses are incorporated into the data for analysis.

4.2 CATCHMENTS

As discussed within Section 3 of this report the pre and post development stormwater catchments (refer ***Appendix B***) have been determined using a combination of the site based Contour and Detail survey undertaken by Gassman Development Perspectives (refer ***Appendix A***) along with LiDAR survey of the surrounding area to identify any potential external catchments.

A summary of the parameters assigned to these sub-catchments used to assess the pre and post development flows is contained within *Tables 4.2A, 4.2B and 4.2C* below which aligns with the two scenarios assessed within this reporting.

Parameter	**Sub-Catchments (Pre Development –** Contributing to LPoD-1 / Stage 2)		
Name	CAT-X1	CAT-X2	CAT-1
Area (Ha)	1.637	2.182	12.715
Vectored Slope (%)	1.00	1.00	5.41
Impervious Area (%)	90.00	90.00	5.00
Pervious Area (%)	10.00	10.00	95.00
Roughness (n)	0.020	0.020	0.080
Parameter	**Sub-Catchments (Pre Development –** Contributing to LPoD-1 / Stage 2)		
Name	CAT-2	CAT-3	CAT-4
Area (Ha)	7.114	3.015	8.666
Vectored Slope (%)	5.95	5.54	5.80
Impervious Area (%)	1.00	0.00	0.00
Pervious Area (%)	99.00	100.00	100.00
Roughness (n)	0.050	0.080	0.100
Parameter	**Sub-Catchments (Pre Development –** Contributing to LPoD-1 / Stage 2)		
Name	CAT-5	CAT-6	CAT-6A
Area (Ha)	4.144	6.474	4.767
Vectored Slope (%)	4.02	3.91	3.50
Impervious Area (%)	0.00	0.00	35.00
Pervious Area (%)	100.00	100.00	65.00
Roughness (n)	0.050	0.100	0.030

Table 4.2A: Pre Development Catchment Parameters

Parameter	Contributing Catchments
Reporting Location	**LPoD-1**
Contributing Sub Catchments	CAT-1, CAT-2, CAT-3, CAT-4, CAT-5, CAT-6, CAT-6A, CAT-X1 and CAT-X2
Area (Ha)	50.714
Initial Loss (mm)	17.20
Continuing Loss (mm/hr)	1.60

Table 4.2B: Contributing Catchment Parameters to Reporting Location LPoD-1

Parameter	**Catchments** (Post Development for Stage 2)	
Name	LPoD-1 *Impervious Catchment*	LPoD-1 *Pervious Catchment*
Total Area (Ha)	36.599 (83% Impervious, 17% Pervious)	
Area Split (Ha)	30.362	6.237
Vectored Slope (%)	1.00	1.00
Impervious Area (%)	100.00	0.00
Roughness (n) for Impervious Area	0.015	N/A
Pervious Area (%)	0.00	100.00
Roughness (n) for Pervious Area	N/A	0.045
Initial Loss (mm)	0.00	17.20
Continuing Loss (mm/hr)	1.60	1.60

Table 4.2C: Post Development Catchment Parameters LPoD-1

4.3 LAND USE

Land uses were mapped within the pre and post development catchments with the varying hydraulic roughness and hydrological losses input into the XPSTORM model summarised in *Table 4.3 below*.

Land Use Type **LPoD-1** (Stage 2)	Initial Loss (mm)	Continuing Loss (mm/hr)
Pre Developed		
Pervious	17.20	1.60
Impervious	0.00	1.60

Land Use Type **LPoD-1** (Stage 2)	Initial Loss (mm)	Continuing Loss (mm/hr)
Post Developed		
Pervious	17.20	1.60
Impervious	0.00	1.60

Table 4.3: Summary of Adopted Initial & Continuing Losses (AR&R Data-HUB 2016)

4.4 PRE AND POST DEVELOPMENT FLOW CALCULATIONS

XPSTORM modelling software was utilised to determine the pre and post development discharge flow rate for the contributing catchments based on the parameters listed above.

The computations were undertaken for the standard Average Exceedance Probabilities (AEP) 63.2%, 0.5EY, 20%, 10%, 5%, 2% and 1%.

Computations were also undertaken for the very frequent non-standard AEP's; being 12EY, 6EY, 4EY, 3EY and 2EY. The very frequent flows represent volumes of catchment runoff for 1 month, 2 month, 3 month, 4 month and 6 month storm events.

The *very frequent mean peak* catchment runoff volumes to the respective existing Lawful Points of Discharge (reporting locations) are summarised in *Table 4.4*.

Catchment	MEAN PEAK Flow Rates for Average Exceedance Probability (m^3/s)				
Pre Developed Condition	**12EY** (1 month)	**6EY** (2 month)	**4EY** (3 month)	**3EY** (4 month)	**2EY** (6 month)
LPoD-1	0.4203	0.6078	1.0602	1.4180	2.0238

Catchment	MEAN PEAK Flow Rates for Average Exceedance Probability (m^3/s)				
Post Developed Condition	**12EY** (1 month)	**6EY** (2 month)	**4EY** (3 month)	**3EY** (4 month)	**2EY** (6 month)
LPoD-1	2.8654	3.4185	4.3664	5.0518	5.9809

Table 4.4: *Very Frequent Mean* Peak Flow Rates Calculated for LPoD-1

The *normal range of mean peak* catchment runoff volumes to the respective existing Lawful Points of Discharge (reporting locations) are summarised in *Table 4.5*

Catchment	MEAN PEAK Flow Rates for Average Exceedance Probability (m^3/s)						
Pre Developed Condition	**63.2%**	**0.5EY**	**20%**	**10%**	**5%**	**2%**	**1%**
LPoD-1	3.3644	4.8920	7.0227	9.1878	11.5355	13.8167	16.0856

Catchment	MEAN PEAK Flow Rates for Average Exceedance Probability (m^3/s)						
Post Developed Condition	**63.2%**	**0.5EY**	**20%**	**10%**	**5%**	**2%**	**1%**
LPoD-1	7.5160	9.4428	11.6273	13.6260	15.6748	18.2499	20.1761

Table 4.5: Normal Range MEAN PEAK Flow Rates Calculated for LPoD-1

Figures 4.12 and *4.13* below contains the *pre* developed MAXIMUM peak flow rate hydrograph at the lawful point of discharge (LPoD-1). Refer also ***Appendix K.***

Catchment	MAXIMUM PEAK Flow Rates for Average Exceedance Probability (m^3/s)						
Pre Developed Condition	**63.2%**	**0.5EY**	**20%**	**10%**	**5%**	**2%**	**1%**
LPoD-1	4.4845	6.4926	9.3301	11.1359	13.9592	16.3402	19.4076

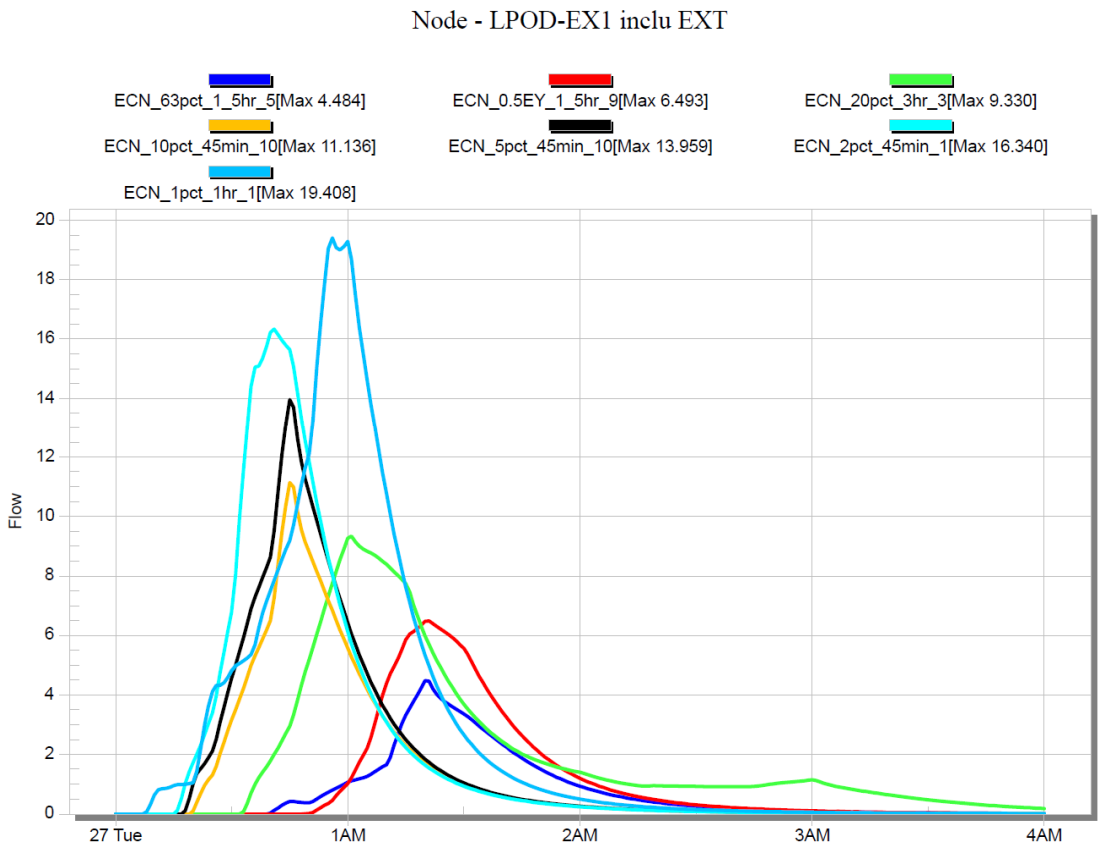


Figure 4.12: Pre Developed MAXIMUM Peak Flow Rate Hydrograph (LPoD-1)

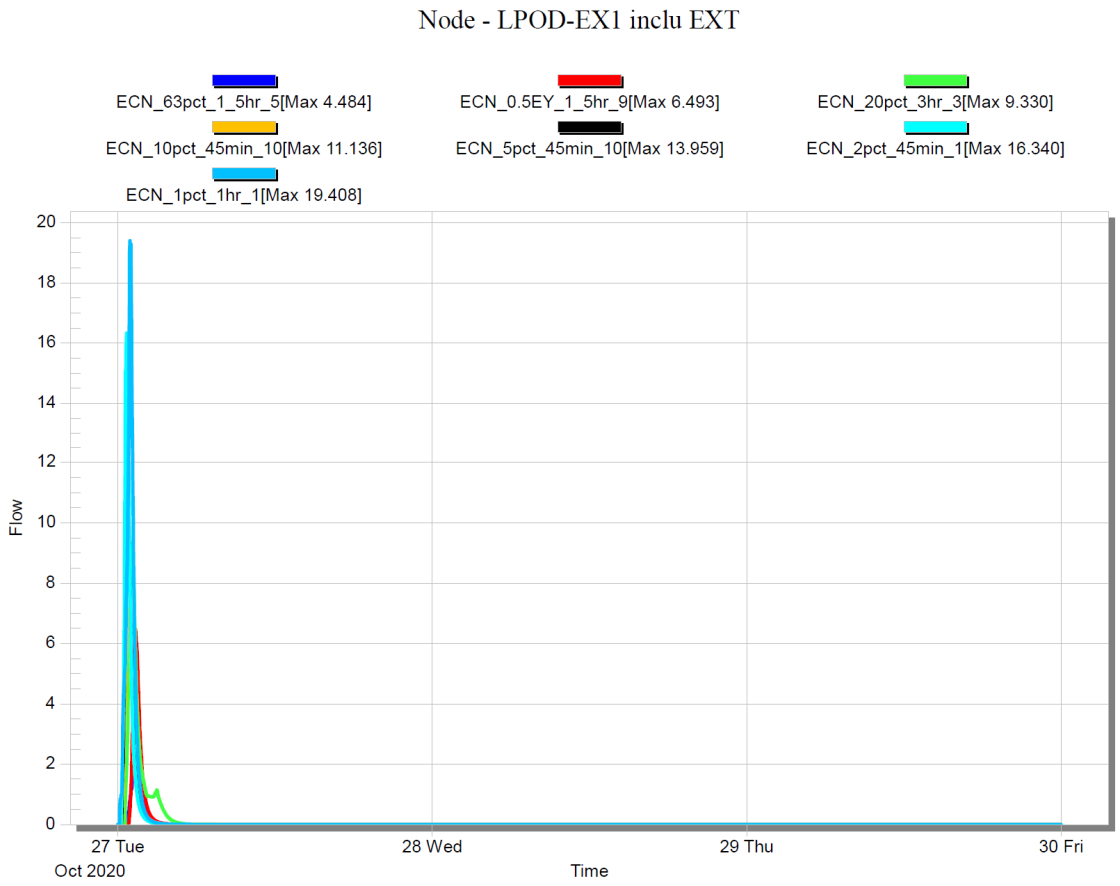


Figure 4.13: Pre Developed MAXIMUM Peak Flow Rate Hydrograph (LPoD-1) 72-Hr Duration

Figures 4.14 and *4.15* below contains the *post* developed MAXIMUM peak flow rate hydrograph at the lawful point of discharge (LPoD-1). Refer also ***Appendix K.***

Catchment	MAXIMUM PEAK Flow Rates for Average Exceedance Probability (m^3/s)						
Post Developed Condition	**63.2%**	**0.5EY**	**20%**	**10%**	**5%**	**2%**	**1%**
LPoD-1	8.6323	10.8501	13.3258	15.8757	18.2378	21.1192	23.2979

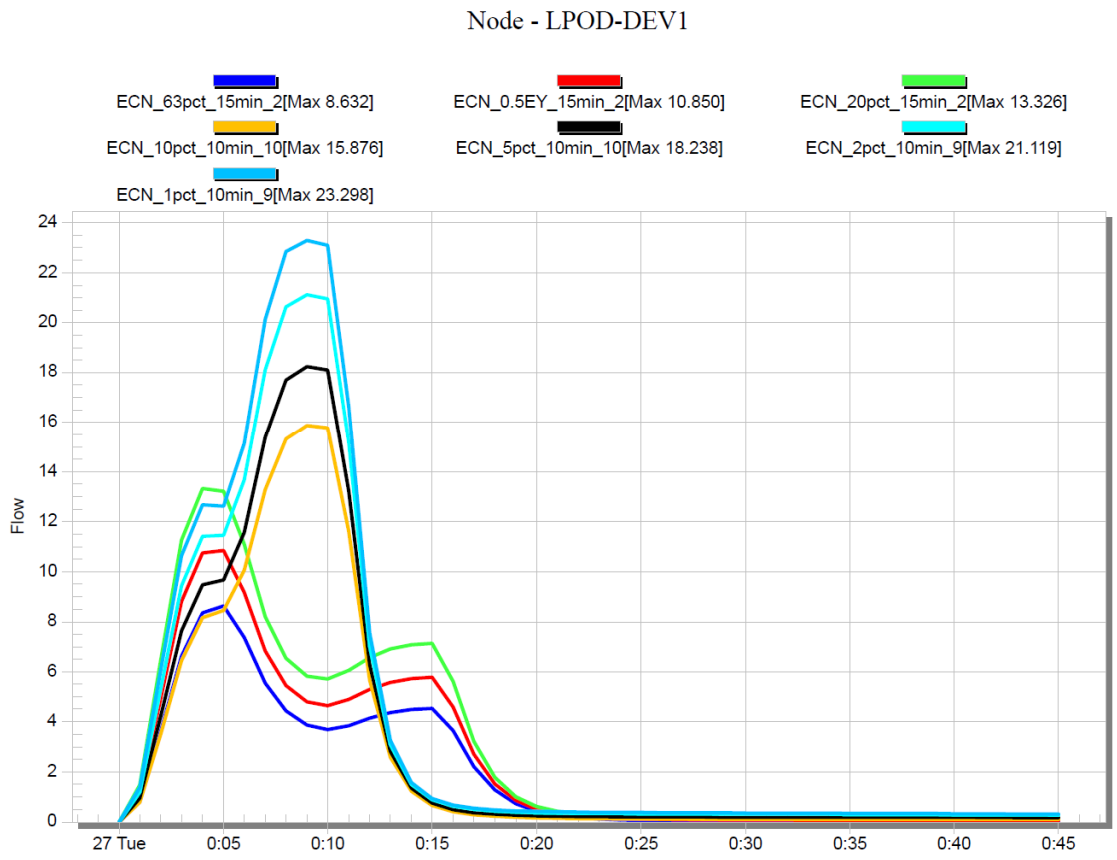


Figure 4.14: Post Developed MAXIMUM Peak Flow Rate Hydrograph (LPoD-1)

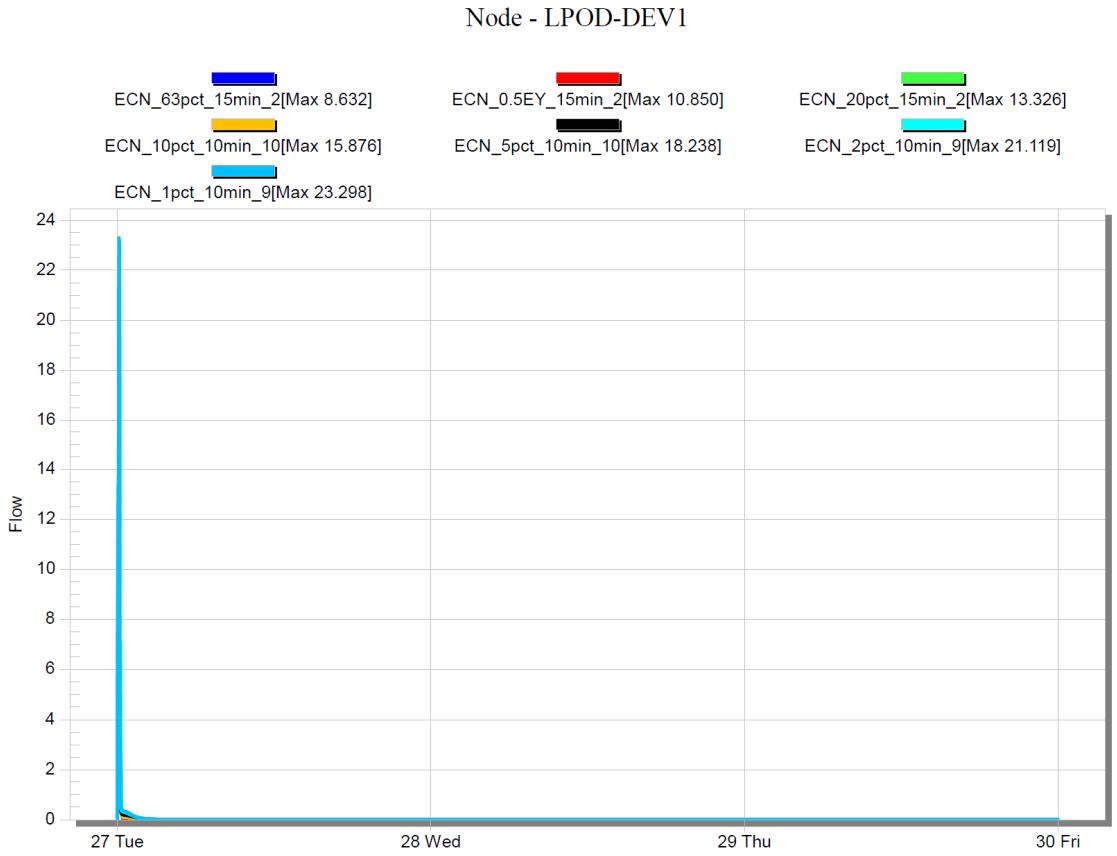


Figure 4.15: Post Developed MAXIMUM Peak Flow Rate Hydrograph (LPoD-1) 72-Hr Duration

5.0 STORMWATER QUANTITY, DETENTION & HYDRAULIC DESIGN

5.1 ATTENUATION OF DEVELOPED FLOWS

To ensure that the increased flow rates from the developed site have minimal impact on downstream property, the following hydrological objective has been set for stormwater exiting the subject site;

- *No increase in peak discharge flow rates from the developed site to downstream infrastructure.*

To achieve this objective, stormwater discharge from the development site must be detained to pre-development flow rates for all storms events up to and including the 1% AEP (equiv. to Q_{100}). The following sections provide a summary of the procedure used to design the onsite detention system at subject site.

5.2 METHODOLOGY

For the site catchment identified as having increase in peak flow rates when developed, a hydrologic model was created using XPSTORM. The model was then used to route post-development runoff through various proposed detention structures to determine the most efficient on-site detention system.

5.2.1 MODEL CONDITIONS

In XPSTORM three (3) hydraulic conditions were modelled in order to demonstrate the stormwater quantity, detention and hydraulic objective;

1. Existing Condition - Current condition of site with all the external catchments to assess the natural hydrology.

2. Developed Condition - Future condition of site when developed with all the external catchments. The main changes in hydrology as part of development include; increase in impervious area of the subject site due to the construction of the hardstand and other impervious areas and reduction in Manning's roughness coefficient for sections of the site to be developed.

3. Mitigated Condition - Future condition of site when developed with proposed detention structures in place with all the external catchments *where applicable.*

5.2.2 CRITICAL STORM EVENT AND DURATIONS

An analysis of storm events ranging from 12EY to 2EY and 63.2% AEP to 1% AEP was undertaken to determine the critical storm event and the critical storm duration per contributing catchment. The determined critical storm events for the pre developed and post developed condition are indicated in *Table 5.2.2* below.

MODEL CONDITION	CRITICAL STORM EVENT	PEAK DURATION	'MAXIMUM' PEAK FLOW
Pre Developed	AEP	(mins)	(m^3/s)
LPoD-1	1%	60	19.4076

MODEL CONDITION	CRITICAL STORM EVENT	PEAK DURATION	'MEAN' PEAK FLOW
Pre Developed	AEP	(mins)	(m^3/s)
LPoD-1	1%	30	16.0856

MODEL CONDITION	CRITICAL STORM EVENT	PEAK DURATION	'MAXIMUM' PEAK FLOW
Post Developed	AEP	(mins)	(m^3/s)
LPoD-1	1%	10	23.2979

MODEL CONDITION	CRITICAL STORM EVENT	PEAK DURATION	'MEAN' PEAK FLOW
Post Developed	AEP	(mins)	(m^3/s)
LPoD-1	1%	10	20.1761

Table 5.2.2: MEAN AND MAXIMUM Critical Storm Event and Duration Summary Table

Refer to ***Appendix L*** of this report which presents the detailed XPSTORM Box & Whisker plots for the above hydrological assessments.

5.2.3 DETENTION SYSTEM DESIGN

Detention devices capture and temporarily store stormwater runoff during major / critical storm events and release to the Lawful Point of Discharge (LPoD) at a controlled rate. Hence, detention devices act to mitigate potential downstream flooding impacts and also provide minor water quality treatment.

Therefore, to achieve the objective of zero post development mean peak flow rate increase to pre-developed 63.2% AEP (equiv. Q_1) to the 1% AEP (equiv. Q_{100}) flow rates at the downstream reporting location (outfall), on-site detention basins are introduced with low and high flow outlet configurations.

Table 5.2.3 includes the design details for the proposed on site detention system for Stage 2.

Parameter	Value
Catchment	**LPoD-1**
Type	Detention basin (in ground)
Internal Batter Slope on Basin Sides	1 in 3
Basin Floor RL	10.470m AHD *graded flat*
Basin Embankment / Crown R.L	13.000m AHD *highest nominal* 12.651m AHD *lowest*
Basin Transverse Weir Crest RL	11.570m AHD
Freeboard to Crown (1% AEP WSL)	0.705m
Detention Volume Depth	1.476m to 1% AEP WSL *(measured from floor / IL of basin)*
Detention Volume to *lowest* Crown	14,789m^3 to RL 12.651m *(deducting 0.30m extended detention volume of 1,446m^3)*
Detention Volume to 1% AEP WSL	8,076m^3 to RL 11.946m *(deducting 0.30m extended detention volume of 1,446m^3)*
Detention Volume to Weir Crest	5,073m^3 to RL 11.570m *(deducting 0.30m extended detention volume of 1,446m^3)*
Low Flow Outlets	• 5 / 600mm x 600mm grated field inlet pits connected to a low flow outlet pipe (450mm diameter at 1.111%) *Top of grate levels set at 0.300m above basin floor at RL10.77m AHD (typical and unless noted otherwise)*
High Flow Outlets	• 25 metre wide broad crested transverse weir *1.10m above basin floor at RL11.570m AHD* *1.70 discharge coefficient for transverse weir* • 3 / 450mm RCP laid at max. grade of 1.145%

Table 5.2.3: Summary of Design Parameters of Proposed Detention System (Stage 2)

5.2.4 MODEL RESULTS

Table 5.2.4.1 presents the results obtained from XPSTORM modelling as a result of implementing the above detention system for flow mitigation.

PRE-DEVELOPED MEAN PEAK FLOWS FOR LPoD-1							
AEP	**63.2%**	**0.5EY**	**20%**	**10%**	**5%**	**2%**	**1%**
Peak Flow (m3/sec)	3.3644	4.8920	7.0227	9.1878	11.5355	13.8167	16.0856

POST-DEVELOPED MEAN PEAK FLOWS (MITIGATED) FOR LPoD-1							
AEP	**63.2%**	**0.5EY**	**20%**	**10%**	**5%**	**2%**	**1%**
Mitigated Flow (m3/sec)	3.0839	4.3736	6.7270	8.8570	10.8044	13.0747	14.8843
Max Water Elevation RL	11.484	11.627	11.722	11.789	11.844	11.902	11.946
Peak Duration	30min	30min	30min	25min	25min	12hr	12hr
Depth to WSL (m)	1.014	1.157	1.252	1.319	1.374	1.432	1.476

Table 5.2.4.1: Summary of XPSTORM MEAN Hydrologic / Hydraulic Results Catchment LPoD-1

Table 5.2.4.2 sums the mean peak mitigated discharges and compares directly against the mean peak pre developed hydrology condition across the range of standard storm events.

MEAN MITIGATED DISCHARGE SUMMARY FOR PROPOSED DETENTION BASIN (LPoD-1)							
AEP	**63.2%**	**0.5EY**	**20%**	**10%**	**5%**	**2%**	**1%**
600 x 600mm F.I. (1) (m^3/s)	0.4059	0.4450	0.4692	0.4855	0.4981	0.5115	0.5214
600 x 600mm F.I. (2) (m^3/s)	0.4059	0.4450	0.4692	0.4855	0.4981	0.5115	0.5214
600 x 600mm F.I. (3) (m^3/s)	0.4059	0.4450	0.4692	0.4855	0.4981	0.5115	0.5214
600 x 600mm F.I. (4) (m^3/s)	0.4059	0.4450	0.4692	0.4855	0.4981	0.5115	0.5214
600 x 600mm F.I. (5) (m^3/s)	0.4059	0.4450	0.4692	0.4855	0.4981	0.5115	0.5214
25m High Flow Weir (m^3/s)	0.0000	0.6562	2.5741	4.4108	6.1388	8.1825	9.8328
3/450mm dia Outlet (m3/s)	1.0542	1.4923	1.8069	2.0188	2.1751	2.3346	2.4445
TOTAL (m^3/s)	**3.0839**	**4.3736**	**6.7270**	**8.8570**	**10.8044**	**13.0747**	**14.8843**
Flow Mitigation from Existing Condition (m^3/s)	0.2805	0.5184	0.2957	0.3308	0.7311	0.7420	1.2013
Attenuation Achieved (Y/N)	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
Flow Mitigation Achieved	8.3%	10.6%	4.2%	3.6%	6.3%	5.4%	7.5%

Table 5.2.4.2: Summary of MEAN Mitigated Discharges from XPSTORM Hydraulic Simulation

5.2.5 DISCUSSION ON MODELLING OUTCOMES

The above hydraulic modelling has confirmed that there is no increase in mean peak discharge flow rates from the development site to existing infrastructure or downstream / neighbouring properties by implementing the proposed designed detention measures.

All AEP's for the mean peak runoffs ranging from 63.2% (equiv. Q_1) to 1% (equiv. Q_{100}) achieve mitigation.

Important Note:

Due to the predicted water surface elevations and depths – it is proposed that the bio-retention basin be fenced at its perimeter to restrict public access for safety. Fencing is proposed as the City of Gold Coast Council's standard chain wire type fencing (or approved equivalent) at a height of 1.80 metres above finished ground level.

Details of the fence type, embellishments and colour will be confirmed at the detailed design phase. Provision shall be made for a master-keyed gate location to enable access for Council staff to the maintenance track/s.

6.0 STORMWATER QUALITY

Stormwater quality analysis has been undertaken through the use of MUSIC software to confirm the adequacy of proposed Stormwater Quality Improvement Devices (SQIDs) required to meet the State Planning Policy's (SPP) Water Quality Objectives (WQOs) and the pollutant removal targets set by the City of Gold Coast Council. A suitable treatment strategy addressing the typical pollutant types generated during construction and operation of an industrial development are outlined within this section of reporting.

6.1 POLLUTANTS OF CONCERN

There are a number of pollutants typically generated during the operational phase (following construction) of an industrial development. These include:

- **Litter / gross pollutants**
- **Sediment**
- Toxic materials
- Heavy metals
- Hydrocarbons
- **Nutrients (i.e. nitrogen & phosphorous)**
- Pathogens / faecal coliforms
- Oxygen demanding substance
- Surfactants
- Acid or alkaline substances
- Organochlorines & organophosphates
- Thermal pollution

The key pollutants highlighted in **bold** above represent those that will be further addressed within this report. This will be done through the use of MUSIC modelling software which will assist in estimating the generation of the pollutants in the developed condition and the associated treatment measures requiring implementation in order to meet the stormwater quality objectives as defined within Section 6.2 of this report.

6.2 STORMWATER QUALITY OBJECTIVES (OPERATIONAL PHASE)

City of Gold Coast Council have set stormwater quality objectives with the intent of "protecting receiving water quality by limiting the quantity (loads) of stormwater pollutants discharged into receiving waters from development" such as that proposed over the subject site.

These are summarised in *Table 4.10 of SC6.11.4 Stormwater Drainage and Water Sensitive Urban Design standards* of Council's City Plan Version 7, and outlined below:

Pollutant Type	Load Reduction Objective (in mean annual load)
Gross Pollutants (>5mm)	90.0%
Total Suspended Solids (TSS)	80.0%
Total Phosphorous (TP)	60.0%
Total Nitrogen (TN)	45.0%

Table 6.2: CoGC's Stormwater Quality Objectives (Source: City Plan v7, Schedule SC6.11.4)

6.3 PROPOSED STORMWATER QUALITY MANAGEMENT STRATEGY

Development over the subject site has the potential to introduce increased pollutant loads and concentrated stormwater runoff into existing downstream waterways. To mitigate any potential increase in the export of pollutants from the subject site, suitable stormwater treatment devices will be utilised throughout the developed area as part of the integrated design of the road and stormwater drainage networks.

The implementation of a site-specific stormwater treatment train prior to the discharge of stormwater from the site will ensure the quality objectives outlined in Section 6.2 of this report are achieved.

6.3.1 BIO RETENTION BASINS

Due to the spatial allowances over the subject site and the proposed development type being an industrial estate, bio retention basins have been identified as a suitable Stormwater Quality Improvement Device (SQID) to reduce the off-site discharge of pollutants in line with the operational phase stormwater quality objectives identified within this report.

Bio retention basins are designed to treat conveyed stormwater by filtering contaminated runoff through various layers of vegetation, biologically active sands and loam filter media which capture the pollutants as the water percolates down through the system.

The treated water is then conveyed through a series of perforated pipes to downstream drainage systems. A typical configuration of a bio retention system is outlined in Figure 6.3.1 below.

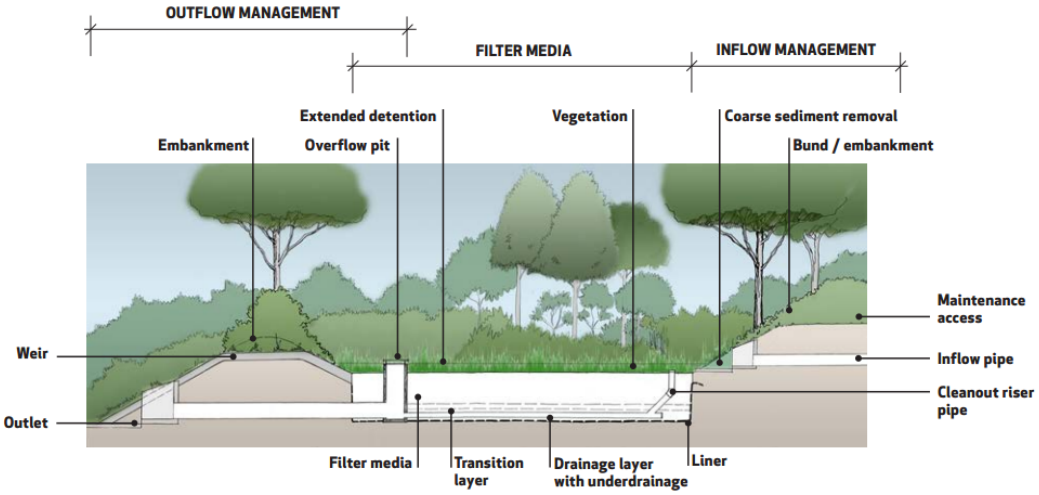


Figure 6.3.1: Components of a Typical Bio Retention System (Source: Water by Design, Bio Retention Technical Design Guidelines Version 1.1 Oct 2014)

The bio retention basin for the subject site has been designed in accordance with *Bio Retention Technical Design Guidelines (2014)* with the properties as outlined in *Table 6.3.1* below.

Outlet structures within the basin are designed to ensure an extended detention depth of 300mm is maintained over the filter media. The required surface area and filter media profile required to adequately treat the contributing developed catchment is discussed within Section 6.4 of this report.

Parameter	Value
Geofabric Lining to Base	Yes
Hydraulic Conductivity *(normal analysis)*	200 mm/hr
Orthophosphate Content	30 mg/kg
Filter Media's TN Content	400 mg/kg
Vegetation Properties	Basin to be vegetated with effective nutrient removal plants

Table 6.3.1: Summary of Adopted Bio Retention Parameters

6.4 MUSIC MODELLING METHODOLOGY FOR THE DEVELOPMENT SITE

MUSIC Version 6.3.0 was utilised for the water quality modelling of the proposed development in accordance with *Water by Design's MUSIC Modelling Guidelines 3.0 (2018).*

Modelling of the developed scenario with the nominated SQIDs in place was undertaken to replicate the transfer of pollutants through a stormwater drainage system and to assist in determining the effectiveness of the proposed stormwater treatment train in meeting City of Gold Coast's Stormwater Quality Objectives.

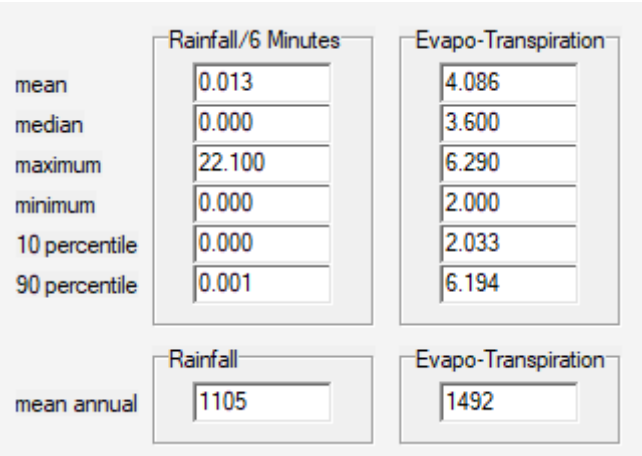
6.4.1 METEOROLOGICAL DATA

The meteorological data required for input into MUSIC software was obtained through CoGC's pre-determined MUSIC-link v6.32 software application for Beenleigh Bowls Club (Weather Station No. 040406). The data utilised is in the form of 6-minute pluviographic data for a 10-year period from 01st January 1990 to 31st December 1999. The mean average rainfall for this period was 1,105mm.

Daily potential evapo-transpiration (PET) data (01/01/1990 to 31/12/1999) from the above-mentioned station has been used.

A summary of the information is indicated below:

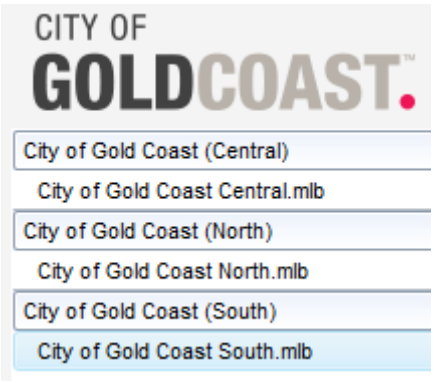
Catchment Name:	*5941 CoGC Industrial Development, Yatala MUSIC Model Stg 2*
Rainfall Station:	*40406 BEENLEIGH*
ET Station:	*User-defined monthly PET*
Start Date:	*1/01/1990 12:00 AM*
End Date:	*31/12/1999 11:54 PM*
Modelling Time Step:	*6 Minutes*



6.4.2 SOURCE NODES

MUSIC modelling has utilised the *City of Gold Coast (North) MUSIC-Link data (Version 6.32)* to define the parameters assigned to the pollutant source node inputs for the MUSIC model. Refer images on the following page. No calibration was undertaken to CoGC source nodes.

Refer ***Appendix E*** for the MUSIC Catchment Plan relevant to the modelling.





The intended industrial land use allows the developed catchment parameters to be conservatively assumed with the catchments broken down into a number of major surface types being ground level, roads (includes entire road reserve) and roofs.

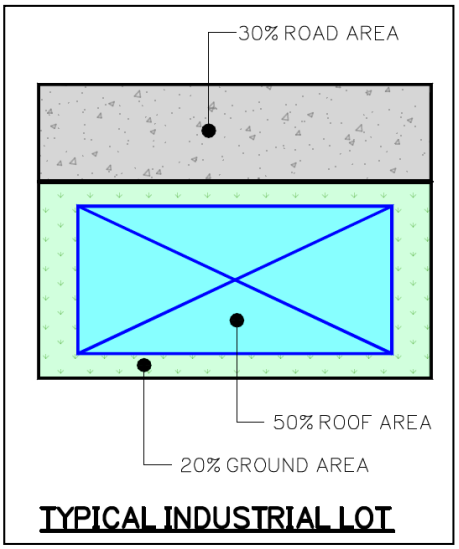
These surface types were allocated an impervious area (%) and further refined through the MUSIC modelling process via the "split" catchment approach in accordance with the *Healthy Waterways MUSIC Modelling Guidelines Version 3.0 – 2018 Table 3.4 and 3.6.*

The below table and figures summarise the imperviousness of the allocated source nodes within the MUSIC model for Stage 1. Where a proposed architectural design was available for the site, the MUSIC modelling has assumed these areas to be exact. However, in the absence of an architectural layout; the modelling has been guided *by Table 3.4 Typical Surface-Type Splits* for Industrial Development type – where the surface splits are defined below:

Road – 30%
Roof – 50%
Ground – 20%

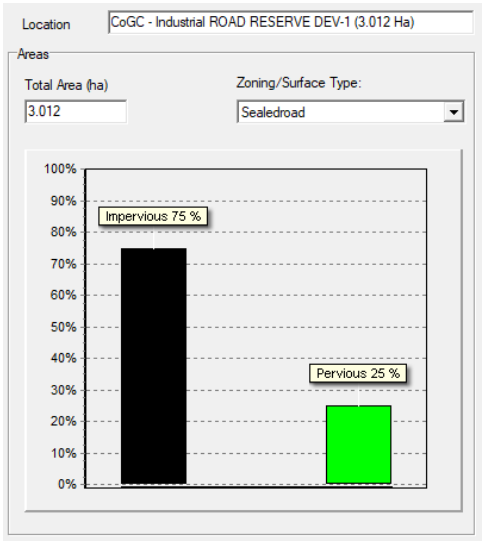
(extract from Healthy Waters V3.0)

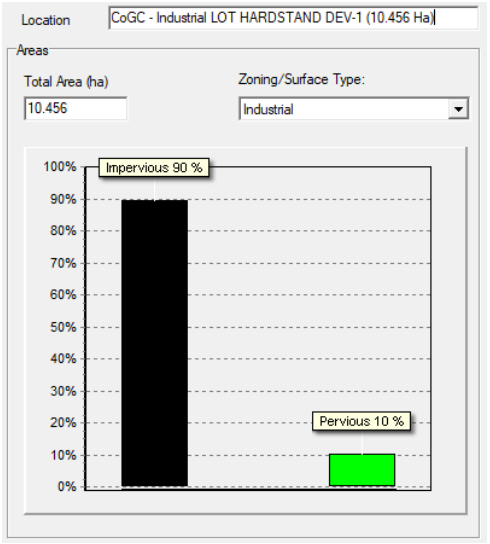
External catchments that are conveyed through the site are assumed to be treated on site by the relevant upstream lot owner prior to entering the subject site.

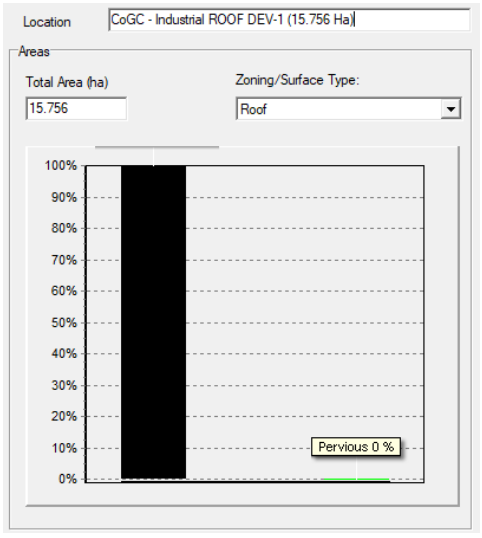


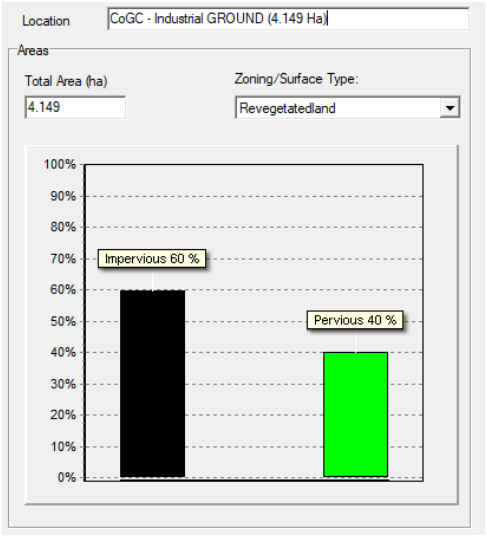
MUSIC Source Node	Modelling Approach	Area (Ha)	Impervious %
Stage 2 (DEV-1) Total Catchment = 36.599 Ha *including 'DEV-1 Part'*			
Road	SPLIT	3.012	75
Hardstand	SPLIT	11.567	90
Roof	SPLIT	14.423	100
Ground	SPLIT	4.373	60
Lot 119	SPLIT	0.382	80
Part Lot 206	SPLIT	0.235	80
Drainage Reserve	SPLIT	1.573	20
20m Ecological Buffer	SPLIT	1.271	0
Total		**36.599**	

Table 6.4: MUSIC Modelling Summary of Source Node Impervious Allocations









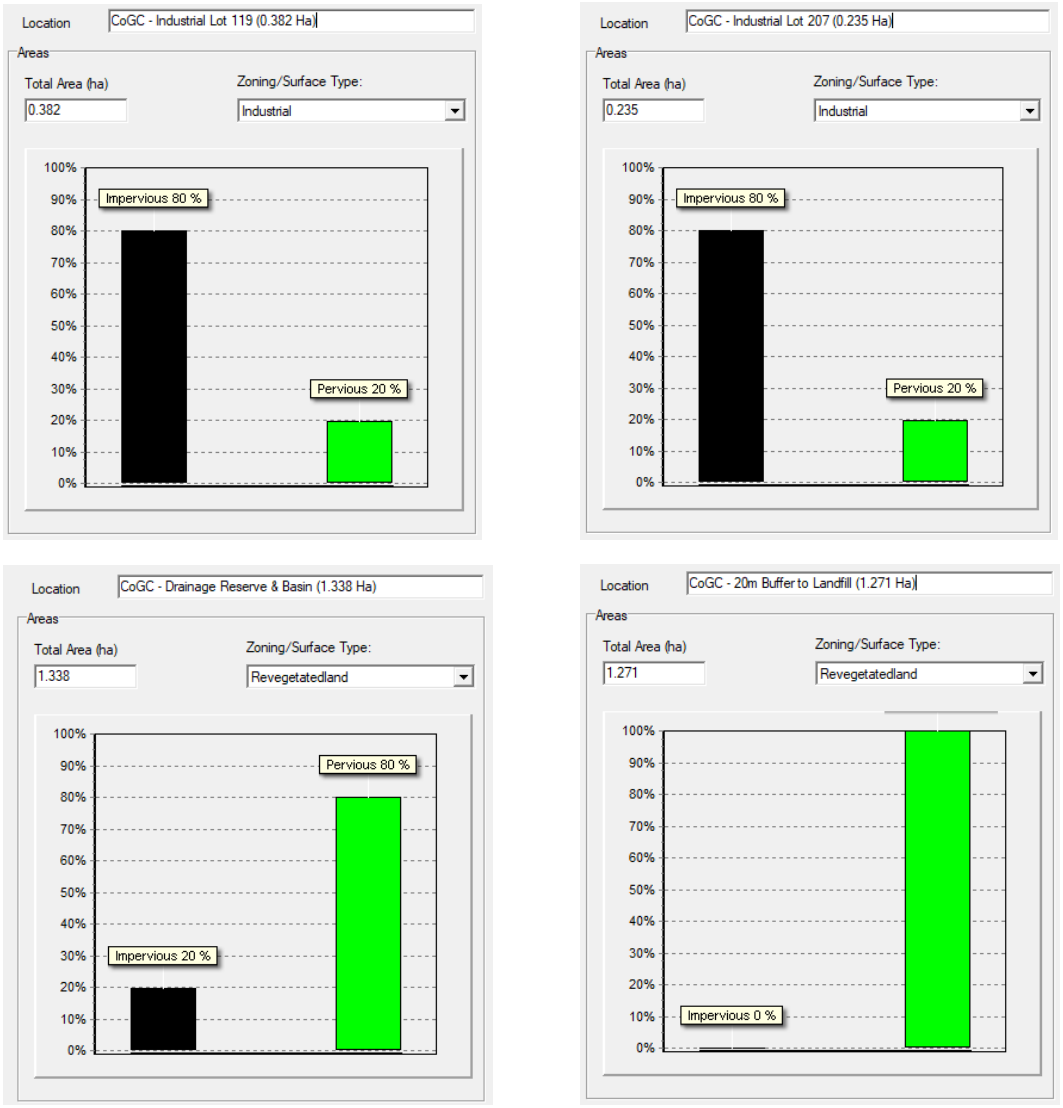


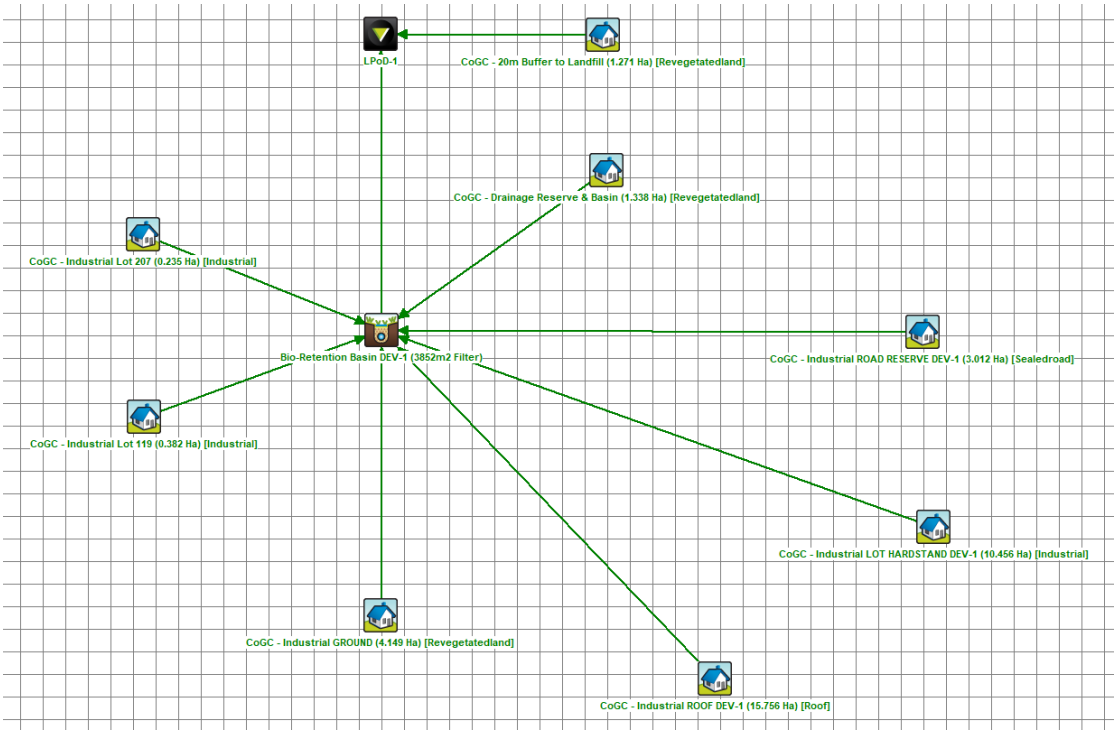
Figure 6.4.1: MUSIC Modelling Source Node Impervious Allocations

6.4.3 DRAINAGE LINKS

No routing has been adopted for the drainage links within the modelling that has been undertaken. This approach is believed to provide more conservative results.

6.4.4 MUSIC MODEL LAYOUT AND RESULTS

The diagrammatic representation of the source nodes, modelling configuration and results of pollutant reduction are outlined in Figure 6.4.4-1 below for the post developed catchment.



Treatment Train Effectiveness - LPoD-1

	Sources	Residual Load	% Reduction
Flow (ML/yr)	321	310	3.4
Total Suspended Solids (kg/yr)	36100	6840	81.1
Total Phosphorus (kg/yr)	94.5	25.3	73.2
Total Nitrogen (kg/yr)	693	332	52.1
Gross Pollutants (kg/yr)	7810	0	100

NORMAL ANALYSIS @ 200mm/hr SATURATED HYDRAULIC CONDUCTIVITY (SHC).

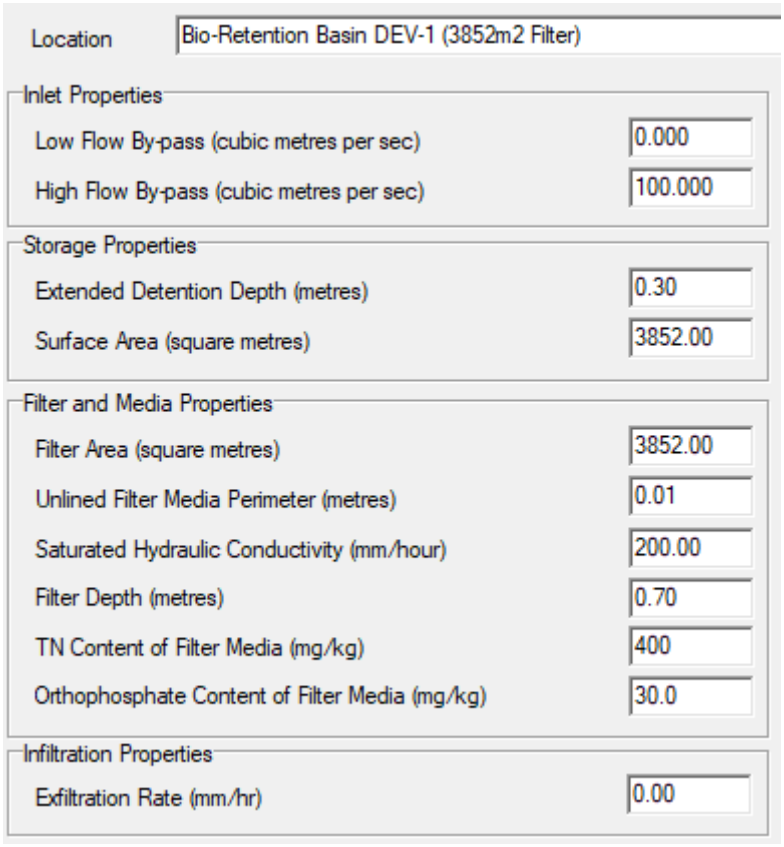
Figure 6.4.4-1: Catchment LPoD-1 MUSIC Layout and Results

The normal analysis returns a satisfactory result for meeting the SPP Water Quality Objectives. Refer above image for modelling outcomes.

The reduction in target pollutants to meet City of Gold Coast Council's requirements are achieved based on the below bio retention measures being implemented for the catchment.

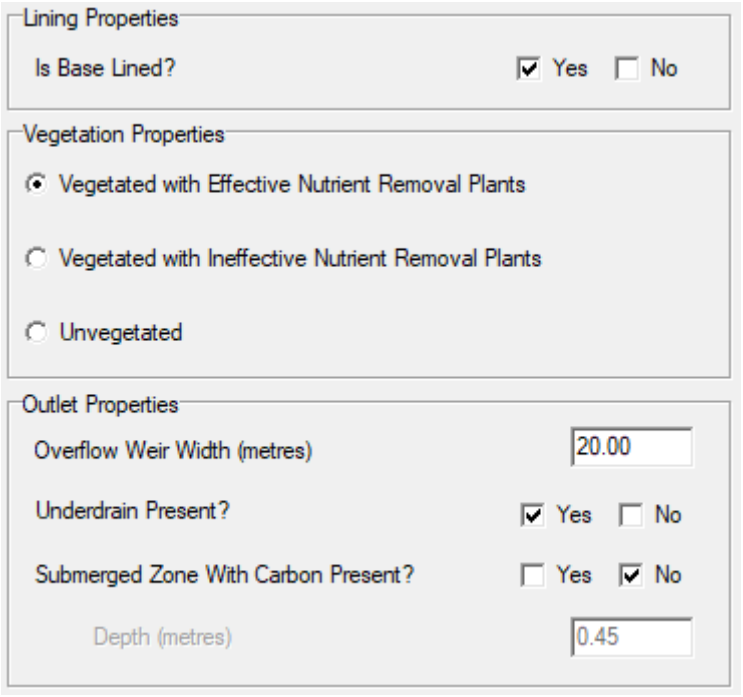
Parameter	Value
	LPoD-1
Filter Media Area (m2)	3,852
Filter Media Depth (m) *to support tree planting*	0.70
Extended Detention Depth (m)	0.30
Weir Crest Width (m)	25.00

Refer also ***Appendix F*** for the CoGC MUSIC-Link summary report card to support the modelling outcomes described in this section.



NORMAL ANALYSIS @ 200mm/hr SHC

Table 6.4.4: Summary of Proposed Bio Retention Measures



NORMAL ANALYSIS @ 200mm/hr SHC

Table 6.4.4: Summary of Proposed Bio Retention Measures (cont.)

The MUSIC modelling outcome achieves the following results for the subject catchment in direct comparison to the *Load Reduction Objectives* required by Council:

Pollutant Type	Load Reduction Objective (in mean annual load)	Load Reduction Achieved
Gross Pollutants (>5mm)	90.0%	***100.0%*** *complies*
Total Suspended Solids (TSS)	80.0%	***81%*** *complies*
Total Phosphorous (TP)	60.0%	***73%*** *complies*
Total Nitrogen (TN)	45.0%	***52.1%*** *complies*

7.0 CONSTRUCTION, OPERATIONAL MANAGEMENT & MAINTENANCE

7.1 CONSTRUCTION PHASE SEDIMENT AND EROSION CONTROL

The operational phase detention basin within Stage 2 is proposed to be utilised as a HES (High Efficiency Sediment basin) during the construction phase of the development. The sizing of the basin has been determined using the ICEA Best Practice Erosion & Sediment Control Guidelines as well as calculation spreadsheets prepared by an industry provider.

Refer to ***Appendix D*** which contains copies of the Sediment Basin design calculations, and the Sediment & Erosion Control plans.

Where ultimate detention basin sizing does not align with the volumetric requirements of International Erosion Control Association's (IECA) Best Practice Guidelines, temporary construction phase sediment basins will be implemented.

Monitoring and maintenance of both the construction phase sediment basins and associated sediment and erosion control measures implemented over the site will be in accordance with IECA's Best Practice Guidelines and City of Gold Coast Council's standards.

7.2 ASSET OWNERSHIP AND HANDOVER

The SQIDs have been designed in accordance with QUDM standards and City of Gold Coast Council's Land Development Guidelines and in doing so aim to provide suitable and safe vehicular access for future maintenance.

The current development proposal involves dedication of proposed Lot 901 containing the SQIDs to Council though a formal 'On Maintenance' handover in accordance with Council's Land Development Guidelines to ensure the SQIDs have been built in accordance with the requirements.

7.3 MAINTENANCE OF BIO RETENTION BASINS DURING OPERATIONAL PHASE

Inspections and maintenance are to be carried out on a yearly basis to determine if the SQIDs are functioning as intended.

The WSUD Technical Design Guideline for South East Queensland incorporates Maintenance Checklists *(Refer **Appendix G**)* covering the items to be inspected and should be utilised and kept on record to ensure that a mechanism is in place to log the continued effectiveness of the SQIDs.

Inspections and any required maintenance will be the responsibility of the asset owner.

Refer to ***Appendix C*** which contains copies of the Operational Phase Bio Retention basin plans.

8.0 CONCLUSION

Gassman Development Perspectives have prepared this Site Based Stormwater Management Plan to support an application for *Reconfiguration of Lot* over Lot 501 on SP295994 (60 Stapylton Jacobs Well Road, Stapylton).

The purpose of which is to address and manage stormwater quantity and quality requirements of the proposed development of Stage 2 over the subject site in accordance with the relevant State and Local Authority's legislation and regulatory guidelines.

The key outcomes achieved through the analysis and modelling undertaken within this report are demonstrated in the stormwater bio-retention and sediment basin designs within ***Appendix C*** *and* ***Appendix D****,* and are as described below:

Stormwater Quantity

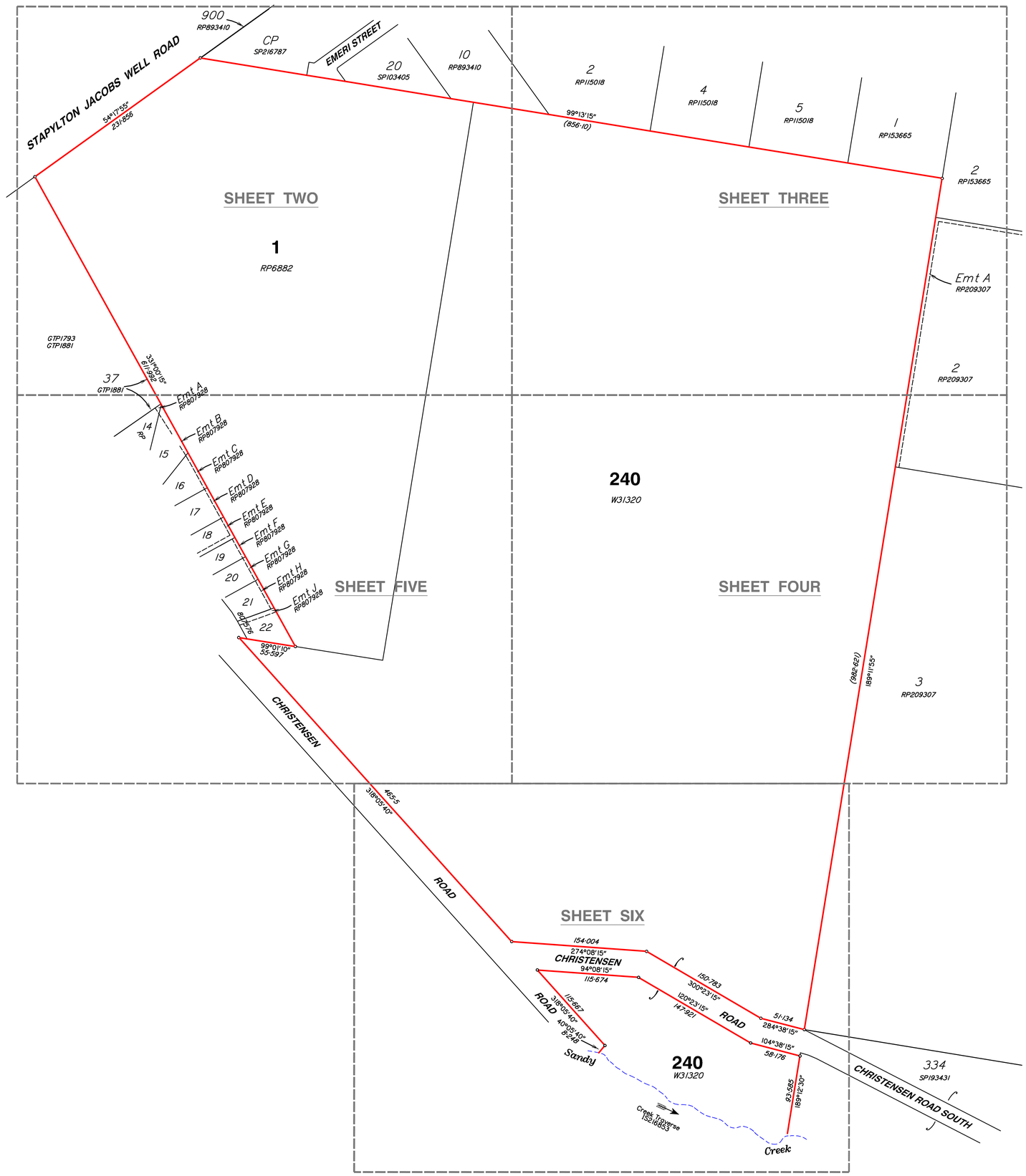
Suitable attenuation measures are able to be incorporated into the proposed development to ensure there is no adverse impacts to downstream properties, waterways or infrastructure as a result of an increase in peak stormwater flow rates discharging from the subject site upon development.

This is achieved through the design of an appropriately sized detention basin that complies with City of Gold Coast Council's Land Development Guidelines and the Queensland Urban Drainage Manual (QUDM).

Stormwater Quality

Stormwater quality objectives for the subject site are achieved through the design of a suitable stormwater treatment train that implements all necessary steps to ensure that the quality of stormwater discharging from the subject site meets the necessary standards to comply with City of Gold Coast Council's Water Sensitive Urban Design (WSUD) requirements, Queensland Urban Drainage Manual (QUDM) and the performance objectives of the Queensland State Planning Policy (SPP).

Appendix A – Site Survey Plan



Scale 1:2500 - Lengths are in Metres.

0 20 40 60 80 100 120 140 160 180 200

Notes

This plan has been prepared for the exclusive use and purposes of the client as stated on this plan and should not be used by any other person or corporation and for any other purpose.

Property boundaries have not been defined by this survey and have been compiled from IS216853.

Only those underground features and services as shown on this plan have been located by this survey. Prior to any construction, demolition or excavation on the site, the relevant authority should be contacted for the location of any further underground services and detailed location of all services.

This plan may not be photocopied unless these notes are included.

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Client
HESTER

Project
CONTOUR AND DETAIL PLAN

Over Lot 1 on RP6882 and Lot 240 on WD31320

Parish of ***ALBERT***
County of ***Ward***
Local Govt ***GOLD COAST CITY COUNCIL***

Level Datum	A.H.D.	Date Surveyed	Jan 2011
Meridian	IS216853	Surveyor	A. Macdonald
Contour Interval	0.2	Drawn	S. Holt
F.B.	No	Date Drafted	02–02–2011
Origin	PSM 133471 RL 22.169	Checked	
Scale (on A1 original)		Designed	
1:2500		Drawn	
		Date Designed	

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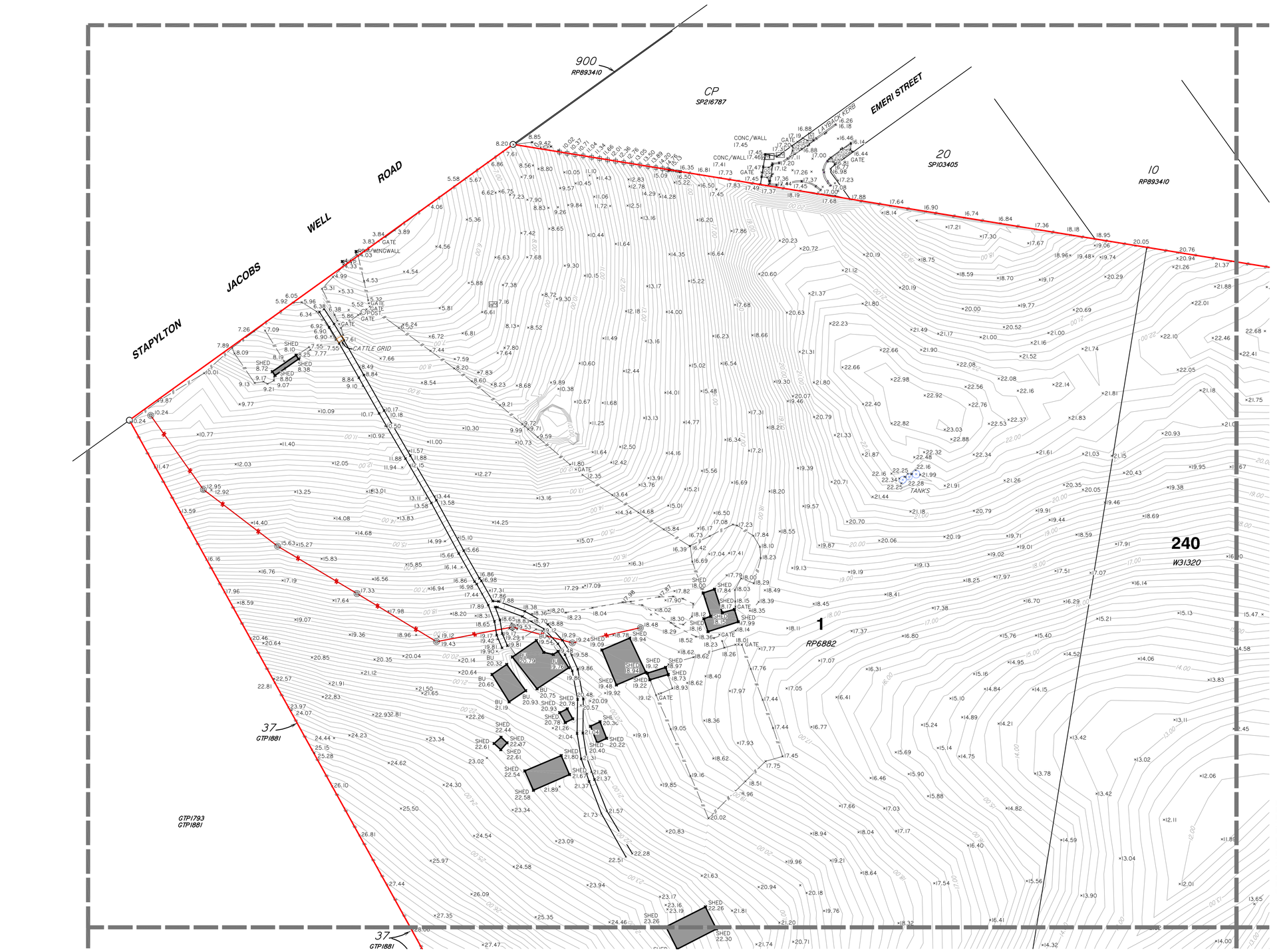
REFERENCE No. *5093-10*

PLAN No. ***5093 S CD 01***



Scale 1:1000 - Lengths are in Metres.

0 10 20 30 40 50 60 70 80

SHEET 2 OF 6

LEGEND

- PERMANENT MARK
- SEWER MANHOLE
- SEWER INSPECTION OUTLET
- ELECTRICITY PILLAR
- ELECTRICITY POLE
- ELECTRICITY POLE WITH LIGHT
- TELSTRA PIT
- MANHOLE
- STORMWATER MANHOLE
- GULLY TRAP
- WATER METER
- FIRE HYDRANT
- VALVE
- GATE
- BOLLARD
- CONCRETE
- EDGE OF BITUMEN
- FENCE
- OVERHEAD ELECTRICITY
- OPEN DRAIN
- RETAINING WALL
- EDGE OF GARDEN
- CONTOUR LEVEL

Notes

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Client
HESTER

Project
CONTOUR AND DETAIL PLAN

Over Lot 1 on RP6882 and Lot 240 on WD31320

Parish of ***ALBERT***
County of ***Ward***
Local Govt ***GOLD COAST CITY COUNCIL***

Level Datum	A.H.D.	Date Surveyed	Jan 2011
Meridian	IS133471	Surveyor	A. Macdonald
Contour Interval	0.2	Drawn	S. Holt
F.B.	No	Date Drafted	02-02-2011
Origin	PSM 133471 RL 22.169	Checked	
Scale (on A1 original)	***1:1000***	Designed	
		Drawn	
		Date Designed	

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f: (07) 32875461

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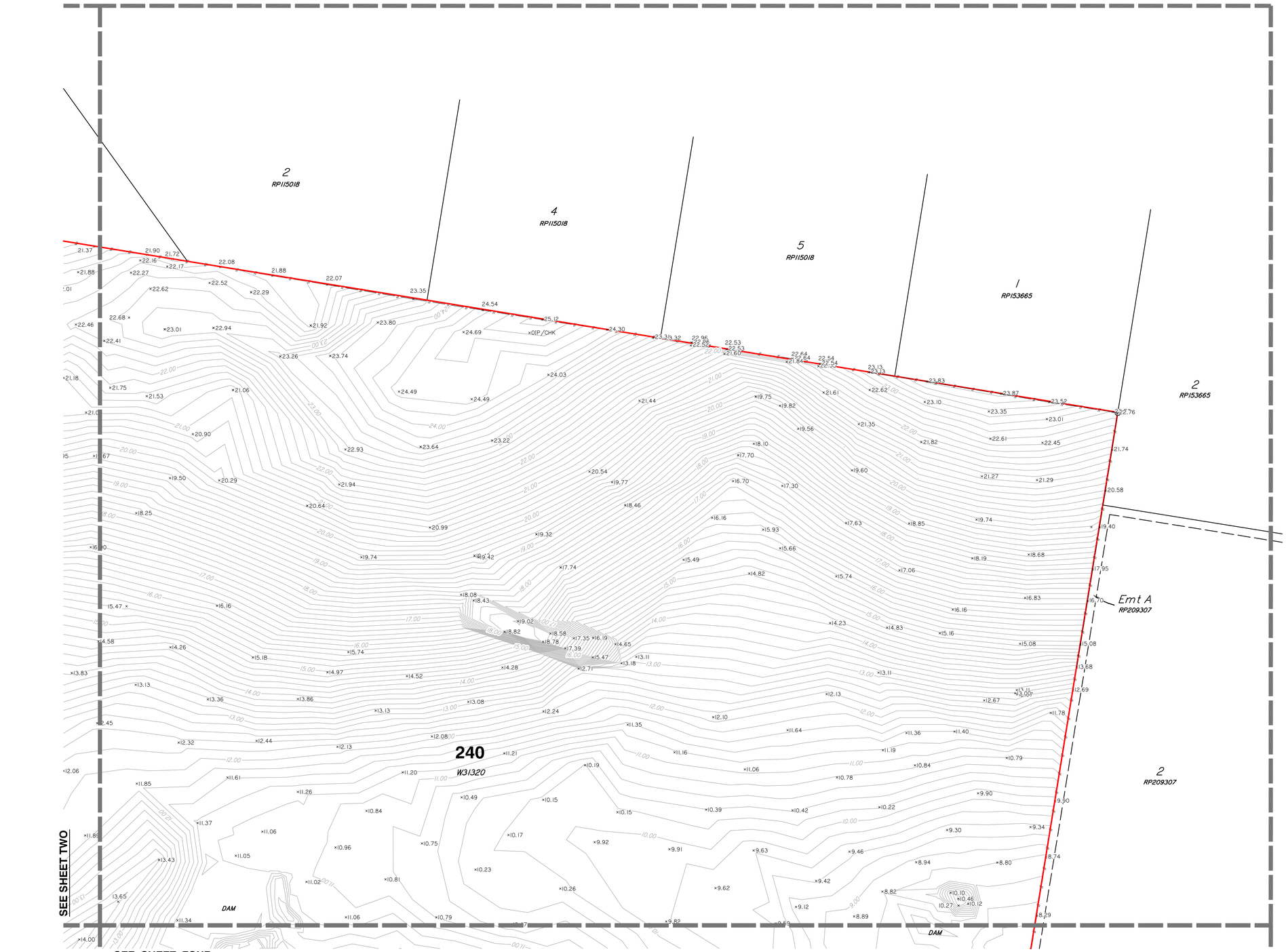
w: www.gassman.com.au

REFERENCE No. *5093-10*

PLAN No. ***5093 S CD 01***



Scale 1:1000 - Lengths are in Metres.

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LEGEND

- . . . . PERMANENT MARK
- . . . . SEWER MANHOLE
- . . . . SEWER INSPECTION OUTLET
- . . . . ELECTRICITY PILLAR
- . . . . ELECTRICITY POLE
- . . . . ELECTRICITY POLE WITH LIGHT
- . . . . TELSTRA PIT
- . . . . MANHOLE
- . . . . STORMWATER MANHOLE
- . . . . GULLY TRAP
- . . . . WATER METER
- . . . . FIRE HYDRANT
- . . . . VALVE
- . . . GATE
- . . . BOLLARD
- . . . CONCRETE
- EDGE OF BITUMEN
- FENCE
- OVERHEAD ELECTRICITY
- OPEN DRAIN
- RETAINING WALL
- EDGE OF GARDEN
- 14.0 CONTOUR LEVEL

Notes

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Project
CONTOUR AND DETAIL PLAN

Over Lot 1 on RP6882 and Lot 240 on WD31320

Parish of *ALBERT*
County of *Ward*
Local Govt *GOLD COAST CITY COUNCIL*

Level Datum	A.H.D.	Date Surveyed	Jan 2011
Meridian	IS216853	Surveyor	A. Macdonald
Contour Interval	0.2	Drawn	S. Holt
F.B.	No	Date Drafted	02-02-2011
Origin	PSM 133471 RL 22.169	Checked	
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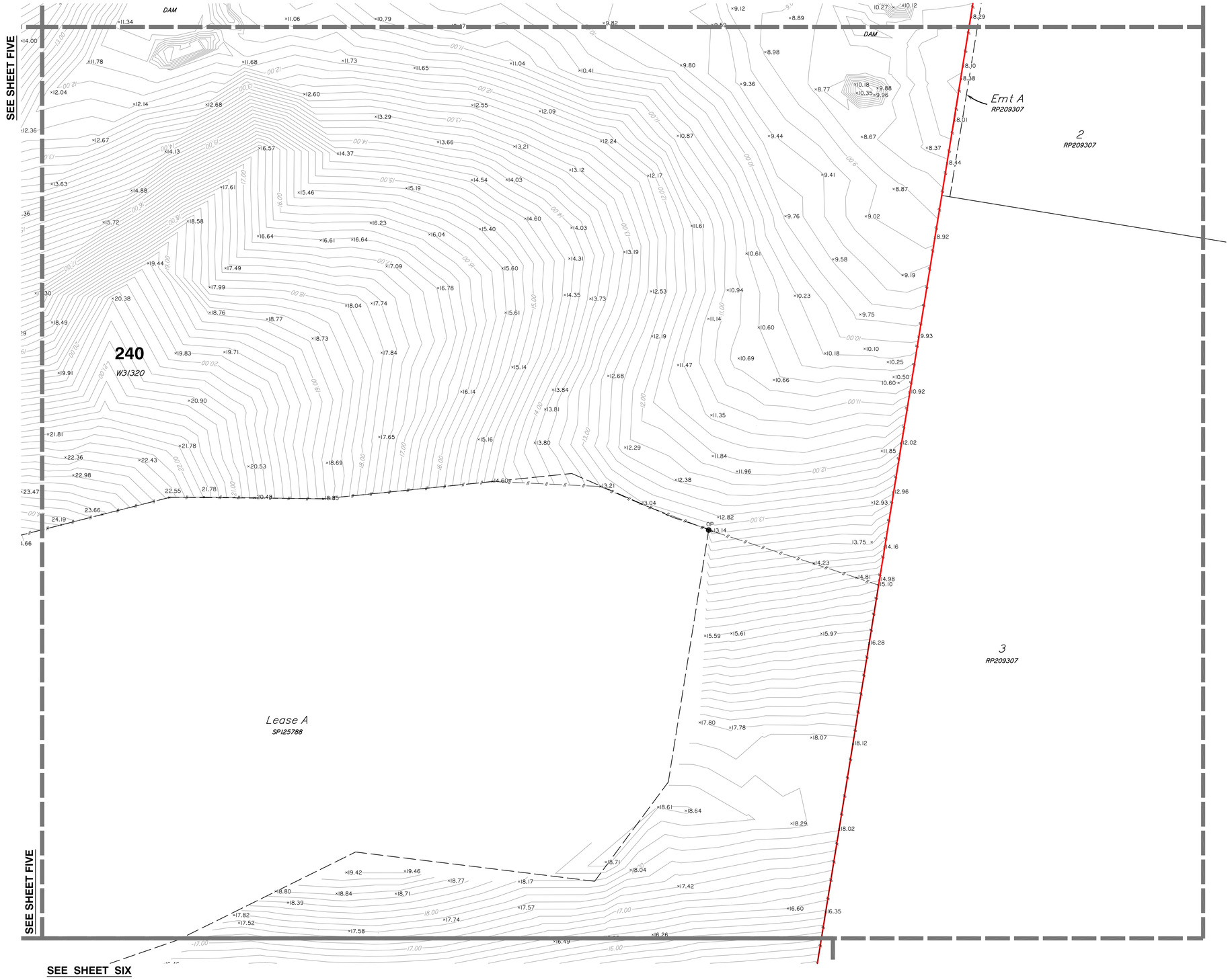
REFERENCE No. *5093-10*

PLAN No. **5093 S CD 01**



Scale 1:1000 - Lengths are in Metres.

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SHEET 4 OF 6

LEGEND

- PERMANENT MARK
- SEWER MANHOLE
- SEWER INSPECTION OUTLET
- ELECTRICITY PILLAR
- ELECTRICITY POLE
- ELECTRICITY POLE WITH LIGHT
- TELSTRA PIT
- MANHOLE
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Over Lot 1 on RP6882 and Lot 240 on WD31320

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Contour Interval	0.2	Drawn	S. Holt
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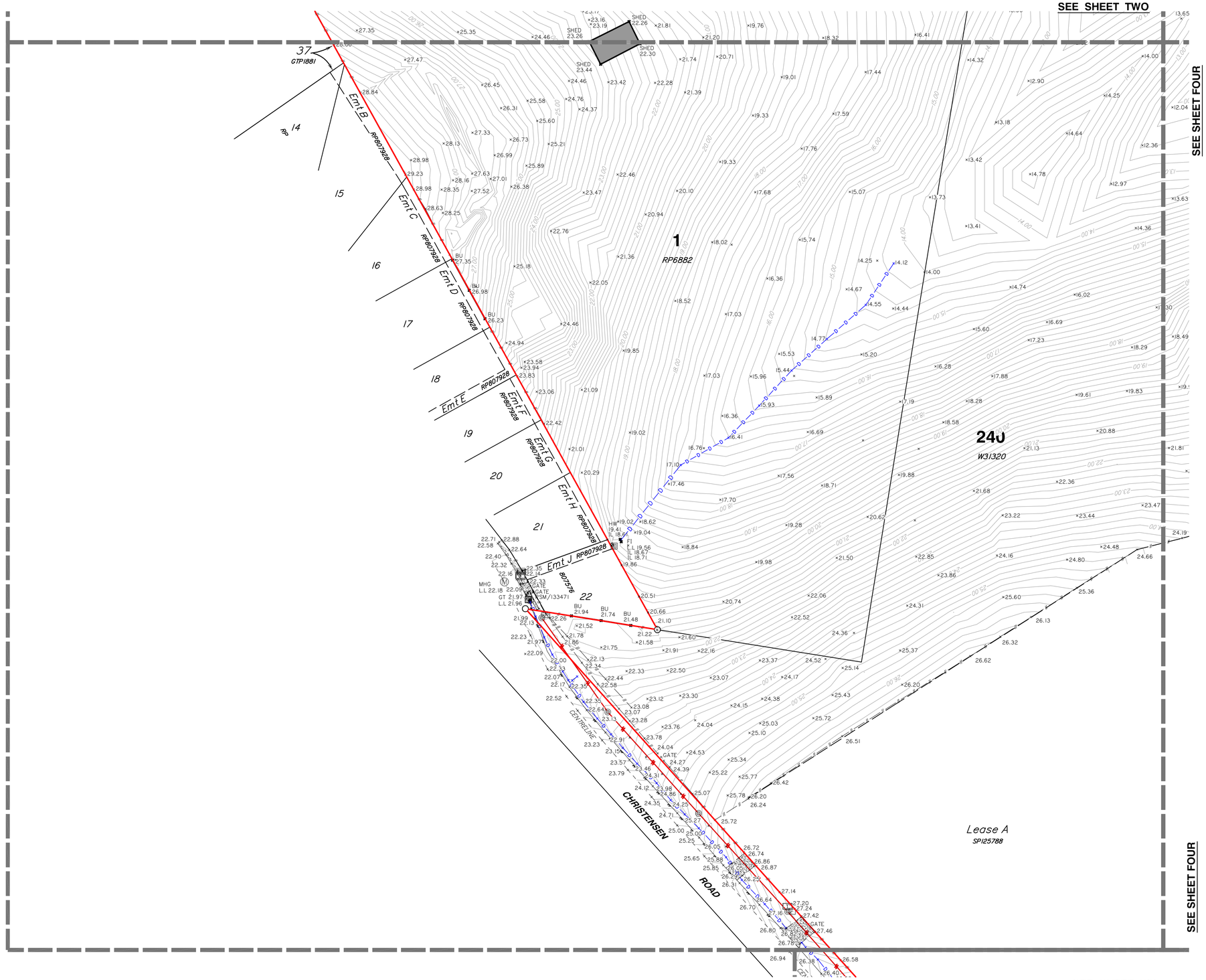

LEGEND

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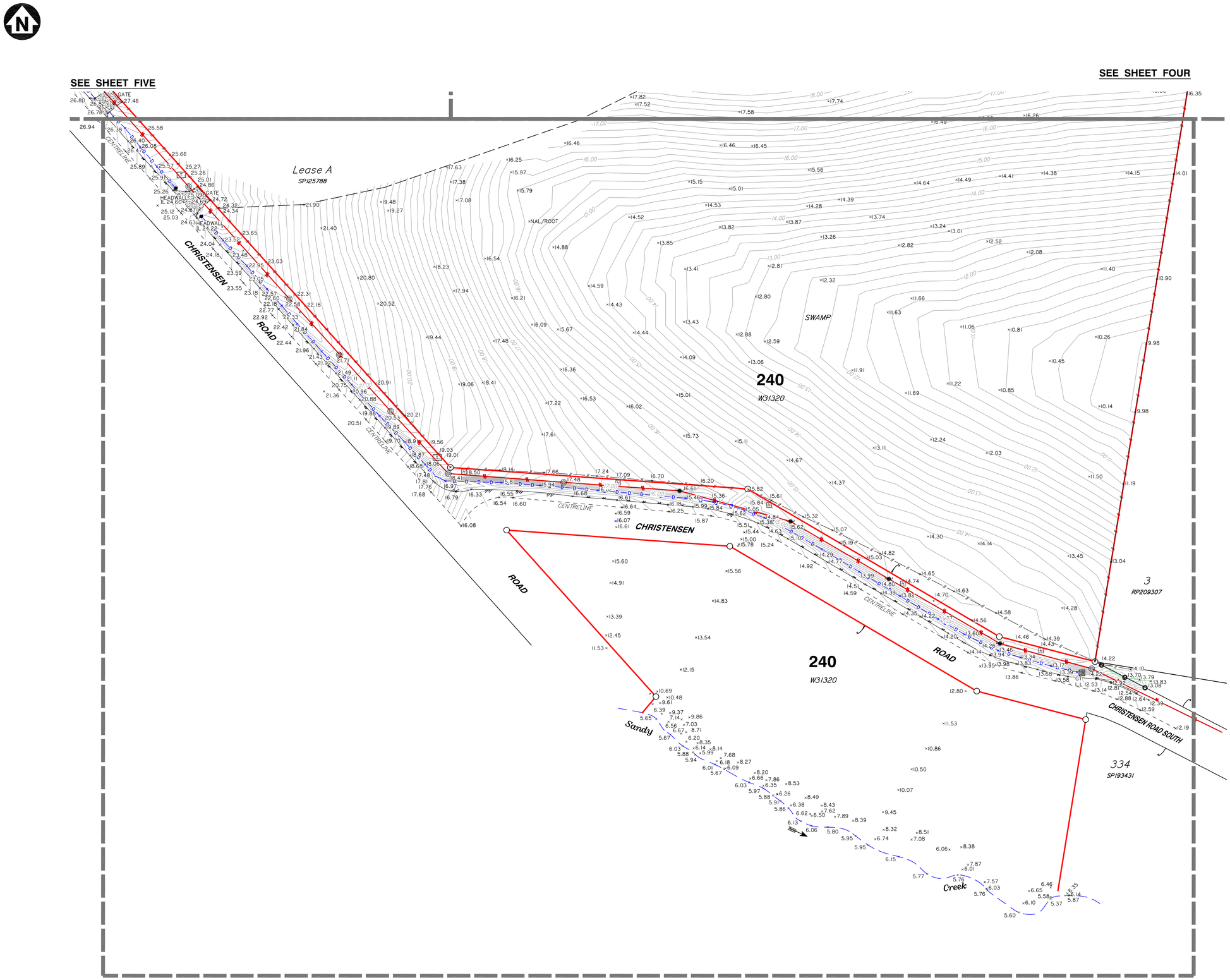

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0 10 20 30 40 50 60 70 80

SHEET 6 OF 6

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Local Govt ***GOLD COAST CITY COUNCIL***

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F.B.	No	Date Drafted	02-02-2011
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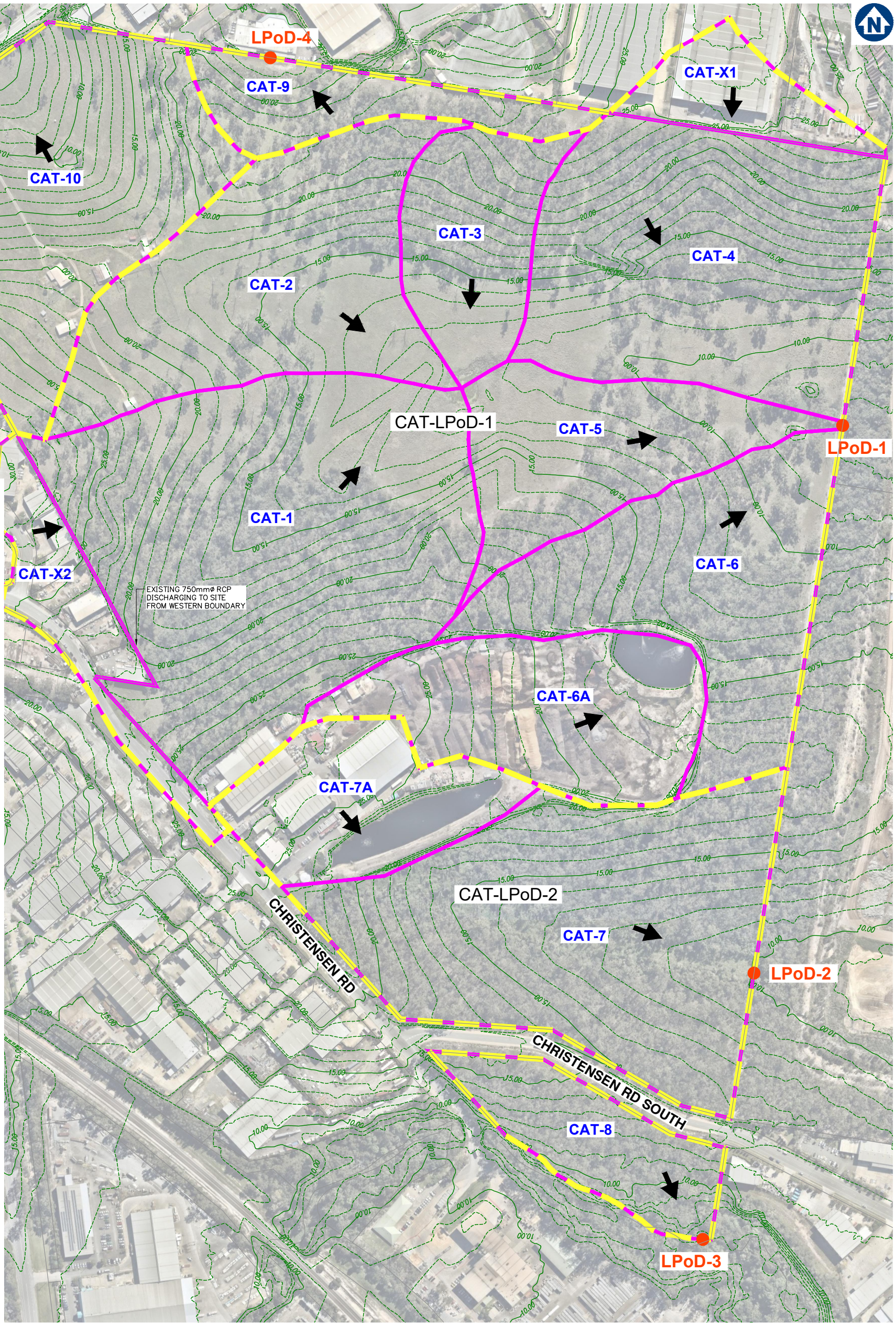
PLAN No. ***5093 S CD 01***

Appendix B – Pre and Post Development Catchment Plans



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FRASERS PROPERTY (AUSTRALIA) PTY. LTD.

Project:

VantageYatala

STAGE 2

Site Address:

60 STAPYLTON JACOBS WELL ROAD, STAPYLTON QLD 4207

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RPD:

Lot:	501
Plan:	SP295994
Local Authority:	CITY OF GOLD COAST COUNCIL
Level Datum:	AHD
Meridian:	-
Contour Interval:	-
PSM:	-
RL:	-

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DRAWING TITLE

PRE DEVELOPED CATCHMENT PLAN

Issue	Date	Description	DRN	CHK
A	20-11-2020	ORIGINAL ISSUE	BA	MG

0 40 80 120 160 200
1:2000 (FULL SIZE A1)
1:4000 (HALF SIZE A3)

Scale at A1:	1:2000
Designed:	IG
Drafted:	BA
Approved:	MG
RPEQ:	16939
Signed:	
Date:	20-11-2020
Drawing No:	5941 ENG SMP2 002
Rev. No:	A

LEGEND

- LOT BOUNDARY
- 28.60 — EXISTING CONTOURS (MINOR)
- 29.00 — EXISTING CONTOURS (MAJOR)
- SUB-CATCHMENT BOUNDARY
- CAT-3 — CATCHMENT BOUNDARY
- LPoD-3 — LAWFUL POINT OF DISCHARGE
- OVERLAND FLOW DIRECTION

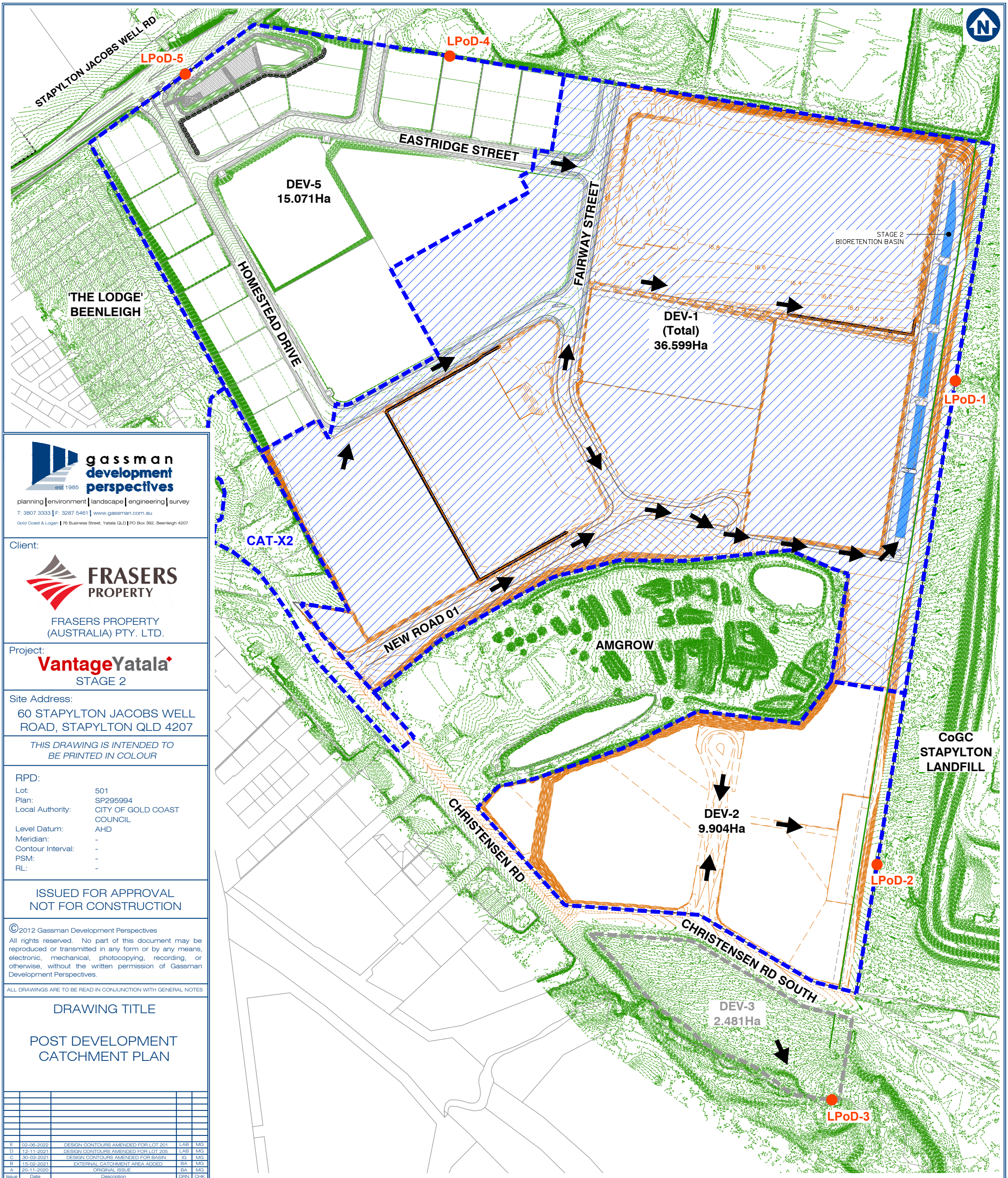
CATCHMENT TABLE

CATCHMENT	AREA (Ha)	IMP %	VECTORED SLOPE (%)
CAT-LPOD-1	50.714	3.10	4.01
CAT-LPOD-2	13.391	2.50	3.01
CAT-LPOD-3	2.481	0.00	3.00
CAT-LPOD-4	2.210	0.00	2.21
CAT-LPOD-5	8.523	9.50	6.75

SUB-CATCHMENT TABLE

CATCHMENT	AREA (Ha)	VECTORED SLOPE (%)
CAT-X1	1.637	1.00
CAT-X2	2.182	1.00
CAT-1	12.715	5.41
CAT-2	7.114	5.95
CAT-3	3.015	5.54
CAT-4	8.666	5.80
CAT-5	4.144	4.02
CAT-6	6.474	3.91
CAT-6A	4.767	3.50
CAT-7	9.981	3.51
CAT-7A	3.410	2.50
CAT-8	2.481	3.00
CAT-9	2.210	2.21
CAT-10	8.523	6.75

PRE DEVELOPED CATCHMENT PLAN



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RPD:

Lot:	501
Plan:	SP295994
Local Authority:	CITY OF GOLD COAST COUNCIL
Level Datum:	AHD
Meridian:	-
Contour Interval:	-
PSM:	-
RL:	-

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DRAWING TITLE

POST DEVELOPMENT CATCHMENT PLAN

Issue	Date	Description	DRN	CHK
E	02-06-2022	DESIGN CONTOURS AMENDED FOR LOT 201	LAB	MG
D	12-11-2021	DESIGN CONTOURS AMENDED FOR LOT 205	LAB	MG
C	30-03-2021	DESIGN CONTOURS AMENDED FOR BASIN	IG	MG
B	15-02-2021	EXTERNAL CATCHMENT AREA ADDED	BA	MG
A	20-11-2020	ORIGINAL ISSUE	BA	MG

0 40 80 120 160 200
1:2000 (FULL SIZE A1)
1:4000 (HALF SIZE A3)

Scale at A1:	1:2000
Designed:	IG
Drafted:	BA
Approved:	MG
RPEQ:	16939
Signed:	
Date:	02-06-2022
Drawing No:	5941 ENG SMP2 003
Rev. No:	E

LEGEND

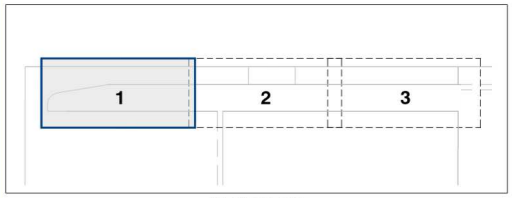
- LOT BOUNDARY
- EXISTING CONTOURS (MINOR)
- EXISTING CONTOURS (MAJOR)
- DESIGN CONTOURS (MINOR)
- DESIGN CONTOURS (MAJOR)
- CATCHMENT BOUNDARY
- LPoD-4 — LAWFUL POINT OF DISCHARGE
- OVERLAND FLOW DIRECTION

STAGE 2 CATCHMENT TABLE

CATCHMENT	AREA (Ha)
DEV-1 (LPoD-1)	36.599

POST DEVELOPMENT CATCHMENT PLAN

Appendix C – Design of Stormwater Quantity and Quality Basin



KEY PLAN
SCALE 1:3000

BIORETENTION BASIN 1 LAYOUT PLAN
SCALE 1:250 (A1)

DETENTION BASIN VOLUME TABLE *

- 14,789m3 to CROWN (RL 12.651)
- 8,076m3 to 1% AEP WSL (RL 11.948)
- 5,073m3 to WEIR LEVEL (RL11.570)

* DEDUCTING 0.30m EXTENDED DETENTION VOLUME OF 1,446m3

BIO-RETENTION NOTES:

MINIMUM BIO-RETENTION 'PROFILE' IS TO BE 1.10m AND IS TO CONSIST OF THE FOLLOWING:

* 0.70 OF SANDY LOAM MATERIAL WITH A HYDRAULIC CONDUCTIVITY OF 200mm/h AND A PARTICLE SIZE OF 0.45-0.50mm.

* 0.15m OF COURSE SAND. PARTICLE SIZE TYPICALLY 0.5-2.0mm.

* 0.25m OF GRAVEL DRAINAGE. PARTICLE SIZE 5-7mm SCREENING.

AEP (%)	MAX. WATER ELEVATION (m) A.H.D	MAX. WATER DEPTH (m)
63.2	11.484	1.014
0.5EY	11.627	1.157
20	11.722	1.252
10	11.789	1.319
5	11.844	1.374
2	11.902	1.432
1	11.946	1.476

BIO RETENTION - COARSE SEDIMENT FOREBAY SIZING GUIDE CALCULATIONS

$V_s = A_C \times R \times L_o \times F$ = 11.0722m³

$R = 1 - \left[\frac{1}{n} \times \frac{V_s}{0.7 A_f}\right]^{-n}$

$0.8 = 1 - \left[\frac{1}{0.5} \times \frac{0.10}{2.7508/A_f}\right]^{-0.5}$ Af = 330.1 m²

$D_s = \frac{V_s}{A_f}$ $D_s = \frac{11.0722}{330.1}$ = 0.034 m

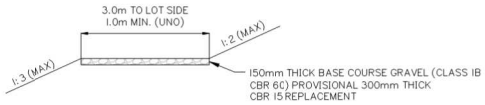
OPTIMIZATION OF MINIMUM FOREBAY SIZE:

$D_s = \frac{11.0722 \times 3}{253.977 \times 2}$ = 0.044 m

CALCULATED FOR 3 FOREBAYS AT 84.659m² ea.

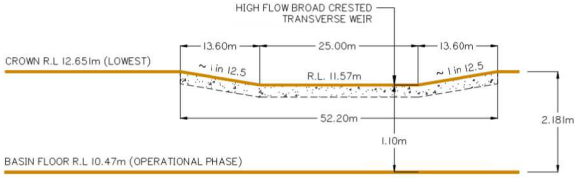
V_s = 11.0722m³ (Workings Above)
A_C = 23.067 ha (Refer Catchment Plans)
UNMITIGATED POST-DEVELOPMENT FLOW
Q = 2.7508 m³/s (3 month ARI)
V_s = 0.1 m/s (Recommended for 1mm Particle)
R = 0.8 (Recommended 80% Capture)
L_o = 0.6 (From Healthy Waterways Guide)
n = 0.5 (Recommended Turbulence)
F_C = 1.0 (Frequency of Clean Out / Yr)

REFER TO BIO RETENTION TECHNICAL DESIGN GUIDELINES FOR FURTHER INFORMATION

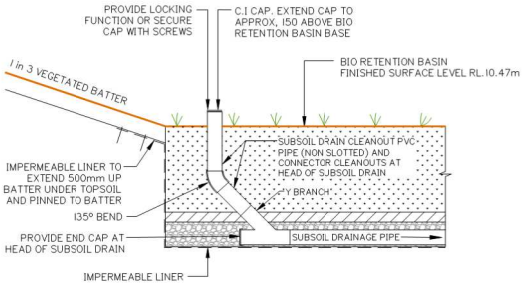


MAINTENANCE ACCESS TRACK - TYPICAL SECTION
N.T.S

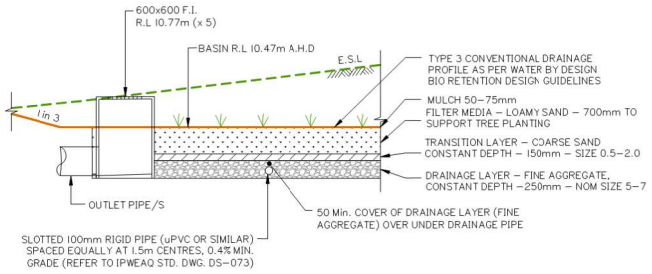
UNO DENOTES 'UNLESS NOTED OTHERWISE'



WEIR / SPILLWAY - TYPICAL ELEVATION
N.T.S



SUBSOIL DRAIN CLEANOUT - IN BASIN
N.T.S



TYPICAL BIO-RETENTION BASIN DETAIL
N.T.S

OPERATIONAL PHASE BIORETENTION BASIN SHEET 1 OF 4

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PSM:	-
RL:	-

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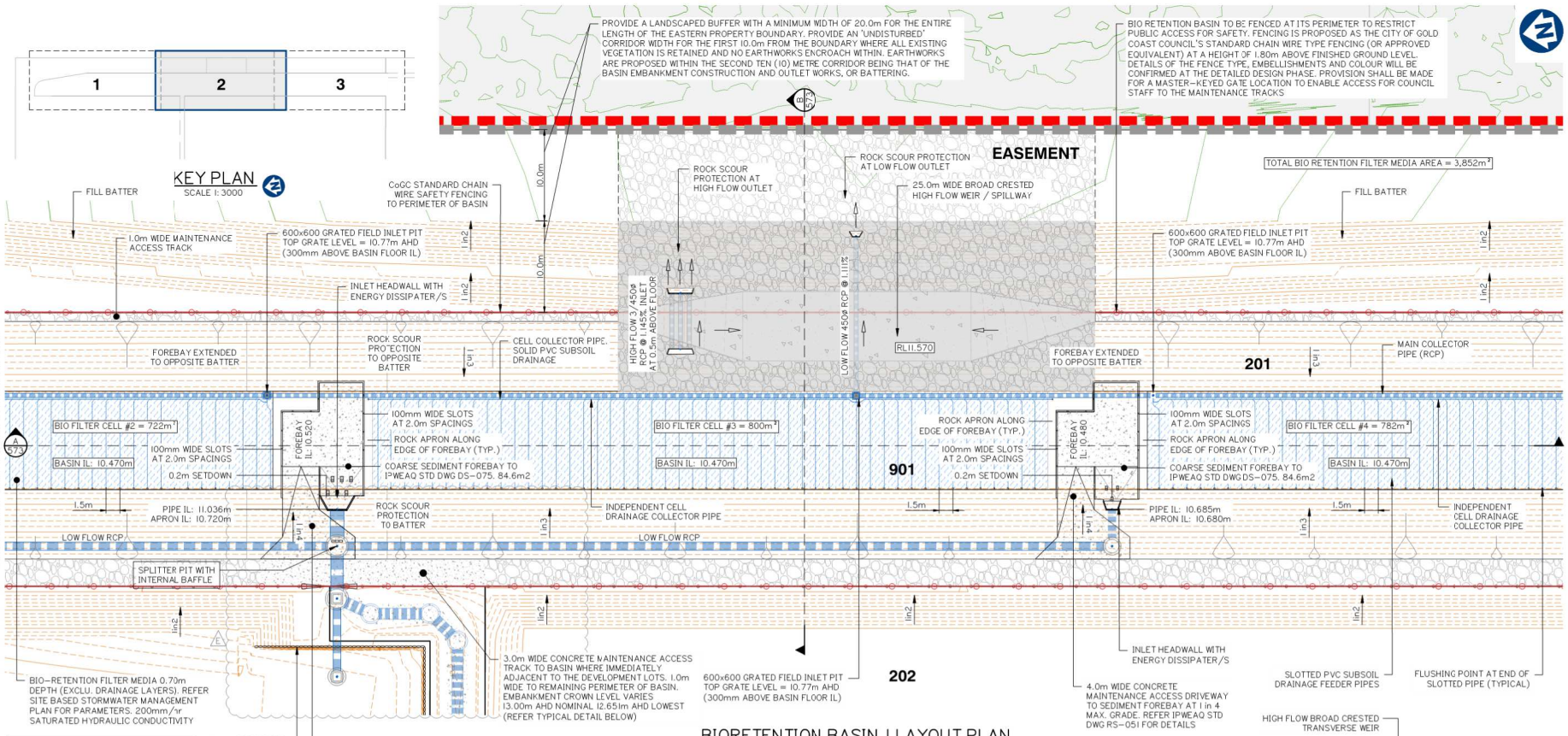
DRAWING TITLE
OPERATIONAL PHASE BIORETENTION BASIN SHEET 1 OF 4

Issue	Date	Description	DRN	CHK
D	24-09-2021	EXTENT OF STAGE 2 EARTHWORKS REDUCED	IG	MG
C	31-03-2021	INFORMATION REQUEST RESPONSE	IG	MG
B	15-02-2021	INFORMATION REQUEST RESPONSE	IG	MG
A	20-11-2020	ORIGINAL ISSUE	BA	MG

SCALE IN METRES
0 5 10 15 20 25
1:250 (FULL SIZE A1)
1:500 (HALF SIZE A3)

Scale at A1:	1:250
Designed:	IG
Drafted:	IG / BA / LAB
Approved:	MG
RPEQ:	16939
Signed:	
Date:	24-09-2021

Drawing No: 5941 ENG BE2 570
Rev. No: D



BIORETENTION BASIN 1 LAYOUT PLAN

SCALE 1:250 (A1)

DETENTION BASIN VOLUME TABLE *

- 14,789m3 to CROWN (RL 12.651)
- 8,076m3 to 1% AEP WSL (RL 11.948)
- 5,073m3 to WEIR LEVEL (RL11.570)

* DEDUCTING 0.30m EXTENDED DETENTION VOLUME OF 1,446m3

BIO-RETENTION NOTES:

MINIMUM BIO-RETENTION 'PROFILE' IS TO BE 1.10m AND IS TO CONSIST OF THE FOLLOWING:

* 0.70 OF SANDY LOAM MATERIAL WITH A HYDRAULIC CONDUCTIVITY OF 200mm/h AND A PARTICLE SIZE OF 0.45-0.50mm.

* 0.15m OF COURSE SAND. PARTICLE SIZE TYPICALLY 0.5-2.0mm.

* 0.25m OF GRAVEL DRAINAGE. PARTICLE SIZE 5-7mm SCREENING.

AEP (%)	MAX. WATER ELEVATION (m) A.H.D	MAX. WATER DEPTH (m)
63.2	11.484	1.014
0.5EY	11.627	1.157
20	11.722	1.252
10	11.789	1.319
5	11.844	1.374
2	11.902	1.432
1	11.946	1.476

BIO RETENTION – COARSE SEDIMENT FOREBAY SIZING GUIDE CALCULATIONS

$V_s = A_c \times R \times L_o \times F$ = 11.0722m³

$R = 1 - \left[\frac{1 + 1 \times \frac{V_s}{0.7/A_f}}{n}\right]^{-n}$

$0.8 = 1 - \left[\frac{1 + \frac{0.10}{2.7508/A_f}}{0.5}\right]^{-0.5}$ Af = 330.1 m²

$D_s = \frac{V_s}{A_f}$ $D_s = \frac{11.0722}{330.1}$ = 0.034 m

OPTIMIZATION OF MINIMUM FOREBAY SIZE:

$D_s = \frac{11.0722 \times 3}{253.977 \times 2}$ = 0.044m

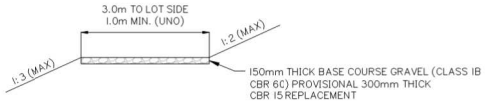
CALCULATED FOR 3 FOREBAYS AT 84.659m² ea.

V_s = 11.0722m³ (Workings Above)
A_c = 23.067 ha (Refer Catchment Plans)
UNMITIGATED POST-DEVELOPMENT FLOW
Q = 2.7508 m³/s (3 month ARI)
V_s = 0.1 m/s (Recommended for 1mm Particle)
R = 0.8 (Recommended 80% Capture)
L_o = 0.6 (From Healthy Waterways Guide)
n = 0.5 (Recommended Turbulence)
F_c = 1.0 (Frequency of Clean Out / Yr)

REFER TO BIO RETENTION TECHNICAL DESIGN GUIDELINES FOR FURTHER INFORMATION

MAINTENANCE ACCESS TRACK – TYPICAL SECTION

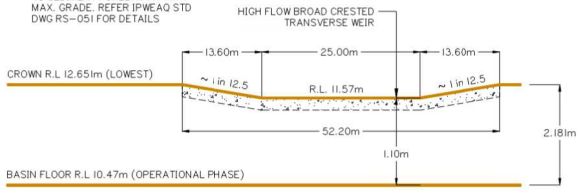
N.T.S



UNO DENOTES 'UNLESS NOTED OTHERWISE'

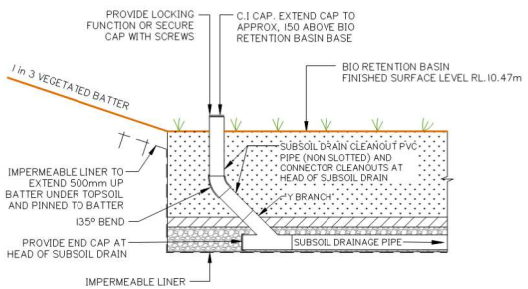
WEIR / SPILLWAY – TYPICAL ELEVATION

N.T.S



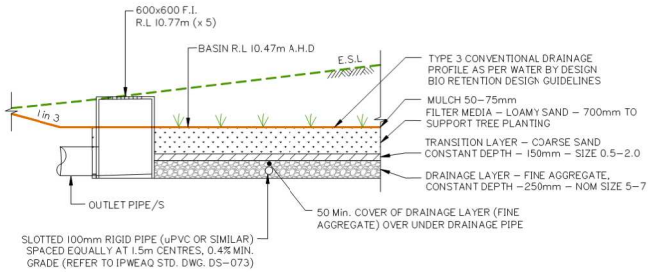
SUBSOIL DRAIN CLEANOUT – IN BASIN

N.T.S



TYPICAL BIO-RETENTION BASIN DETAIL

N.T.S



OPERATIONAL PHASE BIORETENTION BASIN SHEET 2 OF 4

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Project:
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STAGE 2

Site Address:
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RPD:

Lot:	502
Plan:	SP316137
Local Authority:	CITY OF GOLD COAST COUNCIL
Level Datum:	AHD
Meridian:	-
Contour Interval:	-
PSM:	-
RL:	-

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DRAWING TITLE
OPERATIONAL PHASE BIORETENTION BASIN SHEET 2 OF 4

Issue	Date	Description	DRN	CHK
E	23-05-2022	LOT 201 BOUNDARY ALIGNMENT	LAB	MG
D	24-09-2021	EXTENT OF STAGE 2 EARTHWORKS REDUCED	IG	MG
C	31-03-2021	INFORMATION REQUEST RESPONSE	IG	MG
B	15-02-2021	INFORMATION REQUEST RESPONSE	IG	MG
A	20-11-2020	ORIGINAL ISSUE	BA	MG

SCALE IN METRES
0 5 10 15 20 25
1:250 (FULL SIZE A1)
1:500 (HALF SIZE A3)

Scale at A1:	1:500
Designed:	IG
Drafted:	IG / BA / LAB
Approved:	MG
RPEQ:	16939
Signed:	
Date:	23-05-2022

Drawing No: 5941 ENG BE2 571
Rev. No: E

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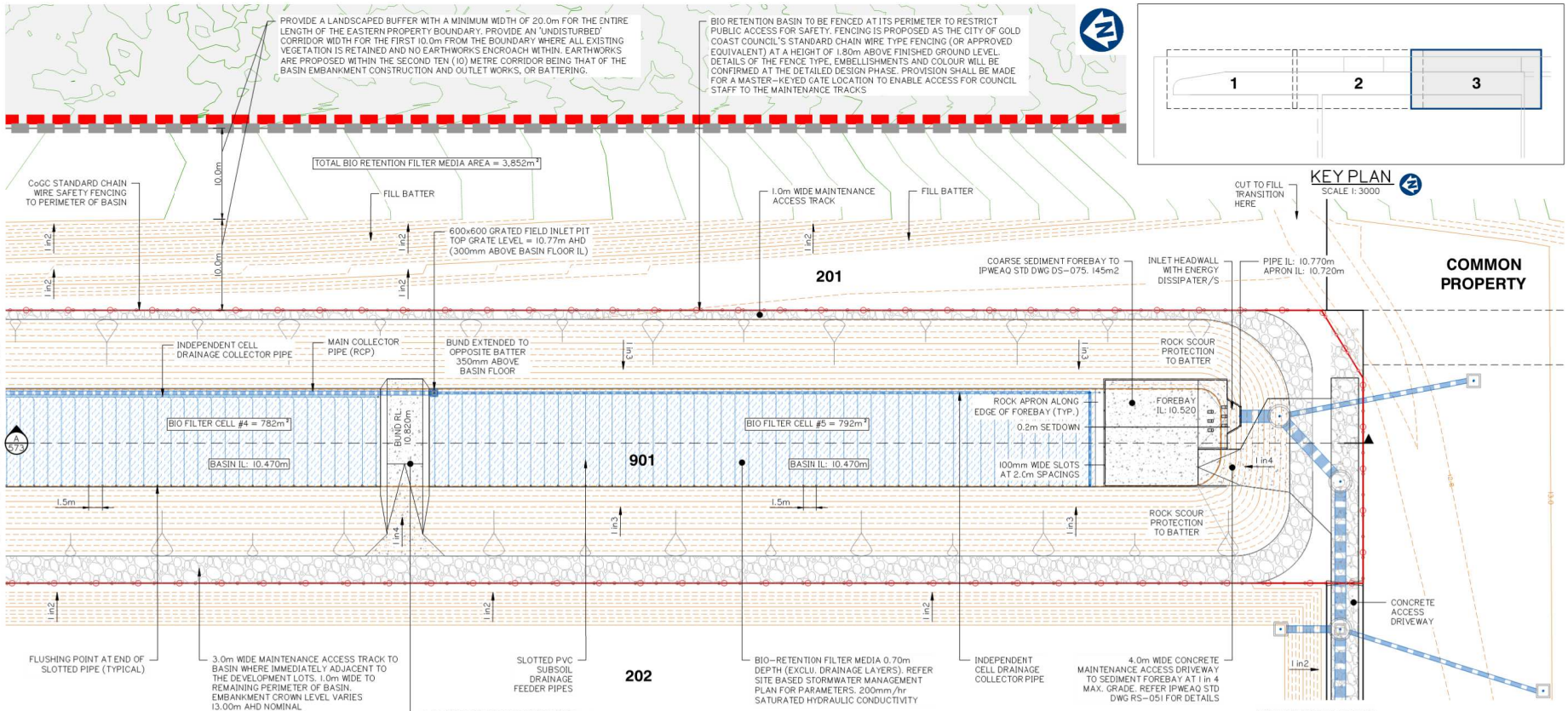
PROVIDE A LANDSCAPED BUFFER WITH A MINIMUM WIDTH OF 20.0m FOR THE ENTIRE LENGTH OF THE EASTERN PROPERTY BOUNDARY. PROVIDE AN 'UNDISTURBED' CORRIDOR WIDTH FOR THE FIRST 10.0m FROM THE BOUNDARY WHERE ALL EXISTING VEGETATION IS RETAINED AND NO EARTHWORKS ENCROACH WITHIN. EARTHWORKS ARE PROPOSED WITHIN THE SECOND TEN (10) METRE CORRIDOR BEING THAT OF THE BASIN EMBANKMENT CONSTRUCTION AND OUTLET WORKS, OR BATTERING.

BIO RETENTION BASIN TO BE FENCED AT ITS PERIMETER TO RESTRICT PUBLIC ACCESS FOR SAFETY. FENCING IS PROPOSED AS THE CITY OF GOLD COAST COUNCIL'S STANDARD CHAIN WIRE TYPE FENCING (OR APPROVED EQUIVALENT) AT A HEIGHT OF 1.80m ABOVE FINISHED GROUND LEVEL. DETAILS OF THE FENCE TYPE, EMBELLISHMENTS AND COLOUR WILL BE CONFIRMED AT THE DETAILED DESIGN PHASE. PROVISION SHALL BE MADE FOR A MASTER-KEYED GATE LOCATION TO ENABLE ACCESS FOR COUNCIL STAFF TO THE MAINTENANCE TRACKS



KEY PLAN
SCALE 1:3000

BIORETENTION BASIN 1 LAYOUT PLAN
SCALE 1:250 (A1)

DETENTION BASIN VOLUME TABLE *

- 14,789m3 to CROWN (RL 12.651)
- 8,076m3 to 1% AEP WSL (RL 11.948)
- 5,073m3 to WEIR LEVEL (RL11.570)

* DEDUCTING 0.30m EXTENDED DETENTION VOLUME OF 1,446m3

BIO-RETENTION NOTES:

MINIMUM BIO-RETENTION 'PROFILE' IS TO BE 1.10m AND IS TO CONSIST OF THE FOLLOWING:

* 0.70 OF SANDY LOAM MATERIAL WITH A HYDRAULIC CONDUCTIVITY OF 200mm/h AND A PARTICLE SIZE OF 0.45-0.50mm.

* 0.15m OF COURSE SAND. PARTICLE SIZE TYPICALLY 0.5-2.0mm.

* 0.25m OF GRAVEL DRAINAGE. PARTICLE SIZE 5-7mm SCREENING.

AEP (%)	MAX. WATER ELEVATION (m) A.H.D	MAX. WATER DEPTH (m)
63.2	11.484	1.014
0.5EY	11.627	1.157
20	11.722	1.252
10	11.789	1.319
5	11.844	1.374
2	11.902	1.432
1	11.946	1.476

BIO RETENTION - COARSE SEDIMENT FOREBAY SIZING GUIDE CALCULATIONS

$V_s = A_C \times R \times L_o \times F$ = 6.495m³

$R = 1 - \left[\frac{1}{n} + \frac{V_s}{Q/A_f}\right]^{-n}$

$0.8 = 1 - \left[\frac{1}{0.5} + \frac{0.10}{1.6156/A_f}\right]^{-0.5}$ Af = 193.87 m²

$D_s = \frac{V_s}{A_f}$ $D_s = \frac{6.495}{193.868}$ = 0.034 m

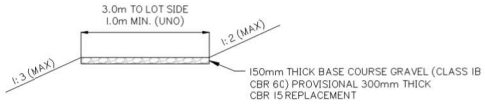
OPTIMIZATION OF MINIMUM FOREBAY SIZE:

$D_s = \frac{6.495\ m3}{145.007\ m2}$ = 0.045 m

CALCULATED FOR 1 FOREBAY AT 145.007m²

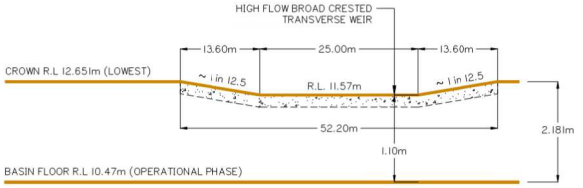
V_s = 11.0722m³ (Workings Above)
A_C = 13.532 ha (Refer Catchment Plans)
UNMITIGATED POST-DEVELOPMENT FLOW Q = 1.61557m³/s (3 month ARI)
V_s = 0.1 m/s (Recommended for Imm Particle)
R = 0.8 (Recommended 80% Capture)
L_o = 0.6 (From Healthy Waterways Guide)
n = 0.5 (Recommended Turbulence)
F_c = 1.0 (Frequency of Clean Out / Yr)

REFER TO BIO RETENTION TECHNICAL DESIGN GUIDELINES FOR FURTHER INFORMATION

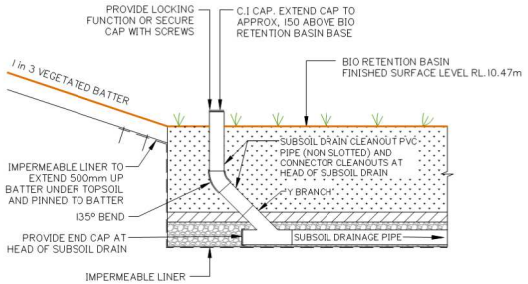


MAINTENANCE ACCESS TRACK - TYPICAL SECTION
N.T.S

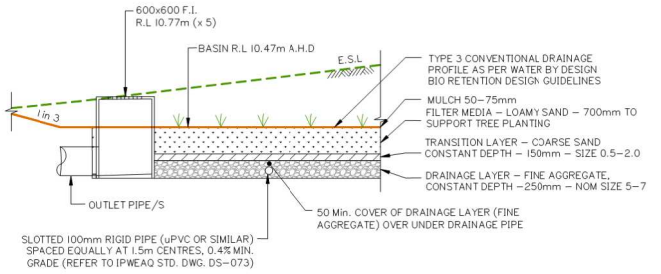
UNO DENOTES 'UNLESS NOTED OTHERWISE'



WEIR / SPILLWAY - TYPICAL ELEVATION
N.T.S



SUBSOIL DRAIN CLEANOUT - IN BASIN
N.T.S



TYPICAL BIO-RETENTION BASIN DETAIL
N.T.S

OPERATIONAL PHASE BIORETENTION BASIN SHEET 3 OF 4

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RPD:

Lot:	502
Plan:	SP316137
Local Authority:	CITY OF GOLD COAST COUNCIL
Level Datum:	AHD
Meridian:	-
Contour Interval:	-
PSM:	-
RL:	-

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DRAWING TITLE
OPERATIONAL PHASE BIORETENTION BASIN SHEET 3 OF 4

Issue	Date	Description	DRN	CHK
D	24-09-2021	EXTENT OF STAGE 2 EARTHWORKS REDUCED	IG	MG
C	31-03-2021	INFORMATION REQUEST RESPONSE	IG	MG
B	15-02-2021	INFORMATION REQUEST RESPONSE	IG	MG
A	20-11-2020	ORIGINAL ISSUE	BA	MG

SCALE IN METRES
0 5 10 15 20 25
1:250 (FULL SIZE A1)
1:500 (HALF SIZE A3)

Scale at A1:	1:250
Designed:	IG
Drafted:	IG / BA / LAB
Approved:	MG
RPEQ:	16939
Signed:	
Date:	24-09-2021

Drawing No: 5941 ENG BE2 572
Rev. No: D

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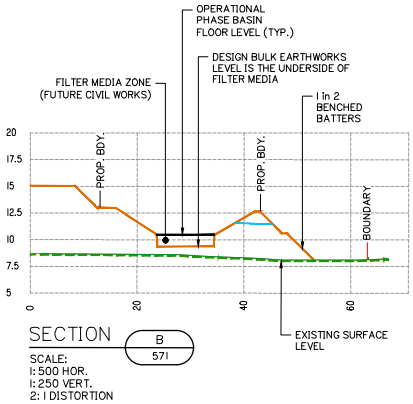
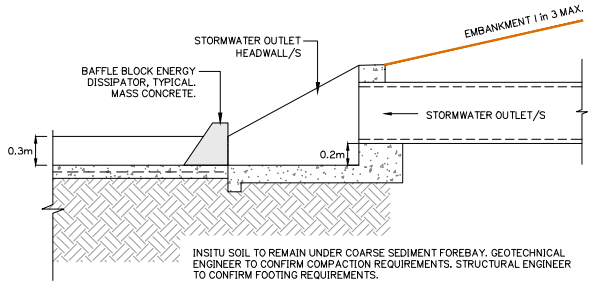


SECTION B 571

SCALE:
1: 500 HOR.
1: 250 VERT.
2: 1 DISTORTION

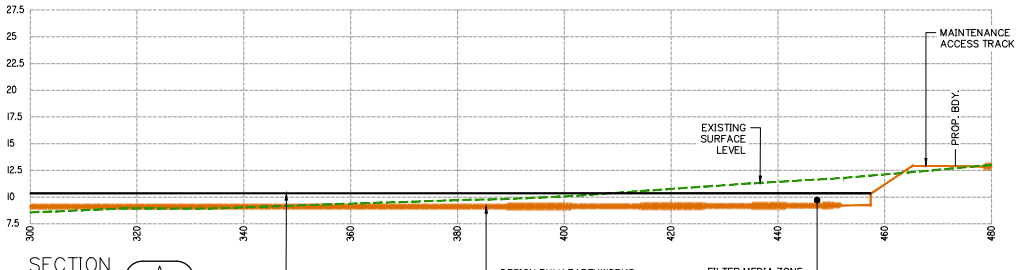
NOTE:

1. BASIN INUNDATION DEPTHS OMITTED FROM CROSS SECTIONS FOR CLARITY. REFER TO CALCULATION TABLES ON DRAWINGS 5941 ENG BE2 570–572



TYPICAL STORMWATER OUTLET TO SEDIMENT FOREBAY

N.T.S



SECTION A 570–571

SCALE:
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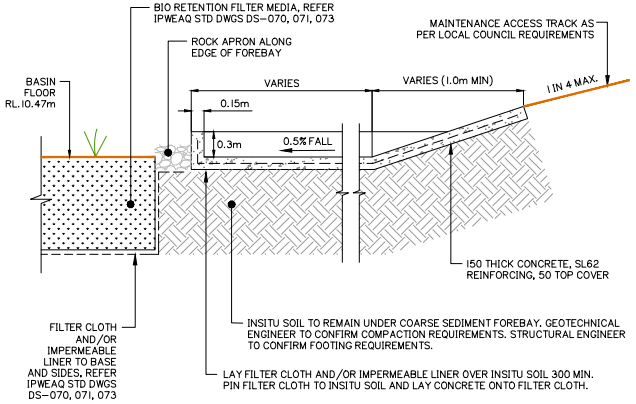
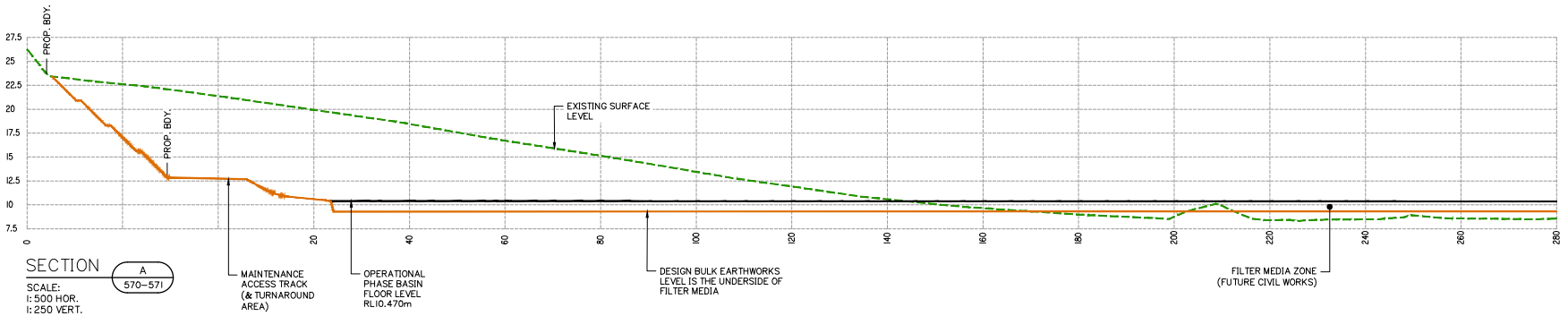
1: 250 VERT.
2: 1 DISTORTION



COARSE SEDIMENT FOREBAY TYPICAL SECTION

N.T.S



SECTION A 570–571

SCALE:
1: 500 HOR.
1: 250 VERT.
2: 1 DISTORTION

OPERATIONAL PHASE BIORETENTION BASIN SHEET 4 OF 4

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Level Datum:	AHD
Meridian:	-
Contour Interval:	-
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C	24-09-2021	EXTENT OF STAGE 2 EARTHWORKS REDUCED	IG	MG
B	31/03/21	INFORMATION REQUEST RESPONSE	IG	MG
A	20-11-2020	ORIGINAL ISSUE	BA	MG

SCALE IN METRES

0 10 20 30 40 50

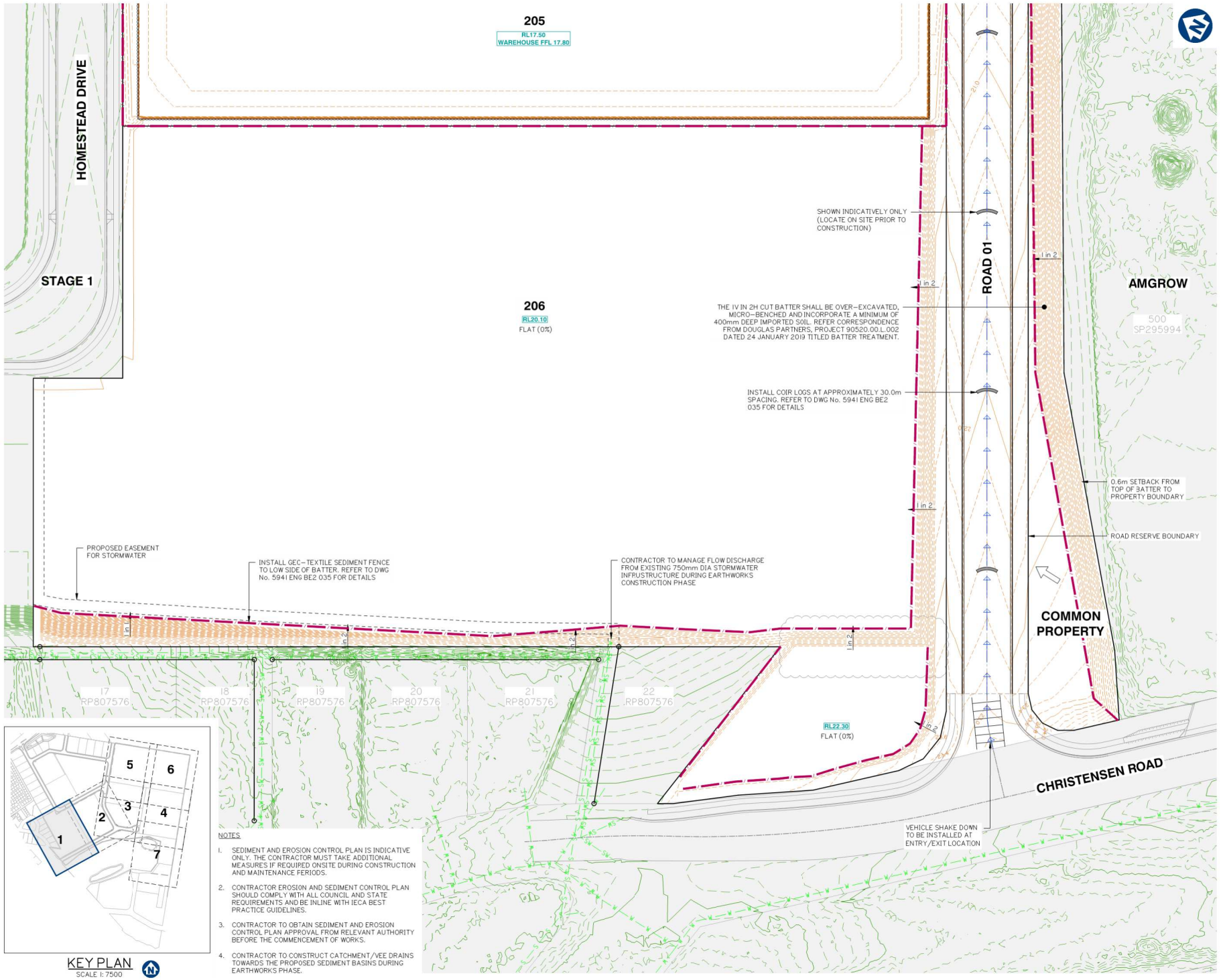
1:500 (FULL SIZE A1)
1:1000 (HALF SIZE A3)

Scale at A1:	1:500
Designed:	IG
Drafted:	IG / BA / LAB
Approved:	MG
RPEQ:	16939
Signed:	
Date:	24-09-2021

Drawing No: 5941 ENG BE2 573
Rev. No: C

Appendix D – Sediment & Erosion Control Plans

FOR CONTINUATION REFER SHEET No. 5941 ENG BE2 021



KEY PLAN
SCALE 1: 7500

NOTES

1. SEDIMENT AND EROSION CONTROL PLAN IS INDICATIVE ONLY. THE CONTRACTOR MUST TAKE ADDITIONAL MEASURES IF REQUIRED ONSITE DURING CONSTRUCTION AND MAINTENANCE PERIODS.
2. CONTRACTOR EROSION AND SEDIMENT CONTROL PLAN SHOULD COMPLY WITH ALL COUNCIL AND STATE REQUIREMENTS AND BE INLINE WITH IECA BEST PRACTICE GUIDELINES.
3. CONTRACTOR TO OBTAIN SEDIMENT AND EROSION CONTROL PLAN APPROVAL FROM RELEVANT AUTHORITY BEFORE THE COMMENCEMENT OF WORKS.
4. CONTRACTOR TO CONSTRUCT CATCHMENT/VEE DRAINS TOWARDS THE PROPOSED SEDIMENT BASINS DURING EARTHWORKS PHASE.

SEDIMENT AND EROSION CONTROL PLAN SHEET 1 OF 7

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DRAWING TITLE
SEDIMENT AND EROSION CONTROL PLAN SHEET 1 OF 7

Issue	Date	Description	DRN	CHK
E	23-05-2022	LOT 201/207 BOUNDARY ALIGNMENT	LAB	MG
D	10-02-2022	LOT 205 BOUNDARY AND EARTHWORKS	DV	MG
C	24-09-2021	EXTENT OF STAGE 2 EARTHWORKS REDUCED	IG	MG
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SCALE IN METRES
0 10 20 30 40 50
1:500 (FULL SIZE A1)
1:1000 (HALF SIZE A3)

Scale at A1:	1:500
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Drafted:	IG / BA / LAB
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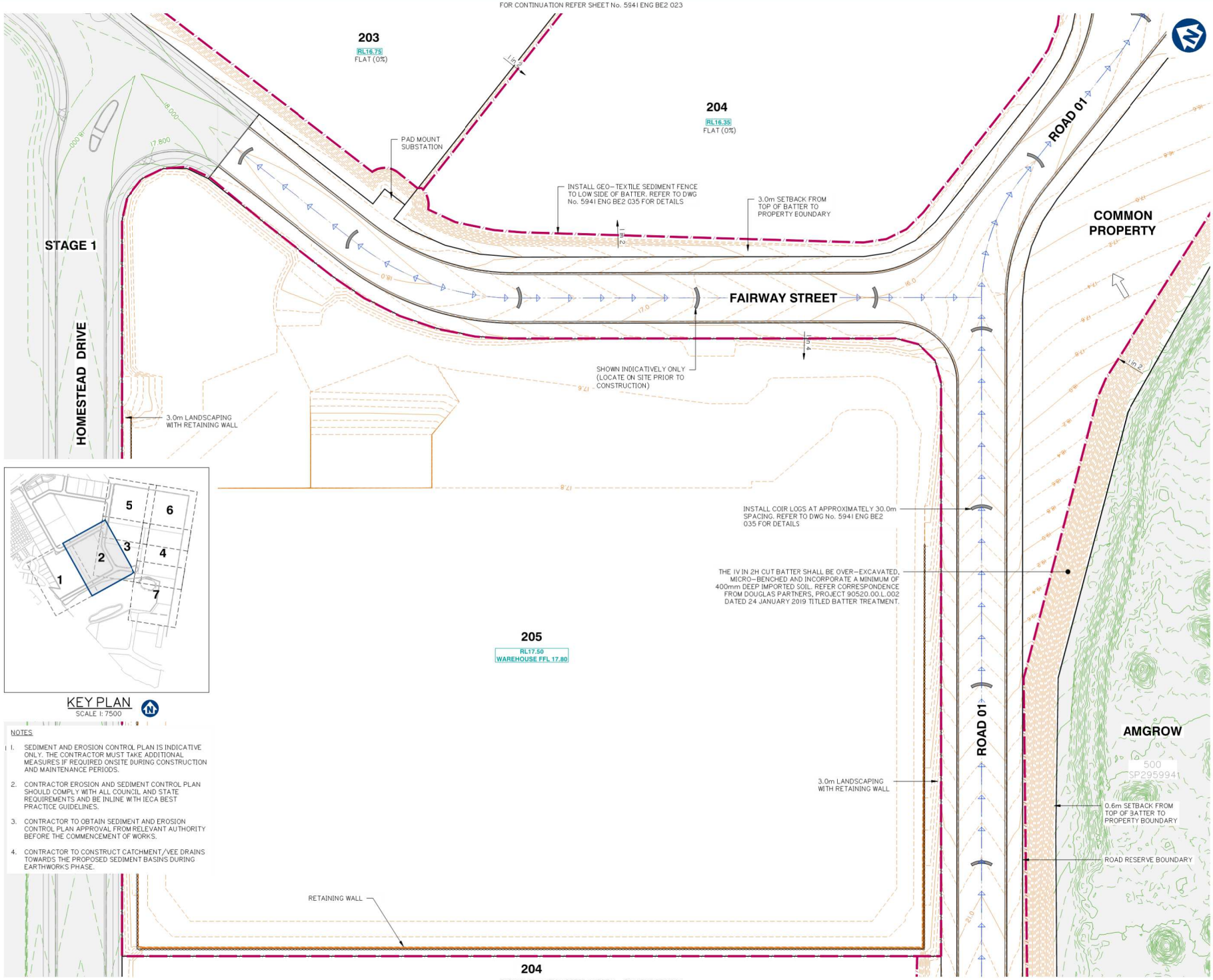
RPEQ:	16939
Signed:	
Date:	23-05-2022

Drawing No: 5941 ENG BE2 020
Rev. No: E



KEY PLAN
SCALE 1: 7500

NOTES

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3. CONTRACTOR TO OBTAIN SEDIMENT AND EROSION CONTROL PLAN APPROVAL FROM RELEVANT AUTHORITY BEFORE THE COMMENCEMENT OF WORKS.
4. CONTRACTOR TO CONSTRUCT CATCHMENT/VEE DRAINS TOWARDS THE PROPOSED SEDIMENT BASINS DURING EARTHWORKS PHASE.

SEDIMENT AND EROSION CONTROL PLAN SHEET 2 OF 7

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Site Address:
60 STAPYLTON JACOBS WELL ROAD, STAPYLTON QLD 4207

THIS DRAWING IS INTENDED TO BE PRINTED IN COLOUR

RPD:

Lot:	502
Plan:	SP316137
Local Authority:	CITY OF GOLD COAST COUNCIL
Level Datum:	AHD
Meridian:	-
Contour Interval:	-
PSM:	-
RL:	-

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DRAWING TITLE
SEDIMENT AND EROSION CONTROL PLAN SHEET 2 OF 7

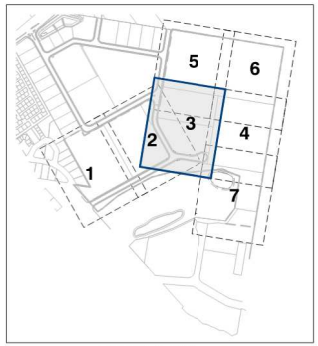
Issue	Date	Description	DRN	CHK
D	10-02-2022	LOT 205 BOUNDARY AND EARTHWORKS	DV	MG
C	24-09-2021	EXTENT OF STAGE 2 EARTHWORKS REDUCED	IG	MG
B	15-02-2021	INFORMATION REQUEST RESPONSE	IG	MG
A	20-11-2020	ORIGINAL ISSUE	BA	MG

SCALE IN METRES
0 10 20 30 40 50
1:500 (FULL SIZE A1)
1:1000 (HALF SIZE A3)

Scale at A1:	1:500
Designed:	IG
Drafted:	IG / BA / LAB
Approved:	MG
RPEQ:	16939
Signed:	
Date:	10-02-2022

Drawing No: 5941 ENG BE2 021
Rev. No: D

FOR CONTINUATION REFER SHEET No. 5941 ENG BE2 023



KEY PLAN
SCALE 1: 7500

NOTES

1. SEDIMENT AND EROSION CONTROL PLAN IS INDICATIVE ONLY. THE CONTRACTOR MUST TAKE ADDITIONAL MEASURES IF REQUIRED ONSITE DURING CONSTRUCTION AND MAINTENANCE PERIODS.
2. CONTRACTOR EROSION AND SEDIMENT CONTROL PLAN SHOULD COMPLY WITH ALL COUNCIL AND STATE REQUIREMENTS AND BE INLINE WITH IECA BEST PRACTICE GUIDELINES.
3. CONTRACTOR TO OBTAIN SEDIMENT AND EROSION CONTROL PLAN APPROVAL FROM RELEVANT AUTHORITY BEFORE THE COMMENCEMENT OF WORKS.
4. CONTRACTOR TO CONSTRUCT CATCHMENT/VEE DRAINS TOWARDS THE PROPOSED SEDIMENT BASINS DURING EARTHWORKS PHASE.

SEDIMENT AND EROSION CONTROL PLAN SHEET 3 OF 7

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Project:
VantageYatala
STAGE 2

Site Address:
60 STAPYLTON JACOBS WELL ROAD, STAPYLTON QLD 4207

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RPD:

Lot:	502
Plan:	SP316137
Local Authority:	CITY OF GOLD COAST COUNCIL
Level Datum:	AHD
Meridian:	-
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DRAWING TITLE
SEDIMENT AND EROSION CONTROL PLAN SHEET 3 OF 7

Issue	Date	Description	DRN	CHK
E	23-05-2022	LOT 201 BOUNDARY ALIGNMENT	LAB	MG
D	09-11-2021	LOT 205 BOUNDARY AND EARTHWORKS	DV	MG
C	24-09-2021	EXTENT OF STAGE 2 EARTHWORKS REDUCED	IG	MG
B	15-02-2021	INFORMATION REQUEST RESPONSE	IG	MG
A	20-11-2020	ORIGINAL ISSUE	BA	MG

SCALE IN METRES
0 10 20 30 40 50
1:500 (FULL SIZE A1)
1:1000 (HALF SIZE A3)

Scale at A1:	1:500
Designed:	IG
Drafted:	IG / BA / LAB
Approved:	MG
RPEQ:	16939
Signed:	
Date:	23-05-2022

Drawing No: 5941 ENG BE2 022
Rev. No: E

NOTES

1. SEDIMENT AND EROSION CONTROL PLAN IS INDICATIVE ONLY. THE CONTRACTOR MUST TAKE ADDITIONAL MEASURES IF REQUIRED ONSITE DURING CONSTRUCTION AND MAINTENANCE PERIODS.
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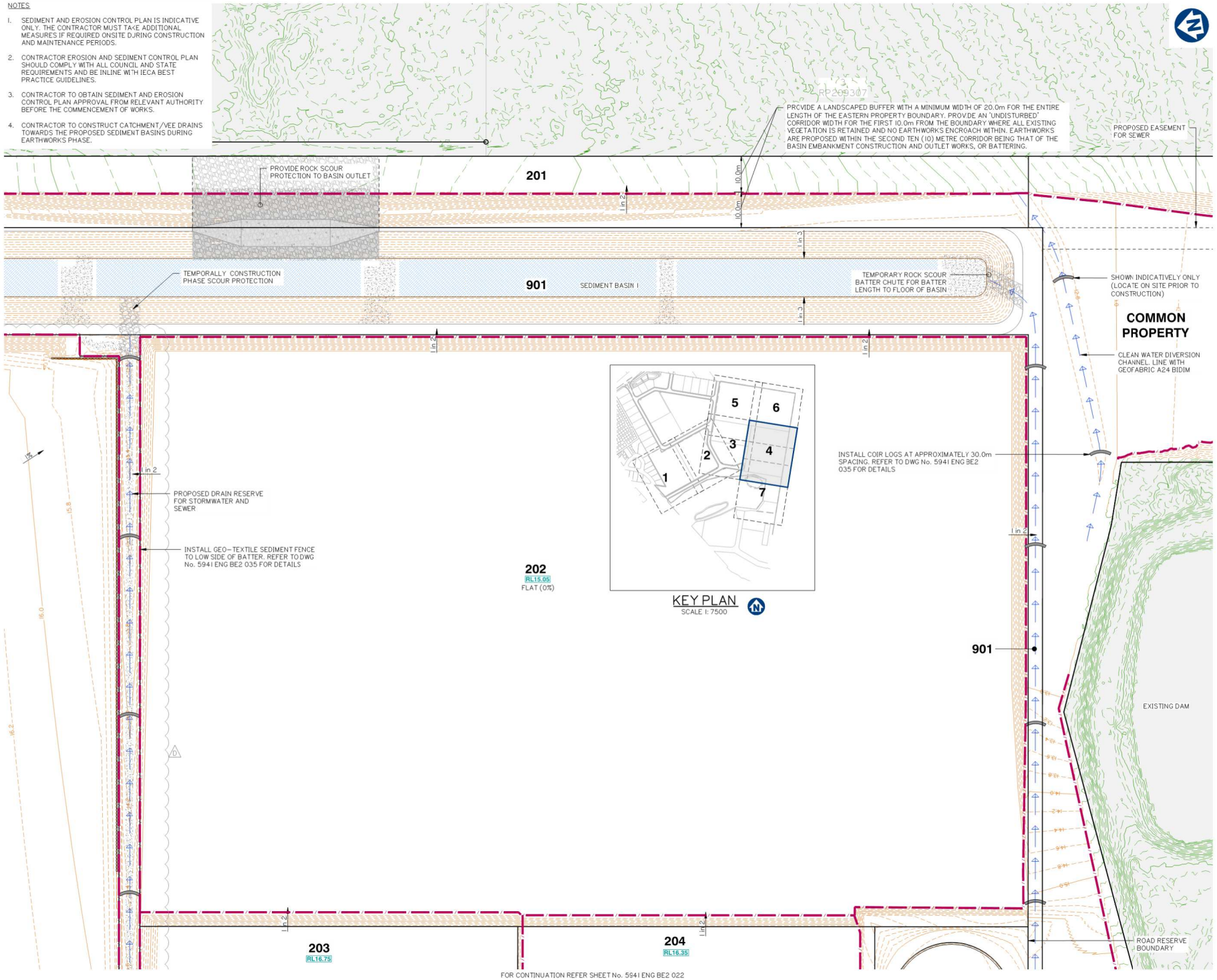
4. CONTRACTOR TO CONSTRUCT CATCHMENT/VEE DRAINS TOWARDS THE PROPOSED SEDIMENT BASINS DURING EARTHWORKS PHASE.



SEDIMENT AND EROSION CONTROL PLAN SHEET 4 OF 7

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Project:

VantageYatala

STAGE 2

Site Address:

60 STAPYLTON JACOBS WELL ROAD, STAPYLTON QLD 4207

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RPD:

Lot:	502
Plan:	SP316137
Local Authority:	CITY OF GOLD COAST COUNCIL
Level Datum:	AHD
Meridian:	-
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DRAWING TITLE

SEDIMENT AND EROSION CONTROL PLAN SHEET 4 OF 7

Issue	Date	Description	DRN	CHK
D	23-05-2022	LOT 201 BOUNDARY ALIGNMENT	LAB	MG
C	24-09-2021	EXTENT OF STAGE 2 EARTHWORKS REDUCED	KI	MG
B	31/03/21	INFORMATION REQUEST RESPONSE	IG	MG
A	20-11-2020	ORIGINAL ISSUE	BA	MG

SCALE IN METRES

0 10 20 30 40 50

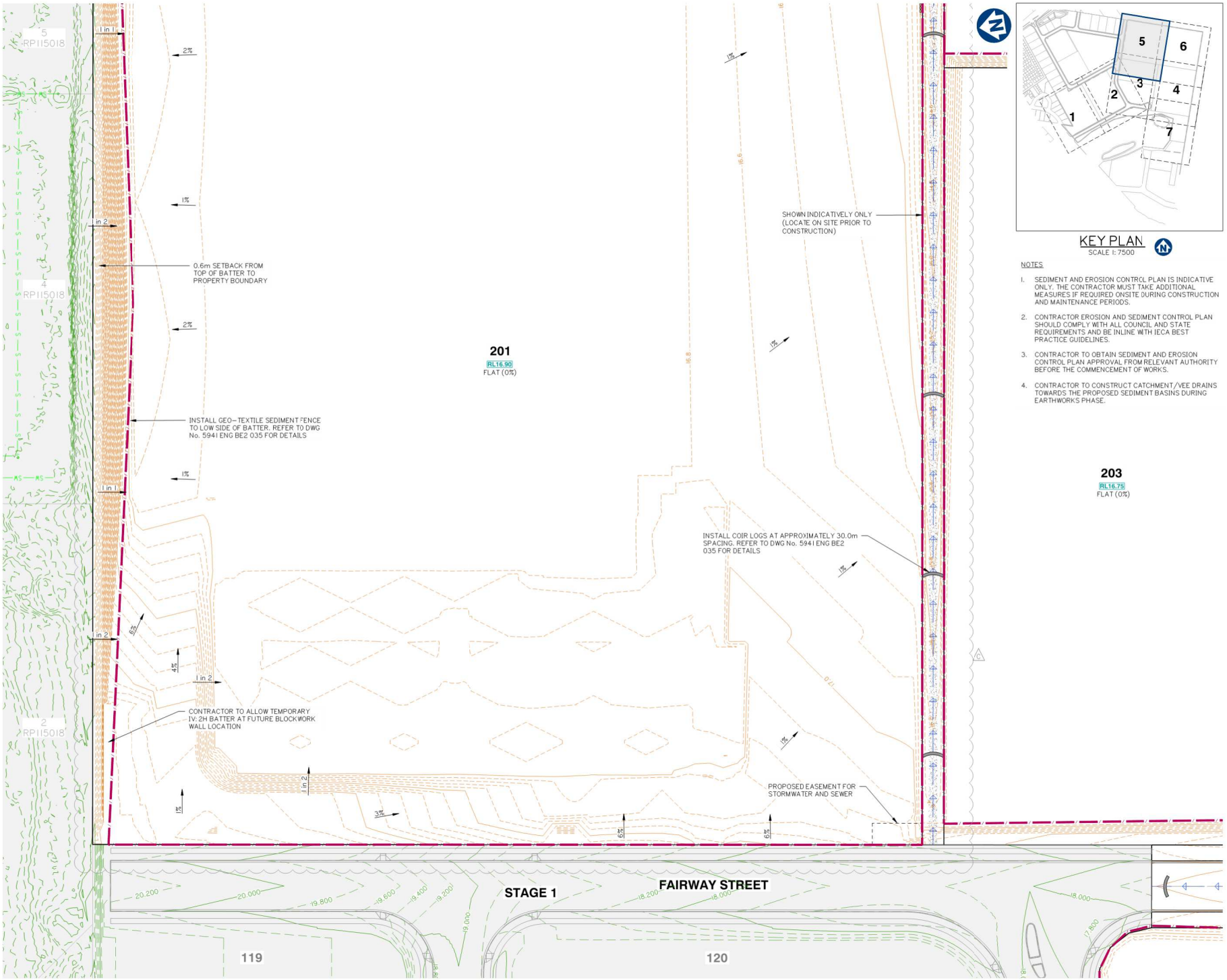
1:500 (FULL SIZE A1)
1:1000 (HALF SIZE A3)

Scale at A1:	1:500
Designed:	IG
Drafted:	IG / BA / LAB
Approved:	MG
RPEQ:	16939
Signed:	
Date:	23-05-2022

Drawing No: 5941 ENG BE2 023

Rev. No: D

FOR CONTINUATION REFER SHEET No. 5941 ENG BE2 025



FOR CONTINUATION REFER SHEET No. 5941 ENG BE2 023

KEY PLAN
SCALE 1: 7500

NOTES

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4. CONTRACTOR TO CONSTRUCT CATCHMENT/VEE DRAINS TOWARDS THE PROPOSED SEDIMENT BASINS DURING EARTHWORKS PHASE.

SEDIMENT AND EROSION CONTROL PLAN SHEET 5 OF 7

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Project:
VantageYatala
STAGE 2

Site Address:
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RPD:

Lot:	502
Plan:	SP316137
Local Authority:	CITY OF GOLD COAST COUNCIL
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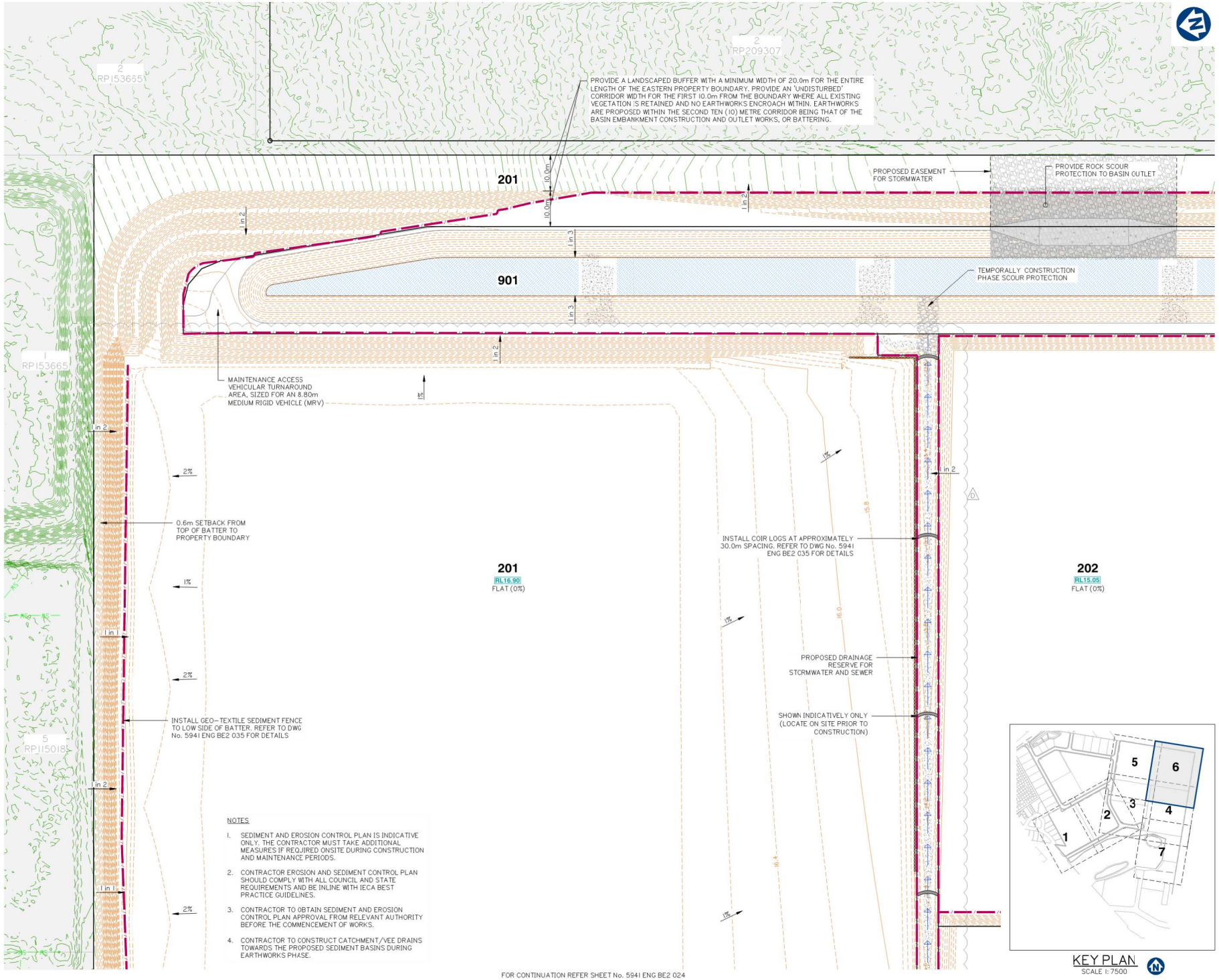
DRAWING TITLE
SEDIMENT AND EROSION CONTROL PLAN SHEET 5 OF 7

Issue	Date	Description	DRN	CHK
C	23-05-2022	LOT 201 BOUNDARY RECONFIGURATION	LAB	MG
B	24-09-2021	EXTENT OF STAGE 2 EARTHWORKS REDUCED	IG	MG
A	20-11-2020	ORIGINAL ISSUE	BA	MG

SCALE IN METRES
0 10 20 30 40 50
1:500 (FULL SIZE A1)
1:1000 (HALF SIZE A3)

Scale at A1:	1:500
Designed:	IG
Drafted:	IG / BA / LAB
Approved:	MG
RPEQ:	16939
Signed:	
Date:	23/05/2022

Drawing No: 5941 ENG BE2 024
Rev. No: C



SEDIMENT AND EROSION CONTROL PLAN SHEET 6 OF 7

FOR CONTINUATION REFER SHEET No. 5941 ENG BE2 023

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Site Address:
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DRAWING TITLE
SEDIMENT AND EROSION CONTROL PLAN SHEET 6 OF 7

Issue	Date	Description	DRN	CHK
D	23-05-2022	LOT 201 BOUNDARY ALIGNMENT	LAB	MG
C	24-09-2021	EXTENT OF STAGE 2 EARTHWORKS REDUCED	IG	MG
B	31/03/21	INFORMATION REQUEST RESPONSE	IG	MG
A	20-11-2020	ORIGINAL ISSUE	BA	MG

SCALE IN METRES
0 10 20 30 40 50
1:500 (FULL SIZE A1)
1:1000 (HALF SIZE A3)

Scale at A1:	1:500
Designed:	IG
Drafted:	IG / BA / LAB
Approved:	MG
RPEQ:	16939
Signed:	
Date:	23-05-2022

Drawing No: 5941 ENG BE2 025
Rev. No: D

NOTES:

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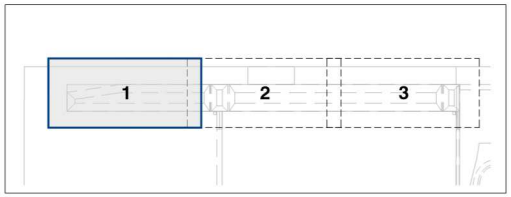


KEY PLAN
SCALE 1: 3000

SEDIMENT BASIN DESIGN

BASIN ID	SELECT DURATION OF CATCHMENT DISTURBANCE	IS DEWATERING OF TRENCHES REQUIRED?	EQUIPMENT LEASE OR PURCHASE?	SELECT CATCHMENT SCALE	DO ALL FLOWS ENTER BASIN AT SINGLE POINT?	BASIN TYPE	DOSING EQUIPMENT	DEWATERING EQUIPMENT
LPoD–1A	> 12 MONTHS	NO	LEASE	> 5Ha	YES	TYPE A	IFOD–FLOW	

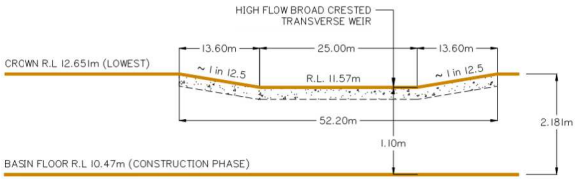
BASIN ID	CATCHMENT AREA	DESIGN EVENT	$I_{1\,yr,\,24\,hr}$	WATER TEMPERATURE	K_s	SETTLING ZONE DEPTH (D_s)	W:L	OPTIMUM LOW–FLOW DECANT RATE	SELECTED LOW–FLOW DECANT RATE (Q_A)	MIN SETTLING ZONE VOLUME (Min V_s)	MIN SETTLING ZONE SURFACE AREA (Min A_s)	LIMITING CRITERIA
	(Ha)	(1: X YEARS)	(mm/hr)	(°C)	(s/m)	(m)	(1: X)	(L/s/Ha)	(L/s/Ha)	(m^3)	(m^2)	
LPoD–1A	23.067	1	4.53	20	11150	1.9	5.1	9	9	5669	2315	VOLUME

BASIN ID	SETTLING ZONE		SCOUR VELOCITY	FREE WATER ZONE		SEDIMENT STORAGE ZONE		OVERALL DIMENSIONS RELATIVE TO SPILLWAY CREST (EXCL. FOREBAY)			
	ACTUAL SETTLING ZONE VOLUME (V_s)	ACTUAL SETTLING ZONE AREA (A_s)		DEPTH OF FREE WATER ZONE	VOLUME OF FREE WATER ZONE	SEDIMENT STORAGE VOLUME	SEDIMENT STORAGE DEPTH (APPROX.)	BATTER	WIDTH	LENGTH	DEPTH
	(m^3)	(m^2)	(m/s)	(m)	(m^3)	(m^3)	(m)	(1: X)	(m)	(m)	(m)
LPoD–1A	5669	2984	0.014	0.34	567	1701	0.76	3	29.89	152.42	3.00

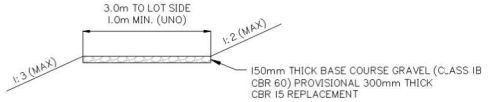
BASIN ID	SPILLWAY										
	BASIN DESIGN LIFE	DESIGN ARI	C_{10}	C	tc	I	Q	HEAD OVER SPILLWAY	SPILLWAY CREST LENGTH	SPILLWAY CREST RL	MIN EMBANKMENT RL
		yr				(mm/hr)	(m^3/s)	(m)	(m)	(m)	(m)
LPoD–1A	> 12 MONTHS	1: 50	0.80	0.92	25.00	143.00	8.43	0.20	25.00	11.57	12.22

BASIN ID	FLOW RATE		FLUME DESIGN PARAMETERS				VELOCITY CHECK			OUTPUT PARAMETERS		
	BASIN DESIGN FLOW (m^3/s)	FLUME DESIGN FLOW (m^3/s)	BASE WIDTH (m)	SLIDE SLOPE (1: x)	LONGITUDINAL SLOPE (m/m)	FLUME LINING	MAX ALLOWABLE VELOCITY (m/s)	MANNINGS ROUGHNESS	VELOCITY (m/s)	FLOW DEPTH (m)	FLUME DEPTH (m)	CALCULATED FLOW (m^3/s)
			b	x	s					d	y	
LPoD–1A	8.43	12.65	6.00	2.00	0.01	CONCRETE	5.00	0.013	4.419	0.42	0.57	12.70

BASIN ID	SETTLING ZONE (incl. sediment storage)				FOREBAY				HYDRAULIC CONTROLS						
	VOLUME (m^3)	LENGTH (m)	WIDTH (m)	DEPTH (m)	VOLUME (m^3)	LENGTH (m)	WIDTH (m)	DEPTH (m)	SPILLWAY CREST LENGTH (m)	SPILLWAY CREST (RL)	EMBANKMENT (RL)	CREST (RL)	FLUME BASE WIDTH (m)	FLUME BATTERS (X: 1)	FLUME DEPTH (m)
LPoD–1A	7369.3	152.4	29.9	3.00	1366.63	15.2	29.9	3.00	25.0	11.57	12.22	11.77	6.0	2.0	0.6



WEIR / SPILLWAY – TYPICAL ELEVATION
N.T.S



MAINTENANCE ACCESS TRACK – TYPICAL SECTION
N.T.S

UNO DENOTES "UNLESS NOTED OTHERWISE"

CONSTRUCTION PHASE SEDIMENT BASIN 1 LAYOUT SHEET 1 OF 4

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RPD:

Lot:	502
Plan:	SP316137
Local Authority:	CITY OF GOLD COAST COUNCIL
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Meridian:	-
Contour Interval:	-
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DRAWING TITLE
CONSTRUCTION PHASE SEDIMENT BASIN 1 LAYOUT SHEET 1 OF 4

Issue	Date	Description	DRN	CHK
D	24-09-2021	EXTENT OF STAGE 2 EARTHWORKS REDUCED	IG	MG
C	31-03-2021	INFORMATION REQUEST RESPONSE	IG	MG
B	15-02-2021	INFORMATION REQUEST RESPONSE	IG	MG
A	20-11-2020	ORIGINAL ISSUE	BA	MG

SCALE IN METRES
0 5 10 15 20 25
1:250 (FULL SIZE A1)
1:500 (HALF SIZE A3)

Scale at A1:	1:250
Designed:	IG
Drafted:	IG / BA / LAB
Approved:	MG
RPEQ:	16939
Signed:	
Date:	24-09-2021

Drawing No: 5941 ENG BE2 029
Rev. No: D

NOTES:

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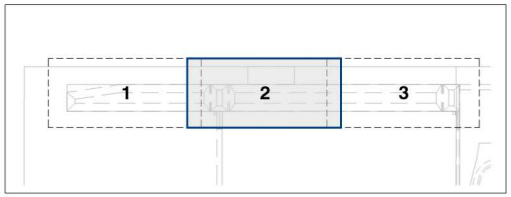
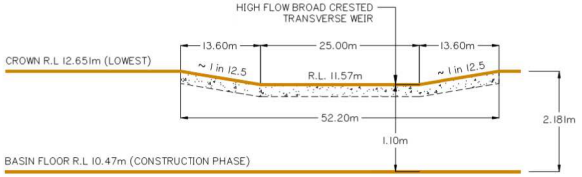


KEY PLAN
SCALE 1:3000

SEDIMENT BASIN DESIGN

BASIN ID	SELECT DURATION OF CATCHMENT DISTURBANCE	IS DEWATERING OF TRENCHES REQUIRED?	EQUIPMENT LEASE OR PURCHASE?	SELECT CATCHMENT SCALE	DO ALL FLOWS ENTER BASIN AT SINGLE POINT?	BASIN TYPE	DOSING EQUIPMENT	DEWATERING EQUIPMENT
LPoD–1B	> 12 MONTHS	NO	LEASE	> 5Ha	YES	TYPE A	IFOD–FLOW	

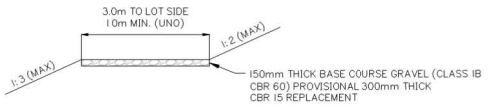
BASIN ID	CATCHMENT AREA	DESIGN EVENT	$I_{x\,yr,\,24\,hr}$	WATER TEMPERATURE	K_s	SETTLING ZONE DEPTH (D_s)	W:L	OPTIMUM LOW–FLOW DECANT RATE	SELECTED LOW–FLOW DECANT RATE (Q_A)	MIN SETTLING ZONE VOLUME (Min V_s)	MIN SETTLING ZONE SURFACE AREA (Min A_s)	LIMITING CRITERIA
	(Ha)	(1:X YEARS)	(mm/hr)	(°C)	(s/m)	(m)	(1:X)	(L/s/Ha)	(L/s/Ha)	(m^3)	(m^2)	
LPoD–1B	13.352	1	4.53	20	11150	1.82	3.1	9	9	3325	1358	VOLUME



WEIR / SPILLWAY – TYPICAL ELEVATION
N.T.S

BASIN ID	SETTLING ZONE		SCOUR VELOCITY	FREE WATER ZONE		SEDIMENT STORAGE ZONE		OVERALL DIMENSIONS RELATIVE TO SPILLWAY CREST (EXCL. FOREBAY)			
	ACTUAL SETTLING ZONE VOLUME (V_s)	ACTUAL SETTLING ZONE AREA (A_s)		DEPTH OF FREE WATER ZONE	VOLUME OF FREE WATER ZONE	SEDIMENT STORAGE VOLUME	SEDIMENT STORAGE DEPTH (APPROX.)	BATTER	WIDTH	LENGTH	DEPTH
	(m^3)	(m^2)	(m/s)	(m)	(m^3)	(m^3)	(m)	(1:X)	(m)	(m)	(m)
LPoD–1B	3325	1827	0.008	0.35	333	998	0.83	3	29.74	92.19	3.00

BASIN ID	SPILLWAY										
	BASIN DESIGN LIFE	DESIGN ARI	C_{10}	C	tc	I	Q	HEAD OVER SPILLWAY	SPILLWAY CREST LENGTH	SPILLWAY CREST RL	MIN EMBANKMENT RL
		yr				(mm/hr)	(m^3/s)	(m)	(m)	(m)	(m)
LPoD–1B	> 12 MONTHS	1:50	0.80	0.92	25.00	143.00	4.95	0.20	25.00	11.57	12.22



MAINTENANCE ACCESS TRACK – TYPICAL SECTION
N.T.S
UNO DENOTES "UNLESS NOTED OTHERWISE"

BASIN ID	FLOW RATE		FLUME DESIGN PARAMETERS				VELOCITY CHECK			OUTPUT PARAMETERS		
	BASIN DESIGN FLOW (m^3/s)	FLUME DESIGN FLOW (m^3/s)	BASE WIDTH (m)	SLIDE SLOPE (1:x)	LONGITUDINAL SLOPE (m/m)	FLUME LINING	MAX ALLOWABLE VELOCITY (m/s)	MANNINGS ROUGHNESS	VELOCITY (m/s)	FLOW DEPTH (m)	FLUME DEPTH (m)	CALCULATED FLOW (m^3/s)
			b	x	s					d	y	
LPoD–1B	4.95	7.43	4.00	2.00	0.01	CONCRETE	5.00	0.013	3.817	0.42	0.57	7.76

BASIN ID	SETTLING ZONE (incl. sediment storage)				FOREBAY				HYDRAULIC CONTROLS						
	VOLUME (m^3)	LENGTH (m)	WIDTH (m)	DEPTH (m)	VOLUME (m^3)	LENGTH (m)	WIDTH (m)	DEPTH (m)	SPILLWAY CREST LENGTH (m)	SPILLWAY CREST (RL)	EMBANKMENT (RL)	CREST (RL)	FLUME BASE WIDTH (m)	FLUME BATTERS (X:1)	FLUME DEPTH (m)
LPoD–1B	4323.1	92.2	29.7	3.00	822.44	9.2	29.7	3.00	25.0	11.57	12.22	11.77	4.0	2.0	0.6

CONSTRUCTION PHASE SEDIMENT BASIN 1 LAYOUT SHEET 2 OF 4

G:\Projects\5941\ENGINEERING\Acad\BE2 CGL\Current\5941 ENG BE2 029-034.dwg

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FRASERS PROPERTY (AUSTRALIA) PTY. LTD.

Project:
VantageYatala
STAGE 2

Site Address:
60 STAPYLTON JACOBS WELL ROAD, STAPYLTON QLD 4207

THIS DRAWING IS INTENDED TO BE PRINTED IN COLOUR

RPD:

Lot:	502
Plan:	SP316137
Local Authority:	CITY OF GOLD COAST COUNCIL
Level Datum:	AHD
Meridian:	-
Contour Interval:	-
PSM:	-
RL:	-

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DRAWING TITLE
CONSTRUCTION PHASE SEDIMENT BASIN 1 LAYOUT SHEET 2 OF 4

Issue	Date	Description	DRN	CHK
E	23-05-2022	LOT 201 BOUNDARY ALIGNMENT	LAB	MG
D	24-09-2021	EXTENT OF STAGE 2 EARTHWORKS REDUCED	IG	MG
C	31-03-2021	INFORMATION REQUEST RESPONSE	IG	MG
B	15-02-2021	INFORMATION REQUEST RESPONSE	IG	MG
A	20-11-2020	ORIGINAL ISSUE	BA	MG

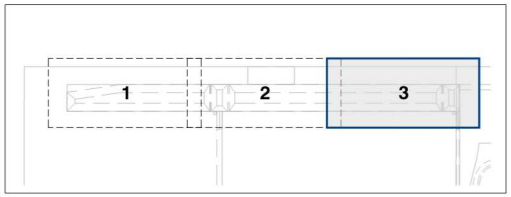
SCALE IN METRES
0 5 10 15 20 25
1:250 (FULL SIZE A1)
1:500 (HALF SIZE A3)

Scale at A1:	1:250
Designed:	IG
Drafted:	IG / BA / LAB
Approved:	MG
RPEQ:	16939
Signed:	
Date:	23-05-2022

Drawing No: 5941 ENG BE2 030
Rev. No: E

NOTES:

1. SEDIMENT AND EROSION CONTROL PLAN IS INDICATIVE ONLY. THE CONTRACTOR MUST TAKE ADDITIONAL MEASURES IF REQUIRED ON SITE DURING CONSTRUCTION AND MAINTENANCE PERIODS.
2. CONTRACTOR EROSION AND SEDIMENT CONTROL PLAN SHOULD COMPLY WITH ALL CITY OF GOLD COAST COUNCIL AND STATE REQUIREMENTS AND TO BE IN ACCORDANCE WITH INDUSTRY BEST PRACTICE GUIDELINES.
3. CONTRACTOR TO OBTAIN SEDIMENT AND EROSION CONTROL PLAN APPROVAL FROM RELEVANT AUTHORITY BEFORE THE COMMENCEMENT OF WORKS.



KEY PLAN
SCALE 1: 3000

FOR CONTINUATION REFER SHEET No. 5941 ENG BE2 030

SEDIMENT BASIN DESIGN

BASIN ID	SELECT DURATION OF CATCHMENT DISTURBANCE	IS DEWATERING OF TRENCHES REQUIRED?	EQUIPMENT LEASE OR PURCHASE?	SELECT CATCHMENT SCALE	DO ALL FLOWS ENTER BASIN AT SINGLE POINT?	BASIN TYPE	DOSING EQUIPMENT	DEWATERING EQUIPMENT
LPoD–1B	> 12 MONTHS	NO	LEASE	> 5Ha	YES	TYPE A	IFOD–FLOW	

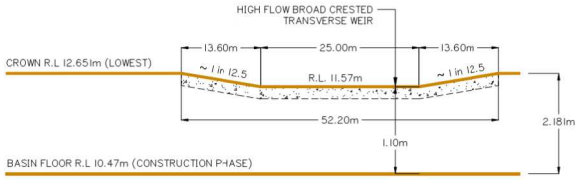
BASIN ID	CATCHMENT AREA	DESIGN EVENT	$I_{1\,yr,\,24\,hr}$	WATER TEMPERATURE	K_s	SETTLING ZONE DEPTH (D_s)	W:L	OPTIMUM LOW–FLOW DECANT RATE	SELECTED LOW–FLOW DECANT RATE (Q_A)	MIN SETTLING ZONE VOLUME (Min V_s)	MIN SETTLING ZONE SURFACE AREA (Min A_s)	LIMITING CRITERIA
	(Ha)	(1: X YEARS)	(mm/hr)	(°C)	(s/m)	(m)	(1: X)	(L/s/Ha)	(L/s/Ha)	(m^3)	(m^2)	
LPoD–1B	13.352	1	4.53	20	11150	1.82	3.1	9	9	3325	1358	VOLUME

BASIN ID	SETTLING ZONE		SCOUR VELOCITY	FREE WATER ZONE		SEDIMENT STORAGE ZONE		OVERALL DIMENSIONS RELATIVE TO SPILLWAY CREST (EXCL. FOREBAY)			
	ACTUAL SETTLING ZONE VOLUME (V_s)	ACTUAL SETTLING ZONE AREA (A_s)		DEPTH OF FREE WATER ZONE	VOLUME OF FREE WATER ZONE	SEDIMENT STORAGE VOLUME	SEDIMENT STORAGE DEPTH (APPROX.)	BATTER	WIDTH	LENGTH	DEPTH
	(m^3)	(m^2)	(m/s)	(m)	(m^3)	(m^3)	(m)	(1: X)	(m)	(m)	(m)
LPoD–1B	3325	1827	0.008	0.35	333	998	0.83	3	29.74	92.19	3.00

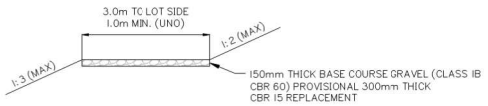
BASIN ID	SPILLWAY										
	BASIN DESIGN LIFE	DESIGN ARI	C_{10}	C	tc	I	Q	HEAD OVER SPILLWAY	SPILLWAY CREST LENGTH	SPILLWAY CREST RL	MIN EMBANKMENT RL
		yr				(mm/hr)	(m^3/s)	(m)	(m)	(m)	(m)
LPoD–1B	> 12 MONTHS	1:50	0.80	0.92	25.00	143.00	4.95	0.20	25.00	11.57	12.22

BASIN ID	FLOW RATE		FLUME DESIGN PARAMETERS				VELOCITY CHECK			OUTPUT PARAMETERS		
	BASIN DESIGN FLOW (m^3/s)	FLUME DESIGN FLOW (m^3/s)	BASE WIDTH (m)	SLIDE SLOPE (1: x)	LONGITUDINAL SLOPE (m/m)	FLUME LINING	MAX ALLOWABLE VELOCITY (m/s)	MANNINGS ROUGHNESS	VELOCITY (m/s)	FLOW DEPTH (m)	FLUME DEPTH (m)	CALCULATED FLOW (m^3/s)
			b	x	s					d	y	
LPoD–1B	4.95	7.43	4.00	2.00	0.01	CONCRETE	5.00	0.013	3.817	0.42	0.57	7.76

BASIN ID	SETTLING ZONE (incl. sediment storage)				FOREBAY				HYDRAULIC CONTROLS						
	VOLUME (m^3)	LENGTH (m)	WIDTH (m)	DEPTH (m)	VOLUME (m^3)	LENGTH (m)	WIDTH (m)	DEPTH (m)	SPILLWAY CREST LENGTH (m)	SPILLWAY CREST (RL)	EMBANKMENT (RL)	CREST (RL)	FLUME BASE WIDTH (m)	FLUME BATTERS (X: 1)	FLUME DEPTH (m)
LPoD–1B	4323.1	92.2	29.7	3.00	822.44	9.2	29.7	3.00	25.0	11.57	12.22	11.77	4.0	2.0	0.6



WEIR / SPILLWAY – TYPICAL ELEVATION
N.T.S



MAINTENANCE ACCESS TRACK – TYPICAL SECTION
N.T.S

UNO DENOTES 'UNLESS NOTED OTHERWISE'

CONSTRUCTION PHASE SEDIMENT BASIN 1 LAYOUT SHEET 3 OF 4

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Project:
VantageYatala
STAGE 2

Site Address:
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THIS DRAWING IS INTENDED TO BE PRINTED IN COLOUR

RPD:

Lot:	502
Plan:	SP316137
Local Authority:	CITY OF GOLD COAST COUNCIL
Level Datum:	AHD
Meridian:	-
Contour Interval:	-
PSM:	-
RL:	-

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DRAWING TITLE
CONSTRUCTION PHASE SEDIMENT BASIN 1 LAYOUT SHEET 3 OF 4

Issue	Date	Description	DRN	CHK
D	24-09-2021	EXTENT OF STAGE 2 EARTHWORKS REDUCED	IG	MG
C	31-03-2021	INFORMATION REQUEST RESPONSE	IG	MG
B	15-02-2021	INFORMATION REQUEST RESPONSE	IG	MG
A	20-11-2020	ORIGINAL ISSUE	BA	MG

SCALE IN METRES
0 5 10 15 20 25
1:250 (FULL SIZE A1)
1:500 (HALF SIZE A3)

Scale at A1:	1:250
Designed:	IG
Drafted:	IG / BA / LAB
Approved:	MG
RPEQ:	16939
Signed:	
Date:	24-09-2021

Drawing No: 5941 ENG BE2 031
Rev. No: D

NOTES:

1. SEDIMENT AND EROSION CONTROL PLAN IS INDICATIVE ONLY. THE CONTRACTOR MUST TAKE ADDITIONAL MEASURES IF REQUIRED ON SITE DURING CONSTRUCTION AND MAINTENANCE PERIODS.
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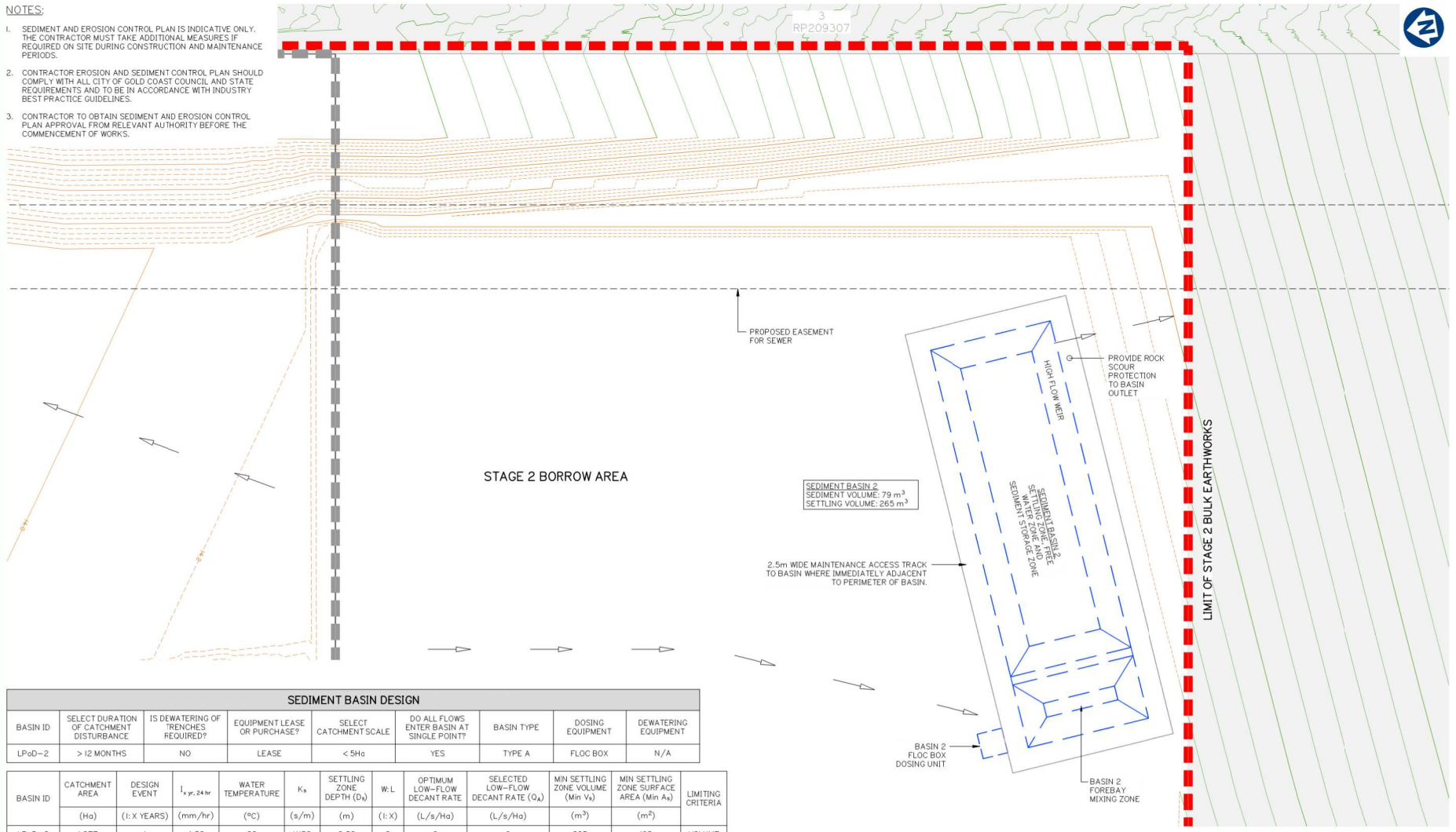
3. CONTRACTOR TO OBTAIN SEDIMENT AND EROSION CONTROL PLAN APPROVAL FROM RELEVANT AUTHORITY BEFORE THE COMMENCEMENT OF WORKS.



SEDIMENT BASIN DESIGN

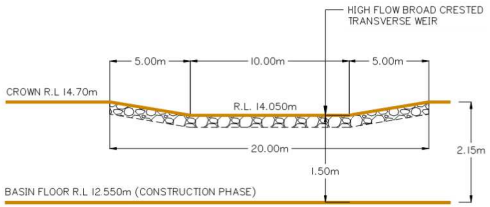
BASIN ID	SELECT DURATION OF CATCHMENT DISTURBANCE	IS DEWATERING OF TRENCHES REQUIRED?	EQUIPMENT LEASE OR PURCHASE?	SELECT CATCHMENT SCALE	DO ALL FLOWS ENTER BASIN AT SINGLE POINT?	BASIN TYPE	DOSING EQUIPMENT	DEWATERING EQUIPMENT
LPoD-2	> 12 MONTHS	NO	LEASE	< 5Ha	YES	TYPE A	FLOC BOX	N/A

BASIN ID	CATCHMENT AREA	DESIGN EVENT	$I_{1\,yr,\,24\,hr}$	WATER TEMPERATURE	K_s	SETTLING ZONE DEPTH (D_s)	W:L	OPTIMUM LOW-FLOW DECANT RATE	SELECTED LOW-FLOW DECANT RATE (Q_A)	MIN SETTLING ZONE VOLUME (Min V_s)	MIN SETTLING ZONE SURFACE AREA (Min A_s)	LIMITING CRITERIA
	(Ha)	(1: X YEARS)	(mm/hr)	(°C)	(s/m)	(m)	(1: X)	(L/s/Ha)	(L/s/Ha)	(m^3)	(m^2)	
LPoD-2	1.077	1	4.53	20	11150	0.86	3	9	9	265	108	VOLUME

BASIN ID	SETTLING ZONE			FREE WATER ZONE		SEDIMENT STORAGE ZONE		OVERALL DIMENSIONS RELATIVE TO SPILLWAY CREST (EXCL. FOREBAY)			
	ACTUAL SETTLING ZONE VOLUME (V_s)	ACTUAL SETTLING ZONE AREA (A_s)	SCOUR VELOCITY	DEPTH OF FREE WATER ZONE	VOLUME OF FREE WATER ZONE	SEDIMENT STORAGE VOLUME	SEDIMENT STORAGE DEPTH (APPROX.)	BATTER	WIDTH	LENGTH	DEPTH
	(m^3)	(m^2)	(m/s)	(m)	(m^3)	(m^3)	(m)	(1: X)	(m)	(m)	(m)
LPoD-2	265	308	0.002	0.20	62	79	0.44	3	12.71	38.13	1.50

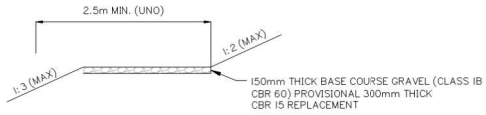
BASIN ID	SPILLWAY									
	BASIN DESIGN LIFE	DESIGN ARI	C_{10}	C	tc	I	Q	HEAD OVER SPILLWAY	SPILLWAY CREST LENGTH	SPILLWAY CREST RL	MIN EMBANKMENT RL
		yr				(mm/hr)	(m^3/s)	(m)	(m)	(m)	(m)
LPoD-2	> 12 MONTHS	1:50	0.80	0.92	15	183	0.50	0.20	10.0	14.050	14.700

BASIN ID	SETTLING ZONE (incl. sediment storage)				FOREBAY				HYDRAULIC CONTROLS			
	VOLUME (m^3)	LENGTH (m)	WIDTH (m)	DEPTH (m)	VOLUME (m^3)	LENGTH (m)	WIDTH (m)	DEPTH (m)	SPILLWAY CREST LENGTH (m)	SPILLWAY CREST (RL)	EMBANKMENT (RL)	LEVEL SPREADER CREST (RL)
LPoD-2	344	38.1	12.7	1.50	73	3.8	12.7	1.50	10	14.050	14.70	14.250



WEIR / SPILLWAY – TYPICAL ELEVATION

N.T.S



MAINTENANCE ACCESS TRACK – TYPICAL SECTION

N.T.S

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CONSTRUCTION PHASE SEDIMENT BASIN 2 LAYOUT SHEET 4 OF 4

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Project:

VantageYatala

STAGE 2

Site Address:

60 STAPYLTON JACOBS WELL ROAD, STAPYLTON QLD 4207

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RPD:

Lot:	502
Plan:	SP316137
Local Authority:	CITY OF GOLD COAST COUNCIL
Level Datum:	AHD
Meridian:	-
Contour Interval:	-
PSM:	-
RL:	-

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DRAWING TITLE

CONSTRUCTION PHASE SEDIMENT BASIN 2 LAYOUT SHEET 4 OF 4

Issue	Date	Description	DRN	CHK
C	24-09-2021	EXTENT OF STAGE 2 EARTHWORKS REDUCED	IG	MG
B	15-02-2021	INFORMATION REQUEST RESPONSE	IG	MG
A	20-11-2020	ORIGINAL ISSUE	BA	MG

SCALE IN METRES

0 5 10 15 20 25

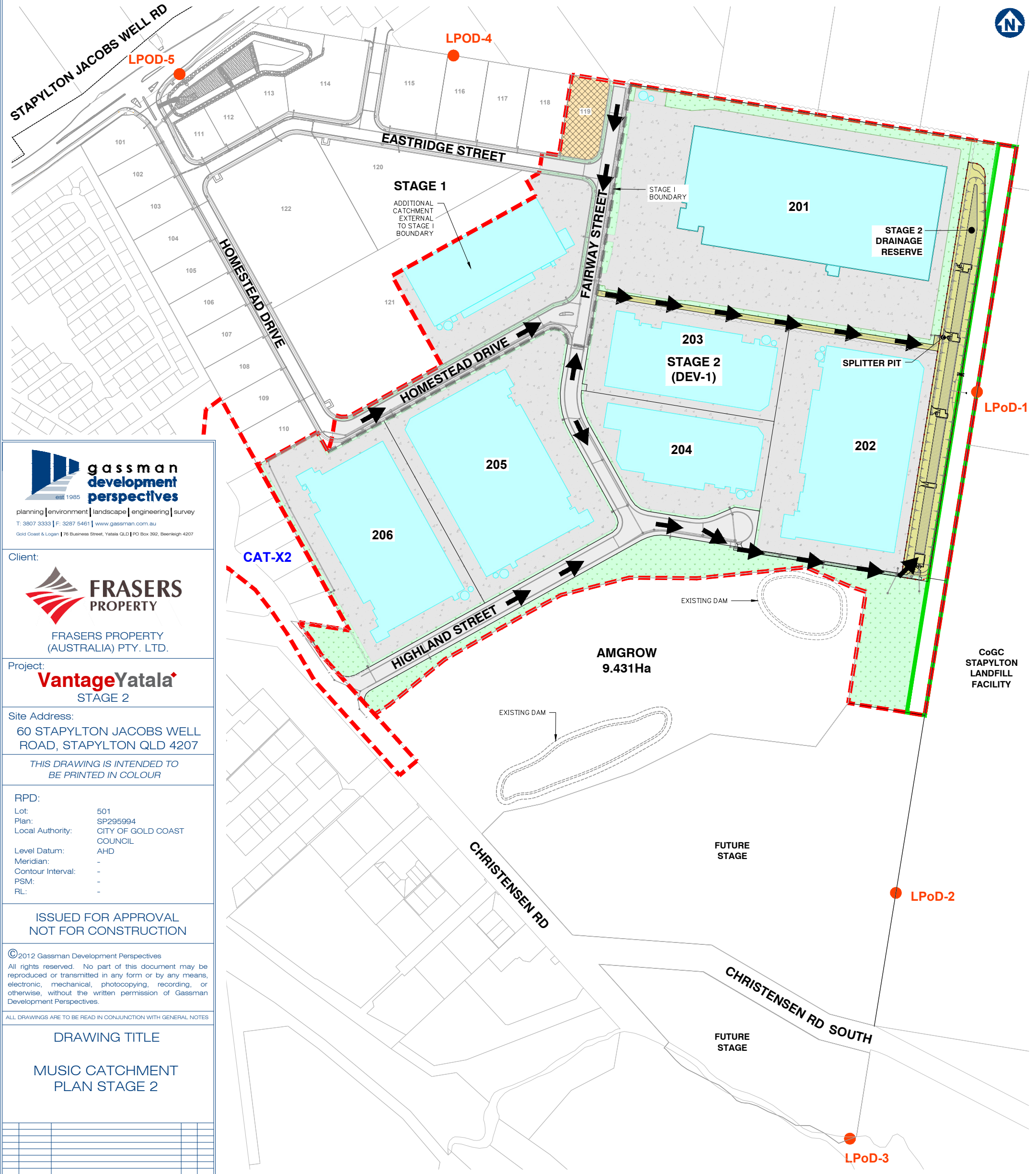
1:250 (FULL SIZE A1)
1:500 (HALF SIZE A3)

Scale at A1:	1:250
Designed:	IG
Drafted:	IG / BA / LAB
Approved:	MG
RPEQ:	16939
Signed:	
Date:	24-09-2021

Drawing No: 5941 ENG BE2 032

Rev. No: C

Appendix E – MUSIC Catchment Plan



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STAGE 2

Site Address:

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RPD:

Lot:	501
Plan:	SP295994
Local Authority:	CITY OF GOLD COAST COUNCIL
Level Datum:	AHD
Meridian:	-
Contour Interval:	-
PSM:	-
RL:	-

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DRAWING TITLE

MUSIC CATCHMENT PLAN STAGE 2

Issue	Date	Description	DRN	CHK
E	03-06-2022	LOT BOUNDARY AMENDED FOR LOT 201/207	LAB	MG
D	11-11-2021	LOT BOUNDARY AMENDED FOR LOT 205	LAB	MG
C	30-03-2021	MINOR UPDATES TO CATCHMENT SPLIT AT BASIN	IG	MG
B	15-02-2021	STAGE 1 BDY ADDED TO DEFINE CATCHMENTS	BA	MG
A	20-11-2020	ORIGINAL ISSUE	BA	MG

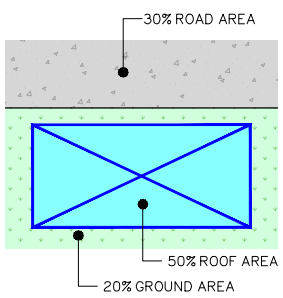
SCALE IN METRES

0 40 80 120 160 200
1:2000 (FULL SIZE A1)
1:4000 (HALF SIZE A3)

Scale at A1:	1:2000
Designed:	IG
Drafted:	BA
Approved:	MG
RPEQ:	16939
Signed:	
Date:	03-06-2022
Drawing No:	5941 ENG SMP2 001
Rev. No:	E

LEGEND

- CATCHMENT BOUNDARY
- ROAD
- HARDSTAND
- ROOF
- GROUND
- LOT 119
- DRAINAGE RESERVE
- 20m BUFFER + ECOLOGICAL CORRIDOR



TYPICAL INDUSTRIAL LOT
TAKEN FROM MUSIC MODELLING GUIDELINES v3.0 (2018)

MUSIC SOURCE NODE	MODELLING APPROACH	AREA (Ha)	IMPERVIOUS %
Stage 2 (DEV-1) Total Catchment = 36.599 Ha			
ROAD	SPLIT	3.012	75
HARDSTAND	SPLIT	11.567	90
ROOF	SPLIT	14.423	100
GROUND	SPLIT	4.373	60
LOT 119	SPLIT	0.382	80
PART OF LOT 206	SPLIT	0.235	60
DRAINAGE RESERVE	SPLIT	1.573	20
20 METER ECOLOGICAL BUFFER	SPLIT	1.271	0
TOTAL		36.599	

OVERALL	
IMPERVIOUS %	PERVIOUS %
83.0	17.0

MUSIC CATCHMENT PLAN STAGE 2

Appendix F – MUSIC Link Report

CITY OF GOLDCOAST.

music@link

MUSIC-*link* Report

Project Details		Company Details	
Project:	5941 Vantage Industrial Development Stage 2	**Company:**	Gassman Development Perspectives
Report Export Date:	3/06/2022	**Contact:**	Mitchell Gassman
Catchment Name:	5941 CoGC Vantage	**Address:**	76 Business Street, Yatala, QLD 4207
Catchment Area:	36.836ha	**Phone:**	(07) 3807 3333
Impervious Area*:	82.56%	**Email:**	mitchell@gassman.com.au
Rainfall Station:	40406 BEENLEIGH		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1990 - 31/12/1999 11:54:00 PM		
Mean Annual Rainfall:	1105mm		
Evapotranspiration:	1492mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.32		
Study Area:	City of Gold Coast (North)		
Scenario:	City of Gold Coast (North)		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node: LPoD-1	**Reduction**	**Node Type**	**Number**	**Node Type**	**Number**
Flow	3.44%	Bio Retention Node	1	Urban Source Node	8
TSS	81%				
TP	73%				
TN	52.1%				
GP	100%				

Comments

NOTE: A successful self-validation check of your model does not constitute an approved model by City of Gold Coast
MUSIC-*link* now in MUSIC by eWater – leading software for modelling stormwater solutions

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Bio	Bio-Retention Basin DEV-1 (3852m2 Filter)	Exfiltration Rate (mm/hr)	None	None	0
Bio	Bio-Retention Basin DEV-1 (3852m2 Filter)	Extended detention depth (m)	None	1	0.3
Bio	Bio-Retention Basin DEV-1 (3852m2 Filter)	Filter depth (m)	0.4	1	0.7
Bio	Bio-Retention Basin DEV-1 (3852m2 Filter)	Hi-flow bypass rate (cum/sec)	None	None	100
Bio	Bio-Retention Basin DEV-1 (3852m2 Filter)	Orthophosphate Content in Filter (mg/kg)	None	None	30
Bio	Bio-Retention Basin DEV-1 (3852m2 Filter)	PET Scaling Factor	2.1	2.1	2.1
Bio	Bio-Retention Basin DEV-1 (3852m2 Filter)	Saturated Hydraulic Conductivity (mm/hr)	50	200	200
Bio	Bio-Retention Basin DEV-1 (3852m2 Filter)	Total Nitrogen Content in Filter (mg/kg)	None	None	400
Receiving	LPoD-1	% Load Reduction	None	None	3.44
Receiving	LPoD-1	GP % Load Reduction	90	None	100
Receiving	LPoD-1	TN % Load Reduction	45	None	52.1
Receiving	LPoD-1	TP % Load Reduction	60	None	73
Receiving	LPoD-1	TSS % Load Reduction	80	None	81
Urban	CoGC - 20m Buffer to Landfill (1.271 Ha)	Area Impervious (ha)	None	None	0
Urban	CoGC - 20m Buffer to Landfill (1.271 Ha)	Area Pervious (ha)	None	None	1.271
Urban	CoGC - 20m Buffer to Landfill (1.271 Ha)	Total Area (ha)	None	None	1.271
Urban	CoGC - Drainage Reserve & Basin (1.573 Ha)	Area Impervious (ha)	None	None	0.312
Urban	CoGC - Drainage Reserve & Basin (1.573 Ha)	Area Pervious (ha)	None	None	1.260
Urban	CoGC - Drainage Reserve & Basin (1.573 Ha)	Total Area (ha)	None	None	1.573
Urban	CoGC - Industrial GROUND (4.373 Ha)	Area Impervious (ha)	None	None	2.614
Urban	CoGC - Industrial GROUND (4.373 Ha)	Area Pervious (ha)	None	None	1.758
Urban	CoGC - Industrial GROUND (4.373 Ha)	Total Area (ha)	None	None	4.373
Urban	CoGC - Industrial Lot 119 (0.382 Ha)	Area Impervious (ha)	None	None	0.306
Urban	CoGC - Industrial Lot 119 (0.382 Ha)	Area Pervious (ha)	None	None	0.075
Urban	CoGC - Industrial Lot 119 (0.382 Ha)	Total Area (ha)	None	None	0.382
Urban	CoGC - Industrial LOT HARDSTAND DEV-1 (11.567 Ha)	Area Impervious (ha)	None	None	10.36
Urban	CoGC - Industrial LOT HARDSTAND DEV-1 (11.567 Ha)	Area Pervious (ha)	None	None	1.206
Urban	CoGC - Industrial LOT HARDSTAND DEV-1 (11.567 Ha)	Total Area (ha)	None	None	11.567
Urban	CoGC - Industrial ROAD RESERVE DEV-1 (3.012 Ha)	Area Impervious (ha)	None	None	2.255
Urban	CoGC - Industrial ROAD RESERVE DEV-1 (3.012 Ha)	Area Pervious (ha)	None	None	0.756
Urban	CoGC - Industrial ROAD RESERVE DEV-1 (3.012 Ha)	Total Area (ha)	None	None	3.012
Urban	CoGC - Industrial ROOF DEV-1 (14.423 Ha)	Area Impervious (ha)	None	None	14.423
Urban	CoGC - Industrial ROOF DEV-1 (14.423 Ha)	Area Pervious (ha)	None	None	0
Urban	CoGC - Industrial ROOF DEV-1 (14.423 Ha)	Total Area (ha)	None	None	14.423
Urban	CoGC - Part of Lot 206 (0.235 Ha)	Area Impervious (ha)	None	None	0.140
Urban	CoGC - Part of Lot 206 (0.235 Ha)	Area Pervious (ha)	None	None	0.094
Urban	CoGC - Part of Lot 206 (0.235 Ha)	Total Area (ha)	None	None	0.235

Only certain parameters are reported when they pass validation

Appendix G – WSUD Bio Retention Basin Maintenance Checklists

BIORETENTION BASIN CONSTRUCTION INSPECTION CHECKLIST

Asset I.D.		Inspected By:	
Site:		Date:	
		Time:	
Constructed By:		Weather:	
		Contact During Visit:	

Items inspected	Checked Y	Checked N	Satisfactory Y	Satisfactory N	Items inspected	Checked Y	Checked N	Satisfactory Y	Satisfactory N
DURING CONSTRUCTION & ESTABLISHMENT									
A. FUNCTIONAL INSTALLATION					**Structural components**				
Preliminary Works					15. Location and configuration of inflow systems as designed				
1. Erosion and sediment control plan adopted					16. Location and levels of overflow pits as designed				
2. Temporary traffic/safety control measures					17. Under-drainage connected to overflow pits as designed				
3. Location same as plans					18. Concrete and reinforcement as designed				
4. Site protection from existing flows					19. Set down to correct level for flush kerbs (streetscape applications only)				
Earthworks and Filter Media					20. Kerb opening width as designed				
5. Bed of basin correct shape and slope									
6. Batter slopes as plans					**B. SEDIMENT & EROSION CONTROL (IF REQUIRED)**				
7. Dimensions of bioretention area as plans					21. Stabilisation immediately following earthworks and planting of terrestrial landscape around basin				
8. Confirm surrounding soil type with design					22. Silt fences and traffic control in place				
9. Confirm filter media specification in accordance with Step 4					23. Temporary protection layers in place				
9. Provision of liner (if required)									
10. Under-drainage installed as designed					**C. OPERATIONAL ESTABLISHMENT**				
11. Drainage layer media as designed					24. Temporary protection layers and associated silt removed				
12. Transition layer media as designed (if required)					**Vegetation**				
14. Extended detention depth as designed					25. Planting as designed (species and densities)				
					26. Weed removal and watering as required				

FINAL INSPECTION									
1. Confirm levels of inlets and outlets					6. Check for uneven settling of banks				
2. Confirm structural element sizes					7. Under-drainage working				
3. Check batter slopes					8. Inflow systems working				
4. Vegetation as designed					9. Maintenance access provided				
5. Bioretention filter media surface flat and free of clogging									

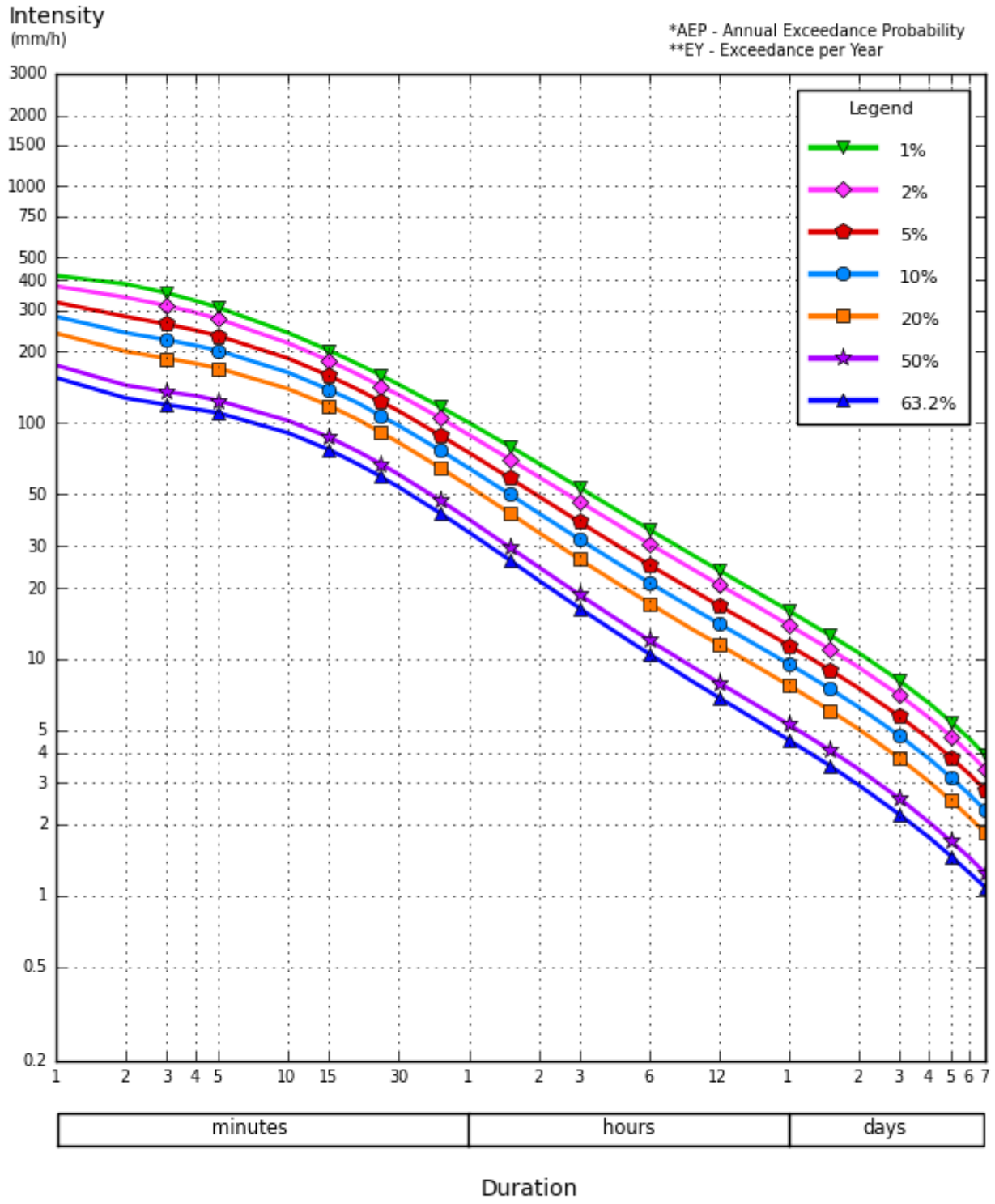
COMMENTS ON INSPECTION
ACTIONS REQUIRED
Inspection officer signature:

BIORETENTION BASIN MAINTENANCE CHECKLIST				
Inspection Frequency:	1 to 6 monthly	Date of Visit:		
Location:				
Description:				
Asset I.D.				
Site Visit by:				
INSPECTION ITEMS:			Y	N	Action Required (details)
Sediment accumulation at inflow points?					
Litter within basin?					
Erosion at inlet or other key structures?					
Traffic damage present?					
Evidence of dumping (e.g. building waste)?					
Vegetation condition satisfactory (density, weeds etc)?					
Watering of vegetation required?					
Replanting required?					
Mowing/slashing required?					
Clogging of drainage points (sediment or debris)?					
Evidence of ponding?					
Damage/vandalism to structures present?					
Surface clogging visible?					
Drainage system inspected?					
Resetting of system required?					
COMMENTS					

BIORETENTION BASIN ASSET TRANSFER CHECKLIST		
Asset I.D.		
Asset Location:		
Construction by:		
'On-maintenance' Period:		
TREATMENT	Y	N
System appears to be working as designed visually?		
No obvious signs of under-performance?		
MAINTENANCE	Y	N
Maintenance plans and indicative maintenance costs provided for each asset?		
Vegetation establishment period completed (2 years)?		
Inspection and maintenance undertaken as per maintenance plan?		
Inspection and maintenance forms provided?		
ASSET INSPECTED FOR DEFECTS AND/OR MAINTENANCE ISSUES AT TIME OF ASSET TRANSFER	Y	N
Sediment accumulation at inflow points?		
Litter within basin?		
Erosion at inlet or other key structures?		
Traffic damage present?		
Evidence of dumping (e.g. building waste)?		
Vegetation condition satisfactory (density, weeds etc)?		
Watering of vegetation required?		
Replanting required?		
Mowing/slashing required?		
Clogging of drainage points (sediment or debris)?		
Evidence of ponding?		
Damage/vandalism to structures present?		
Surface clogging visible?		
Drainage system inspected?		
COMMENTS/ACTIONS REQUIRED FOR ASSET TRANSFER		
ASSET INFORMATION	Y	N
Design Assessment Checklist provided?		
As constructed plans provided?		
Copies of all required permits (both construction and operational) submitted?		
Proprietary information provided (if applicable)?		
Digital files (e.g. drawings, survey, models) provided?		
Asset listed on asset register or database?		

Appendix H – Bureau of Meteorology Rainfall Data

Unit: mm/h ▼



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Australian Government
Bureau of Meteorology

Location

Label: Vantage Yatala Stage 2

Latitude: -27.736 [Nearest grid cell: 27.7375 (S)]

Longitude: 153.238 [Nearest grid cell: 153.2375 (E)]

IFD Design Rainfall Intensity (mm/h)

Issued: 26 May 2020

Rainfall intensity for Durations, Exceedance per Year (EY), and Annual Exceedance Probabilities (AEP).
FAQ for New ARR probability terminology

	Annual Exceedance Probability (AEP)						
Duration	**63.2%**	**50%#**	**20%***	**10%**	**5%**	**2%**	**1%**
1 min	155	175	239	281	323	378	419
2 min	127	144	200	240	281	339	386
3 min	119	135	187	224	261	313	354
4 min	114	130	178	212	246	292	328
5 min	110	124	170	202	233	275	307
10 min	90.5	102	139	163	187	217	240
15 min	76.8	86.8	118	138	158	183	202
20 min	66.7	75.5	103	121	138	160	177
25 min	59.2	67.0	91.1	107	123	143	159
30 min	53.3	60.3	82.3	97.1	112	131	145
45 min	41.5	47.0	64.6	76.6	88.6	105	117
1 hour	34.4	39.0	53.9	64.2	74.7	88.9	100
1.5 hour	26.2	29.7	41.4	49.8	58.3	70.1	79.5
2 hour	21.5	24.5	34.3	41.4	48.8	59.0	67.3
3 hour	16.4	18.7	26.4	32.1	38.0	46.3	53.1
4.5 hour	12.6	14.4	20.5	25.0	29.7	36.4	41.8
6 hour	10.5	12.0	17.2	21.0	25.0	30.7	35.3
9 hour	8.14	9.38	13.5	16.6	19.8	24.3	27.9
12 hour	6.85	7.92	11.5	14.1	16.8	20.6	23.7
18 hour	5.38	6.24	9.11	11.2	13.4	16.4	18.8
24 hour	4.53	5.27	7.72	9.51	11.4	13.9	16.0
30 hour	3.95	4.60	6.76	8.35	10.0	12.2	14.0
36 hour	3.53	4.11	6.05	7.48	8.98	11.0	12.6
48 hour	2.92	3.41	5.04	6.24	7.51	9.20	10.6
72 hour	2.19	2.56	3.79	4.72	5.71	7.01	8.07
96 hour	1.76	2.04	3.03	3.79	4.59	5.65	6.51
120 hour	1.46	1.69	2.51	3.14	3.82	4.70	5.41
144 hour	1.24	1.44	2.13	2.66	3.24	3.98	4.58
168 hour	1.08	1.24	1.83	2.29	2.79	3.42	3.93

Note:
The 50% AEP IFD **does not** correspond to the 2 year Average Recurrence Interval (ARI) IFD.
Rather it corresponds to the 1.44 ARI.
* The 20% AEP IFD **does not** correspond to the 5 year Average Recurrence Interval (ARI) IFD.
Rather it corresponds to the 4.48 ARI.

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Australian Government
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Location

Label: Vantage Yatala Stage 2

Latitude: -27.736 [Nearest grid cell: 27.7375 (S)]

Longitude: 153.238 [Nearest grid cell: 153.2375 (E)]

Very Frequent Design Rainfall Intensity (mm/h)

Issued: 26 May 2020

Rainfall intensity for Durations, Exceedance per Year (EY), and Annual Exceedance Probabilities (AEP).
FAQ for New ARR probability terminology

	Exceedance per Year (EY)							
Duration	**12EY**	**6EY**	**4EY**	**3EY**	**2EY**	**1EY**	**0.5EY#**	**0.2EY***
1 min	65.1	75.1	92.3	105	123	155	194	243
2 min	56.3	64.3	78.2	87.9	102	127	160	204
3 min	52.3	60.0	73.4	82.8	96.2	119	150	191
4 min	49.2	56.8	69.8	79.0	92.0	114	144	182
5 min	46.4	53.9	66.6	75.6	88.2	110	138	174
10 min	36.6	43.0	53.9	61.6	72.4	90.5	114	142
15 min	30.3	35.8	45.2	51.8	61.1	76.8	96.4	120
20 min	26.0	30.8	39.0	44.8	53.0	66.7	83.8	105
25 min	22.9	27.1	34.4	39.6	46.8	59.2	74.4	93.0
30 min	20.5	24.3	30.9	35.5	42.1	53.3	67.0	83.9
45 min	15.8	18.7	23.8	27.4	32.6	41.5	52.2	65.9
1 hour	12.9	15.4	19.6	22.6	26.9	34.4	43.3	54.9
1.5 hour	9.73	11.5	14.7	17.0	20.3	26.2	33.0	42.3
2 hour	7.92	9.39	12.0	13.9	16.6	21.5	27.2	35.0
3 hour	5.93	7.03	9.00	10.4	12.5	16.4	20.8	27.0
4.5 hour	4.46	5.29	6.79	7.91	9.54	12.6	16.0	20.9
6 hour	3.66	4.35	5.60	6.53	7.91	10.5	13.3	17.6
9 hour	2.79	3.32	4.29	5.02	6.11	8.14	10.4	13.8
12 hour	2.31	2.76	3.57	4.19	5.11	6.85	8.79	11.7
18 hour	1.78	2.13	2.77	3.26	3.99	5.38	6.93	9.29
24 hour	1.48	1.77	2.31	2.73	3.35	4.53	5.85	7.87
30 hour	1.28	1.54	2.01	2.37	2.91	3.95	5.11	6.90
36 hour	1.14	1.36	1.79	2.11	2.59	3.53	4.56	6.17
48 hour	0.935	1.12	1.47	1.74	2.14	2.92	3.78	5.14
72 hour	0.696	0.837	1.10	1.30	1.60	2.19	2.84	3.87
96 hour	0.553	0.666	0.876	1.04	1.28	1.76	2.27	3.09
120 hour	0.456	0.549	0.724	0.859	1.06	1.46	1.88	2.56
144 hour	0.385	0.464	0.613	0.730	0.906	1.24	1.60	2.17
168 hour	0.330	0.399	0.528	0.631	0.785	1.08	1.38	1.87

Note:
The 0.5 EY design rainfall corresponds to the 2 year Average Recurrence Interval (ARI) IFD **not** the 50% AEP IFD.
* The 0.2 EY design rainfall corresponds to the 5 year Average Recurrence Interval (ARI) IFD **not** the 20% AEP IFD.

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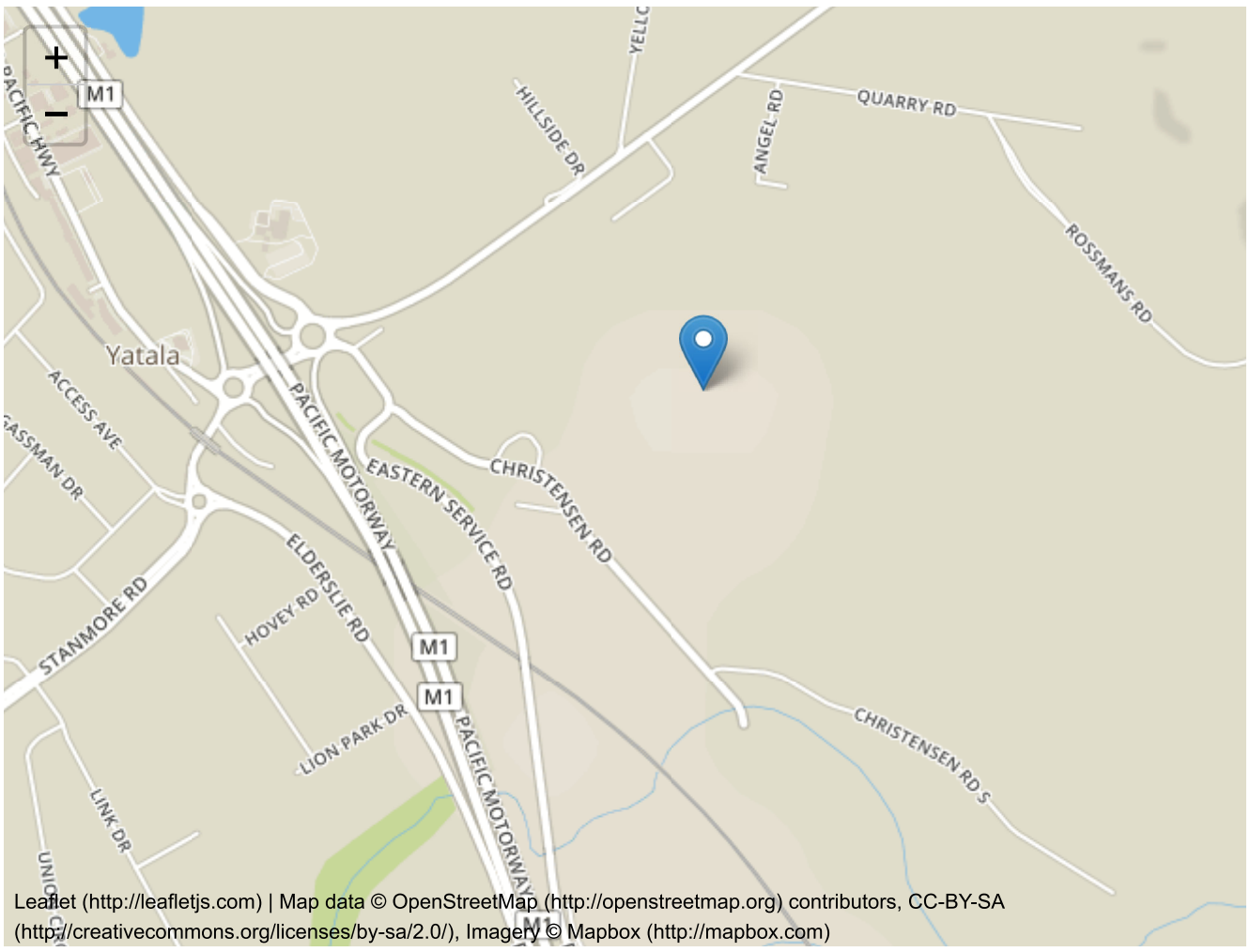
Appendix I – AR&R Storm & Loss Data

ATTENTION: This site was updated recently, changing some of the functionality. Please see the changelog (./changelog) for further information

Australian Rainfall & Runoff Data Hub - Results

Input Data

Longitude	153.238
Latitude	-27.736
Selected Regions (clear)	
River Region	show
ARF Parameters	show
Storm Losses	show
Temporal Patterns	show
Areal Temporal Patterns	show
BOM IFDs	show
Median Preburst Depths and Ratios	show
10% Preburst Depths	show
25% Preburst Depths	show
75% Preburst Depths	show
90% Preburst Depths	show
Interim Climate Change Factors	show
Baseflow Factors	show



Data

River Region

Division	North East Coast
River Number	45
River Name	Logan-Albert Rivers

Layer Info

Time Accessed	26 November 2019 12:45PM
Version	2016_v1

ARF Parameters

$$ARF = Min\left\{1, \left[1 - a\left(Area^{b} - c\log_{10}Duration\right)Duration^{-d} + eArea^{f}Duration^{g}\left(0.3 + \log_{10}AEP\right) + h10^{iArea\frac{Duration}{1440}}\left(0.3 + \log_{10}AEP\right)\right]\right\}$$

Zone	a	b	c	d	e	f	g	h	i
East Coast North	0.327	0.241	0.448	0.36	0.00096	0.48	-0.21	0.012	-0.0013

Short Duration ARF

$$ARF = Min\left[1, 1 - 0.287\left(Area^{0.265} - 0.439\log_{10}(Duration)\right).Duration^{-0.36} + 2.26\ \mathrm{x}\ 10^{-3}\ \mathrm{x}\ Area^{0.226}.Duration^{0.125}\left(0.3 + \log_{10}(AEP)\right) + 0.0141\ \mathrm{x}\ Area^{0.213}\ \mathrm{x}\ 10^{-0.021\frac{(Duration-180)^2}{1440}}\left(0.3 + \log_{10}(AEP)\right)\right]$$

Layer Info

Time Accessed	26 November 2019 12:45PM
Version	2016_v1

Storm Losses

Note: Burst Loss = Storm Loss - Preburst

Note: These losses are only for rural use and are **NOT FOR DIRECT USE** in urban areas

ID	27987.0
Storm Initial Losses (mm)	27.0
Storm Continuing Losses (mm/h)	1.6

Layer Info

Time Accessed	26 November 2019 12:45PM
Version	2016_v1

Temporal Patterns | Download (.zip) (static/temporal_patterns/TP/ECnorth.zip)

code	ECnorth
Label	East Coast North

Layer Info

Time Accessed	26 November 2019 12:45PM
Version	2016_v2

Areal Temporal Patterns | Download (.zip) (./static/temporal_patterns/Areal/Areal_ECnorth.zip)

code	ECnorth
arealabel	East Coast North

Layer Info

Time Accessed	26 November 2019 12:45PM

Version	2016_v2

BOM IFDs

Click here (http://www.bom.gov.au/water/designRainfalls/revised-ifd/?year=2016&coordinate_type=dd&latitude=-27.736&longitude=153.238&sdmin=true&sdhr=true&sdday=true&user_label=) to obtain the IFD depths for catchment centroid from the BoM website

Layer Info

Time Accessed	26 November 2019 12:45PM

Median Preburst Depths and Ratios

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	2.5 (0.064)	4.6 (0.085)	6.0 (0.093)	7.3 (0.098)	8.7 (0.098)	9.8 (0.098)
90 (1.5)	2.8 (0.063)	10.7 (0.172)	15.9 (0.213)	20.9 (0.239)	16.8 (0.160)	13.8 (0.115)
120 (2.0)	2.6 (0.053)	9.9 (0.144)	14.8 (0.178)	19.4 (0.199)	20.9 (0.177)	21.9 (0.163)
180 (3.0)	3.8 (0.067)	13.4 (0.169)	19.8 (0.205)	25.9 (0.227)	32.8 (0.236)	38.0 (0.238)
360 (6.0)	5.8 (0.080)	19.3 (0.187)	28.2 (0.223)	36.8 (0.245)	64.4 (0.350)	85.1 (0.401)
720 (12.0)	6.0 (0.063)	19.6 (0.142)	28.6 (0.169)	37.2 (0.184)	61.7 (0.250)	80.1 (0.282)
1080 (18.0)	7.1 (0.063)	15.9 (0.097)	21.8 (0.108)	27.3 (0.113)	47.7 (0.162)	63.0 (0.186)
1440 (24.0)	7.0 (0.055)	12.7 (0.069)	16.5 (0.072)	20.2 (0.074)	32.0 (0.096)	40.9 (0.107)
2160 (36.0)	0.0 (0.000)	6.6 (0.030)	10.9 (0.041)	15.1 (0.047)	28.6 (0.072)	38.8 (0.086)
2880 (48.0)	0.0 (0.000)	5.5 (0.023)	9.1 (0.030)	12.6 (0.035)	23.2 (0.053)	31.1 (0.061)
4320 (72.0)	0.0 (0.000)	0.9 (0.003)	1.4 (0.004)	2.0 (0.005)	10.2 (0.020)	16.3 (0.028)

Layer Info

Time Accessed	26 November 2019 12:45PM
Version	2018_v1
Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

10% Preburst Depths

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
90 (1.5)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
120 (2.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
180 (3.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
360 (6.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
720 (12.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.9 (0.004)	1.5 (0.005)
1080 (18.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
1440 (24.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
2160 (36.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
2880 (48.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
4320 (72.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)

Layer Info

Time Accessed	26 November 2019 12:45PM
Version	2018_v1
Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

25% Preburst Depths

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	0.1 (0.003)	0.3 (0.005)	0.4 (0.006)	0.5 (0.007)	0.7 (0.008)	0.9 (0.009)
90 (1.5)	0.0 (0.000)	0.7 (0.011)	1.2 (0.016)	1.6 (0.019)	1.0 (0.009)	0.5 (0.004)
120 (2.0)	0.0 (0.000)	1.2 (0.017)	2.0 (0.024)	2.7 (0.028)	1.7 (0.014)	1.0 (0.007)
180 (3.0)	0.0 (0.000)	0.9 (0.012)	1.6 (0.016)	2.2 (0.019)	3.6 (0.026)	4.7 (0.029)
360 (6.0)	0.0 (0.000)	1.8 (0.017)	2.9 (0.023)	4.0 (0.027)	5.6 (0.030)	6.8 (0.032)
720 (12.0)	0.0 (0.000)	2.5 (0.018)	4.2 (0.025)	5.8 (0.029)	20.8 (0.084)	32.0 (0.113)
1080 (18.0)	0.0 (0.000)	2.2 (0.013)	3.7 (0.018)	5.1 (0.021)	9.5 (0.032)	12.7 (0.038)
1440 (24.0)	0.0 (0.000)	0.3 (0.002)	0.5 (0.002)	0.7 (0.002)	6.9 (0.021)	11.6 (0.030)
2160 (36.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	1.7 (0.004)	3.0 (0.007)
2880 (48.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	2.0 (0.005)	3.5 (0.007)
4320 (72.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)

Layer Info

Time Accessed	26 November 2019 12:45PM
Version	2018_v1
Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

75% Preburst Depths

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	26.3 (0.675)	35.6 (0.661)	41.8 (0.650)	47.7 (0.639)	45.7 (0.514)	44.2 (0.441)
90 (1.5)	25.6 (0.573)	56.5 (0.909)	77.0 (1.031)	96.6 (1.105)	96.4 (0.917)	96.2 (0.806)
120 (2.0)	27.1 (0.554)	61.6 (0.896)	84.3 (1.017)	106.2 (1.089)	143.2 (1.213)	171.0 (1.270)
180 (3.0)	39.7 (0.708)	71.9 (0.907)	93.3 (0.969)	113.7 (0.999)	150.7 (1.085)	178.5 (1.120)
360 (6.0)	36.5 (0.507)	70.0 (0.678)	92.2 (0.730)	113.4 (0.755)	146.0 (0.792)	170.3 (0.803)
720 (12.0)	27.3 (0.287)	66.3 (0.481)	92.0 (0.544)	116.8 (0.578)	175.7 (0.710)	219.8 (0.773)
1080 (18.0)	37.0 (0.329)	56.1 (0.342)	68.7 (0.340)	80.8 (0.335)	114.2 (0.387)	139.2 (0.411)
1440 (24.0)	31.0 (0.245)	46.9 (0.253)	57.4 (0.251)	67.5 (0.247)	91.4 (0.274)	109.3 (0.285)
2160 (36.0)	10.3 (0.070)	30.1 (0.138)	43.1 (0.160)	55.7 (0.172)	89.0 (0.225)	114.0 (0.251)
2880 (48.0)	6.0 (0.037)	30.3 (0.125)	46.4 (0.155)	61.8 (0.171)	89.8 (0.203)	110.8 (0.219)
4320 (72.0)	0.1 (0.000)	17.4 (0.064)	28.9 (0.085)	40.0 (0.097)	57.9 (0.115)	71.4 (0.123)

Layer Info

Time Accessed	26 November 2019 12:45PM
Version	2018_v1
Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

90% Preburst Depths

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	69.8 (1.790)	104.6 (1.942)	127.6 (1.987)	149.7 (2.005)	191.9 (2.160)	223.6 (2.234)
90 (1.5)	118.2 (2.648)	152.7 (2.458)	175.6 (2.353)	197.6 (2.261)	245.2 (2.333)	280.9 (2.354)
120 (2.0)	99.3 (2.026)	145.0 (2.112)	175.3 (2.115)	204.4 (2.096)	264.9 (2.244)	310.3 (2.304)
180 (3.0)	130.9 (2.333)	181.1 (2.284)	214.4 (2.227)	246.3 (2.163)	291.9 (2.102)	326.0 (2.046)
360 (6.0)	106.3 (1.476)	150.2 (1.455)	179.2 (1.420)	207.1 (1.378)	259.5 (1.409)	298.8 (1.409)
720 (12.0)	75.3 (0.792)	135.6 (0.984)	175.5 (1.037)	213.8 (1.059)	267.1 (1.080)	307.1 (1.080)
1080 (18.0)	86.2 (0.767)	131.6 (0.802)	161.6 (0.801)	190.4 (0.790)	215.9 (0.732)	235.1 (0.694)
1440 (24.0)	73.3 (0.580)	110.6 (0.597)	135.3 (0.593)	159.0 (0.582)	201.0 (0.602)	232.5 (0.607)
2160 (36.0)	38.4 (0.260)	82.9 (0.380)	112.3 (0.417)	140.6 (0.435)	184.6 (0.467)	217.5 (0.480)
2880 (48.0)	25.8 (0.158)	81.8 (0.338)	118.8 (0.396)	154.3 (0.428)	180.1 (0.408)	199.4 (0.393)
4320 (72.0)	6.5 (0.035)	44.8 (0.164)	70.2 (0.206)	94.5 (0.230)	107.5 (0.213)	117.2 (0.202)

Layer Info

Time Accessed	26 November 2019 12:45PM
Version	2018_v1
Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

Interim Climate Change Factors

	RCP 4.5	RCP6	RCP 8.5
2030	**0.869 (4.3%)**	0.783 (3.9%)	**0.983 (4.9%)**
2040	**1.057 (5.3%)**	1.014 (5.1%)	**1.349 (6.8%)**
2050	**1.272 (6.4%)**	1.236 (6.2%)	**1.773 (9.0%)**
2060	**1.488 (7.5%)**	1.458 (7.4%)	**2.237 (11.5%)**
2070	**1.676 (8.5%)**	1.691 (8.6%)	**2.722 (14.2%)**
2080	**1.810 (9.2%)**	1.944 (9.9%)	**3.209 (16.9%)**
2090	**1.862 (9.5%)**	2.227 (11.5%)	**3.679 (19.7%)**

Layer Info

Time Accessed	26 November 2019 12:45PM
Version	2019_v1
Note	ARR recommends the use of RCP4.5 and RCP 8.5 values. These have been updated to the values that can be found on the climate change in Australia website.

Baseflow Factors

Downstream	0
Area (km2)	3779.48325962
Catchment Number	7250
Volume Factor	0.150296
Peak Factor	0.04523

Layer Info

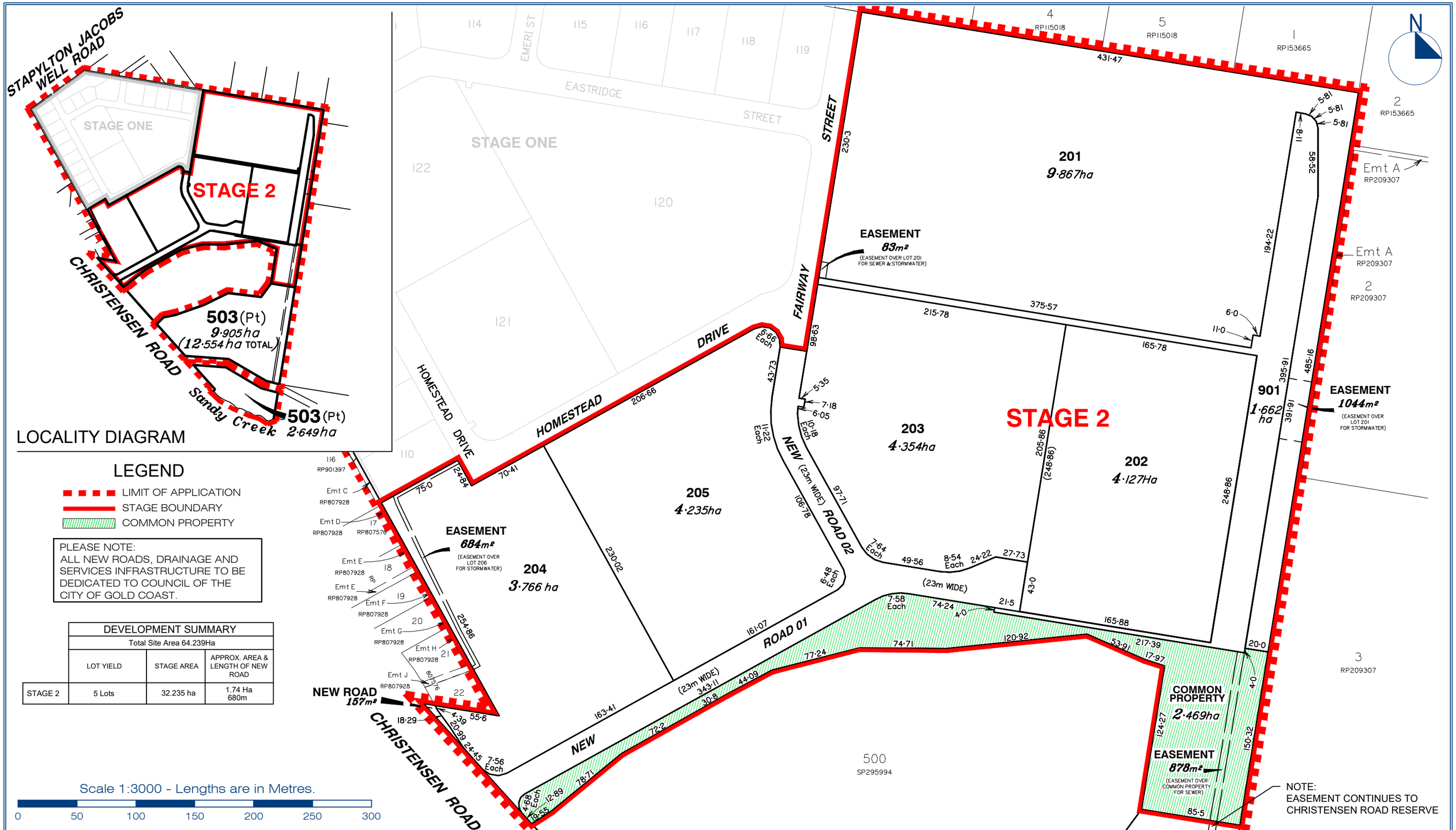
Time Accessed	26 November 2019 12:45PM
Version	2016_v1

Download TXT (downloads/0a320360-3d6e-4b37-96bd-1f41fe5fdfb3.txt)

Download JSON (downloads/5e94d649-e516-45a9-b4fb-f374cf5791a5.json)

Generating PDF... (downloads/579e9dd3-c6b7-4ec5-8a64-fc262213ce3d.pdf)

Appendix J – Proposed Reconfiguration of Lot Plan (ROL)



LOCALITY DIAGRAM

LEGEND

- LIMIT OF APPLICATION
- STAGE BOUNDARY
- COMMON PROPERTY

PLEASE NOTE:
ALL NEW ROADS, DRAINAGE AND SERVICES INFRASTRUCTURE TO BE DEDICATED TO COUNCIL OF THE CITY OF GOLD COAST.

DEVELOPMENT SUMMARY			
Total Site Area 64.239Ha			
	LOT YIELD	STAGE AREA	APPROX. AREA & LENGTH OF NEW ROAD
STAGE 2	5 Lots	32.235 ha	1.74 Ha 680m

Scale 1:3000 - Lengths are in Metres.

0 50 100 150 200 250 300

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76 Business Street, Yatala QLD | PO Box 392, Beenleigh 4207

Scale at A3: 1:3000
Date: 17-02-22
Design: MG
Drawn: SH
Checked: MG/AWG

Issue	Date	Description	DRN	CHK
G	17/02/2022	CHANGE LOT NUMBERS	SJH	AG
F	15/02/2022	LOT CHANGES	SJH	AG
E	09/02/2022	REMOVE SUB-STAGING LINES	SJH	AG
D	08/02/2022	CHANGES TO LOTS 901, 201-203	SJH	AG
C	24/11/2021	PMT LOT 203, SUB-STAGING	SJH	AG
B	09/11/2021	CHANGES TO LOTS 205, 206	SJH	AG
A	31/03/2021	CHANGES TO LOT 901	SJH	AG
	16/11/2020	ORIGINAL ISSUE	SJH	GS

Project: VantageYatala

Client: FRASERS PROPERTY

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This plan has been prepared for the exclusive use of the client as stated on this plan for the purpose of application to the relevant local authority for material change of use and/or reconfiguration of the land as described and should not be used by any other person or corporation and for any other purpose.

All dimensions and area's are approximate only and subject to survey.

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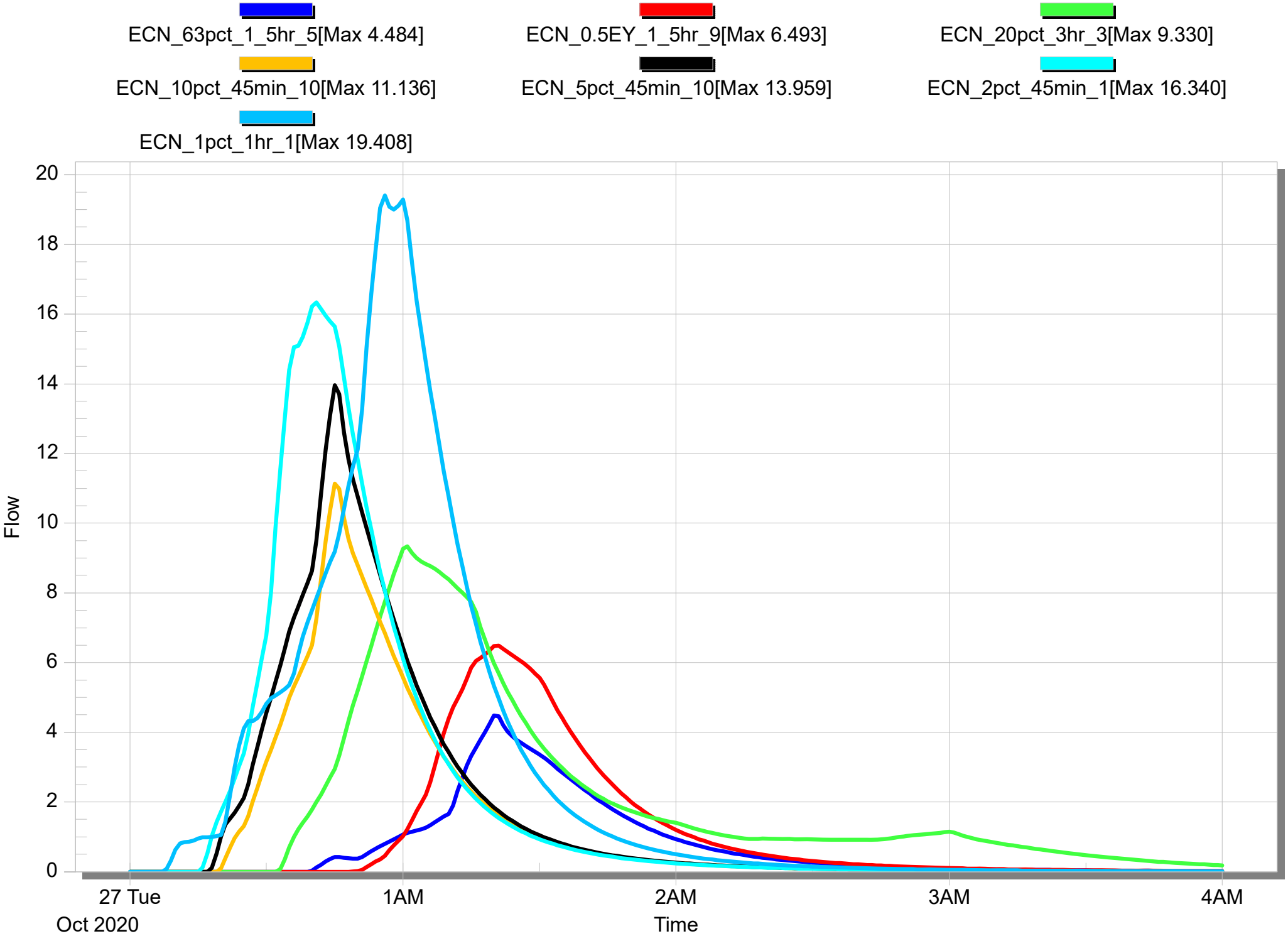
Drawing Title:
Proposed Staged, Community Title Scheme Reconfiguration of Land
Lots 201 to 205, Common Property, Drainage Reserve (Lot 901) & New Road
CANCELLING LOT: 501 on SP295994

LOCATION: 60 Stapylton Jacobs Well Road, Stapylton QLD

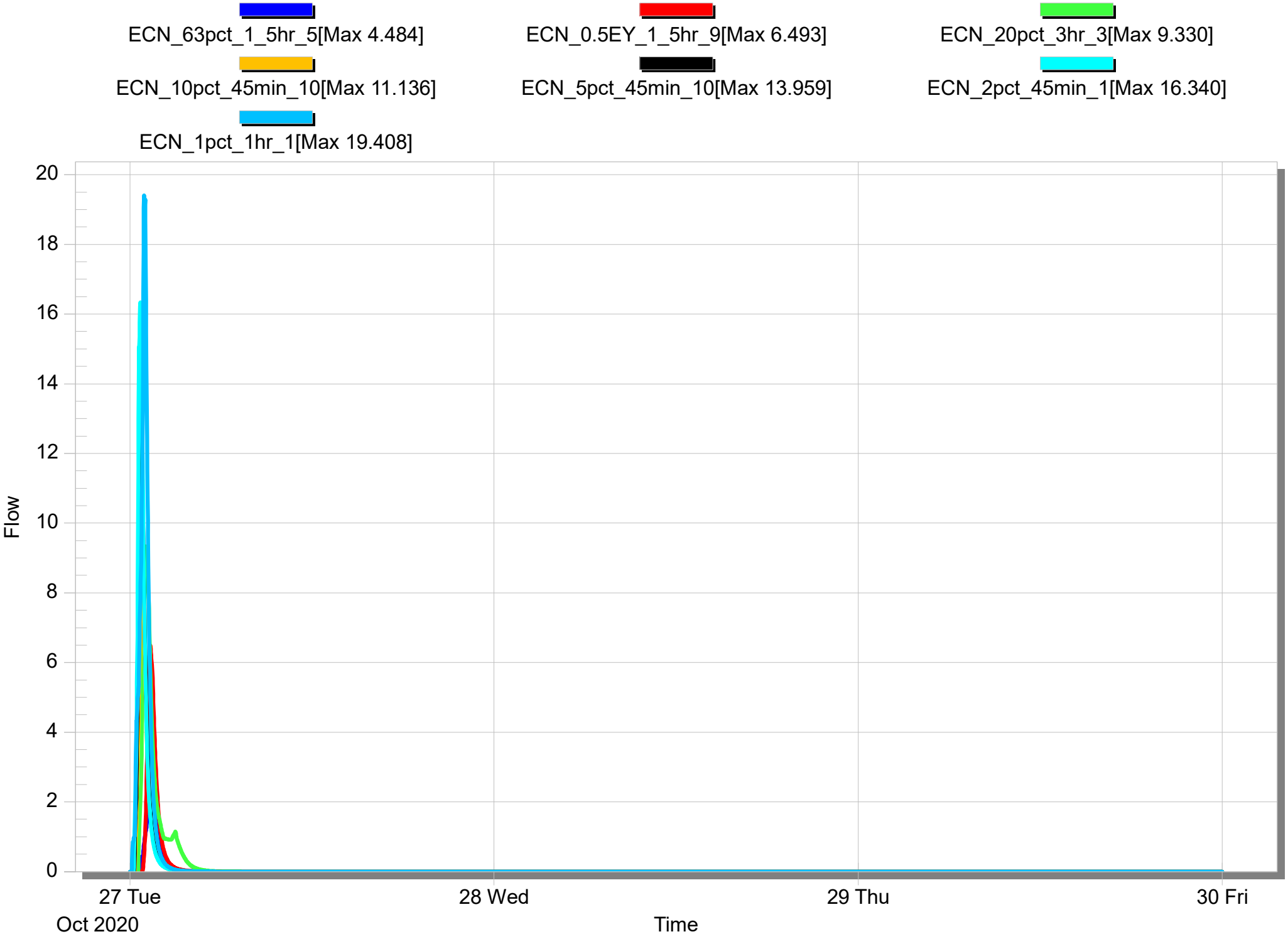
Drawing No: 5941 P STAGE 2 001 G
Revision No:

Appendix K – Pre and Post Development Peak Flow Hydrographs

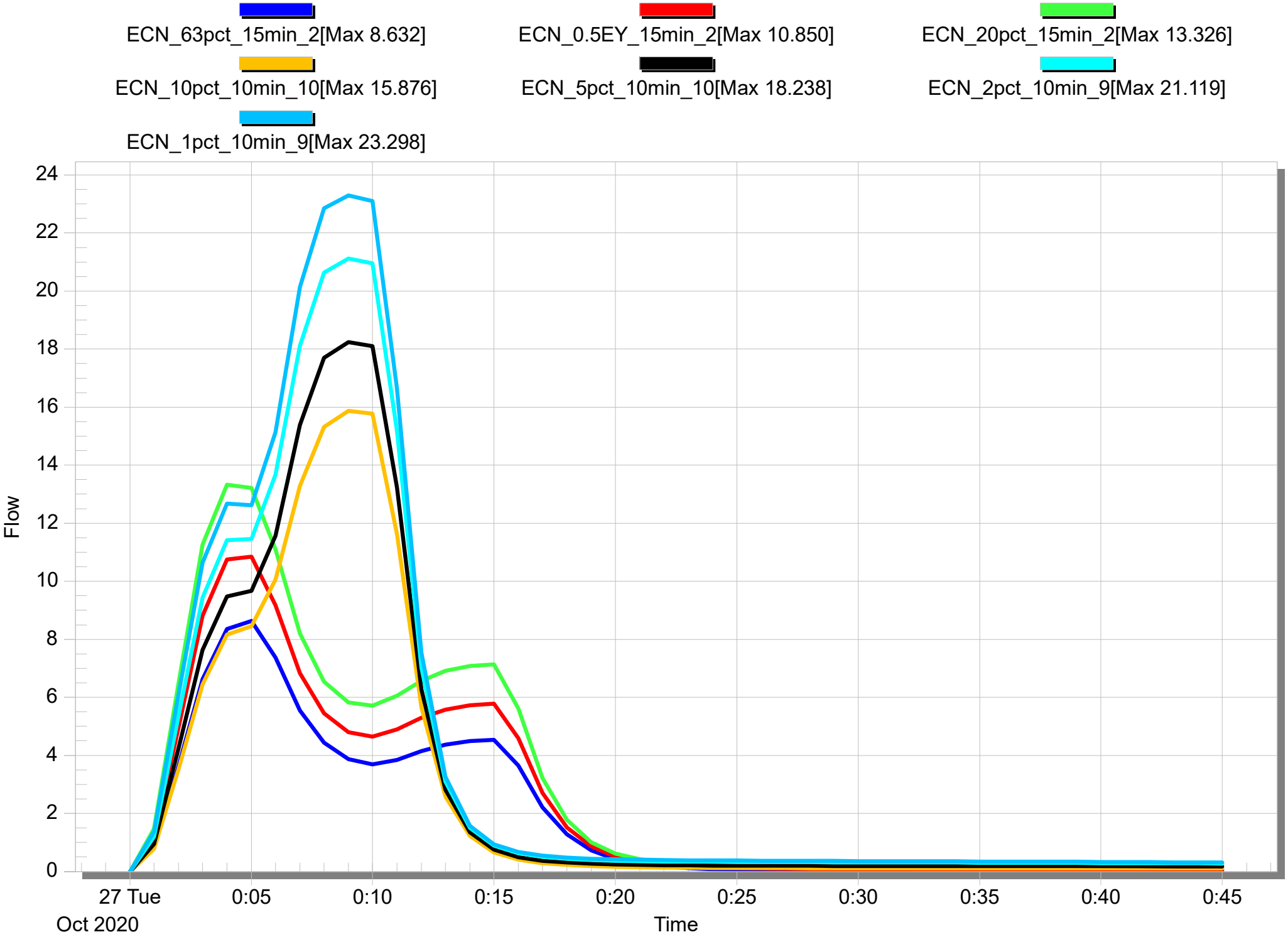
Node - LPOD-EX1 inclu EXT



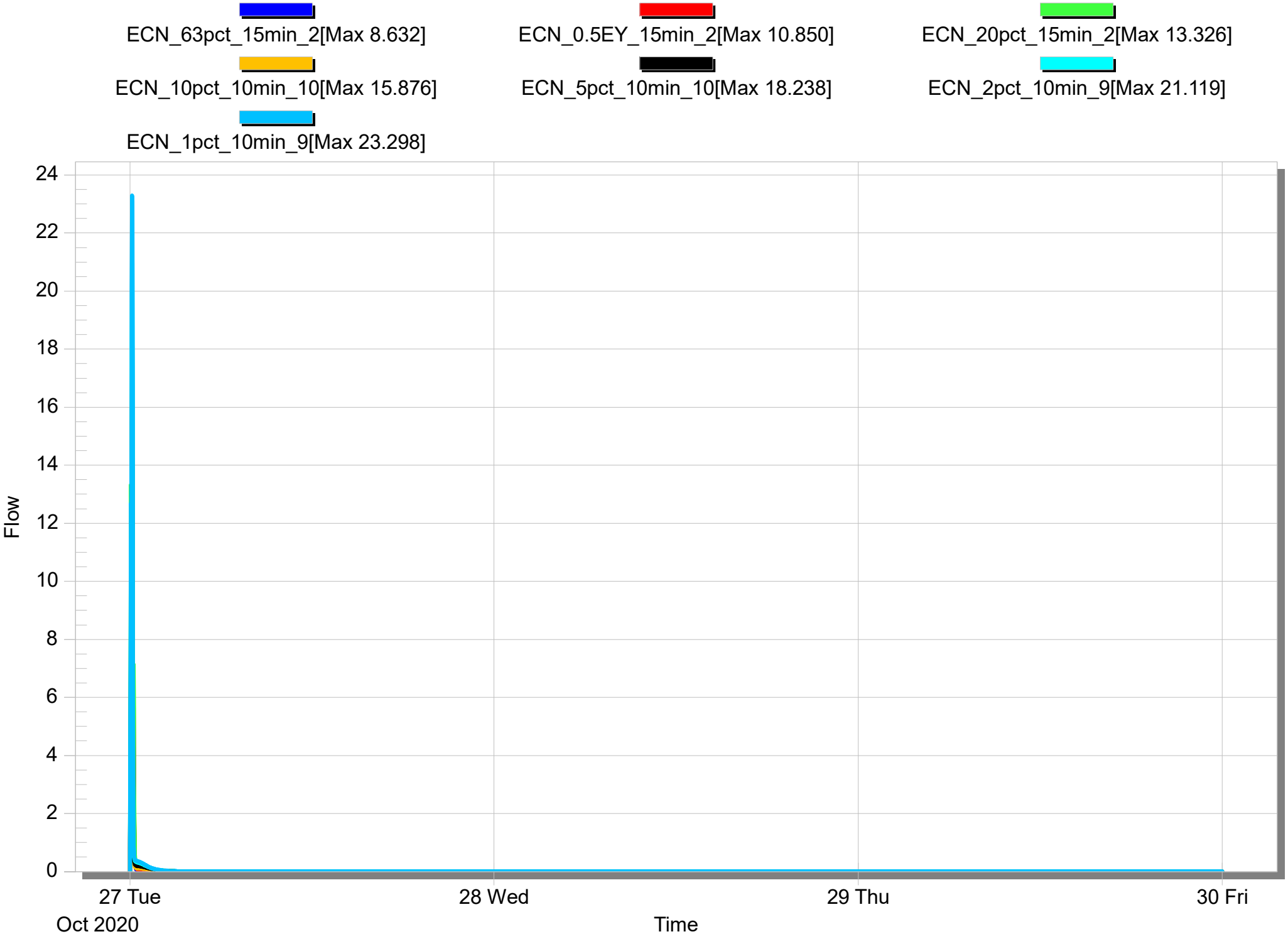
Node - LPOD-EX1 inclu EXT



Node - LPOD-DEV1

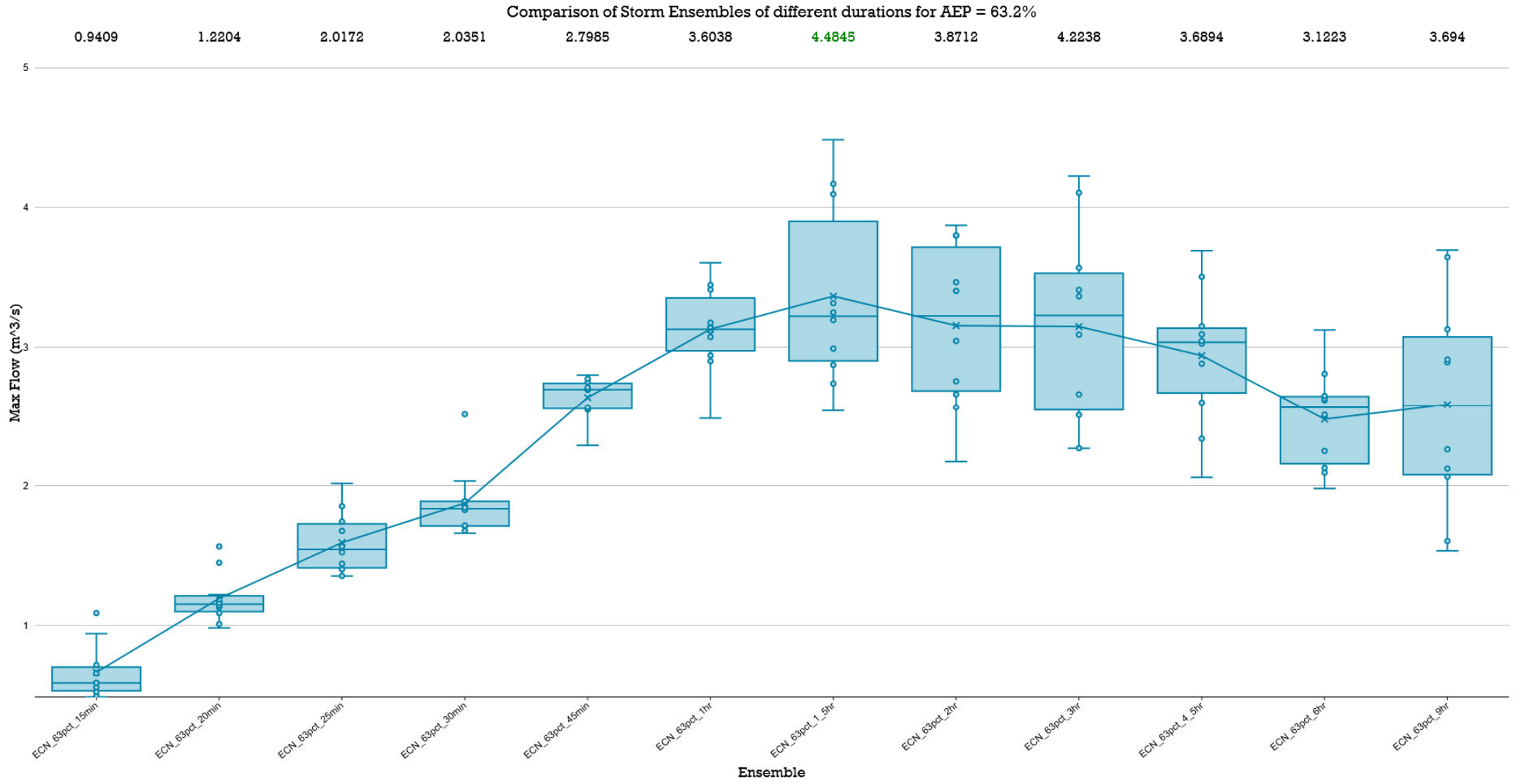


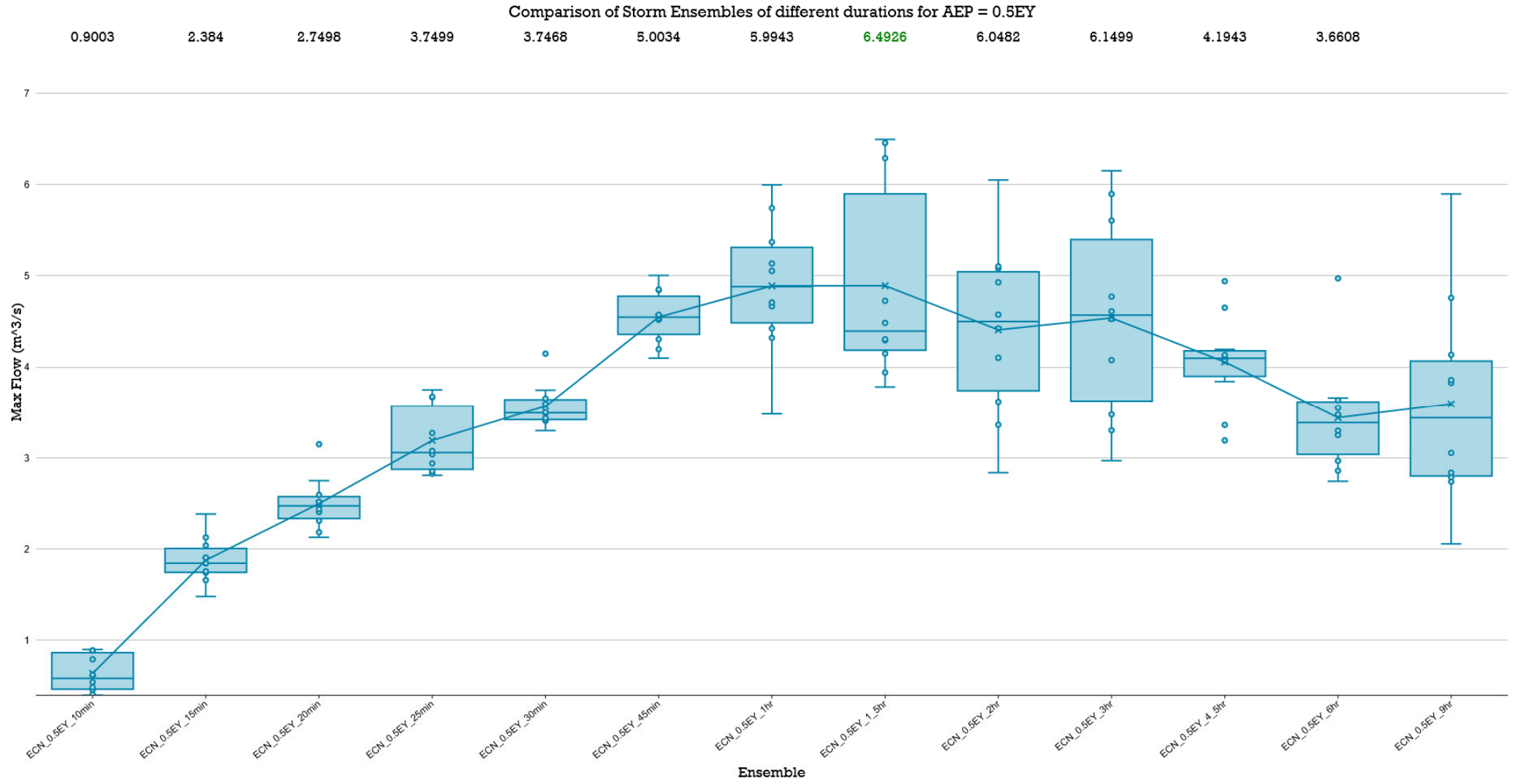
Node - LPOD-DEV1

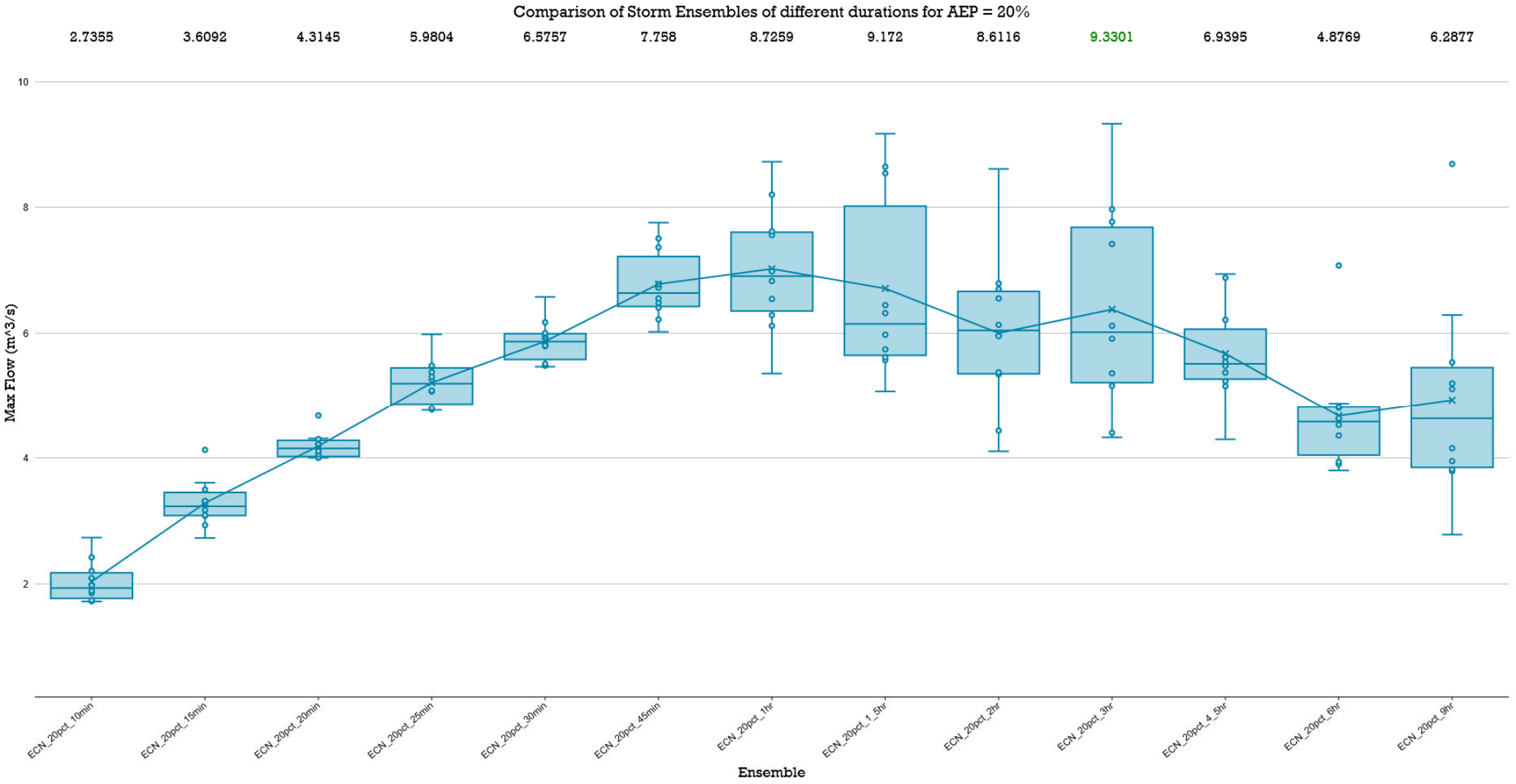


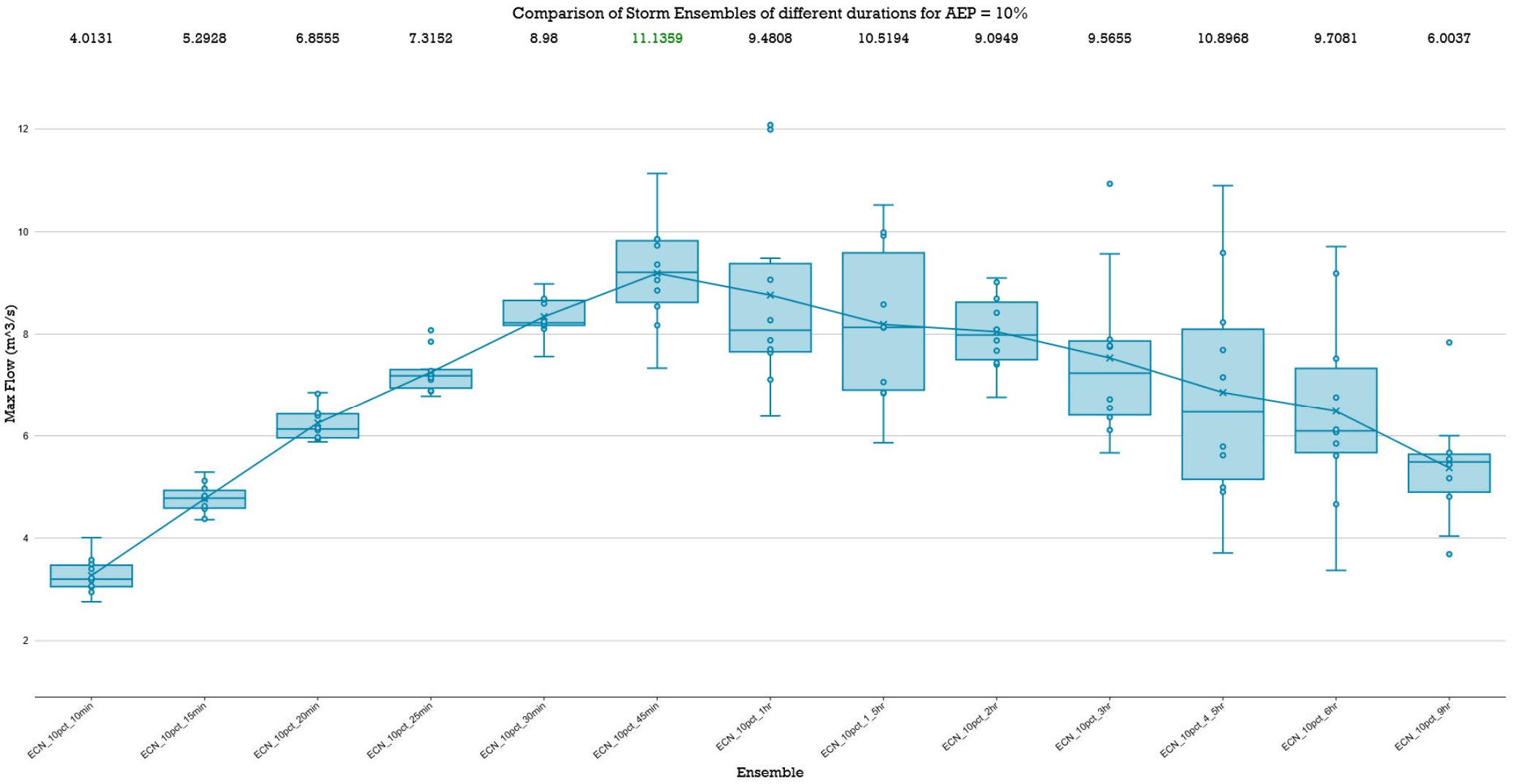
Appendix L – Peak Flow Box & Whisker Plots

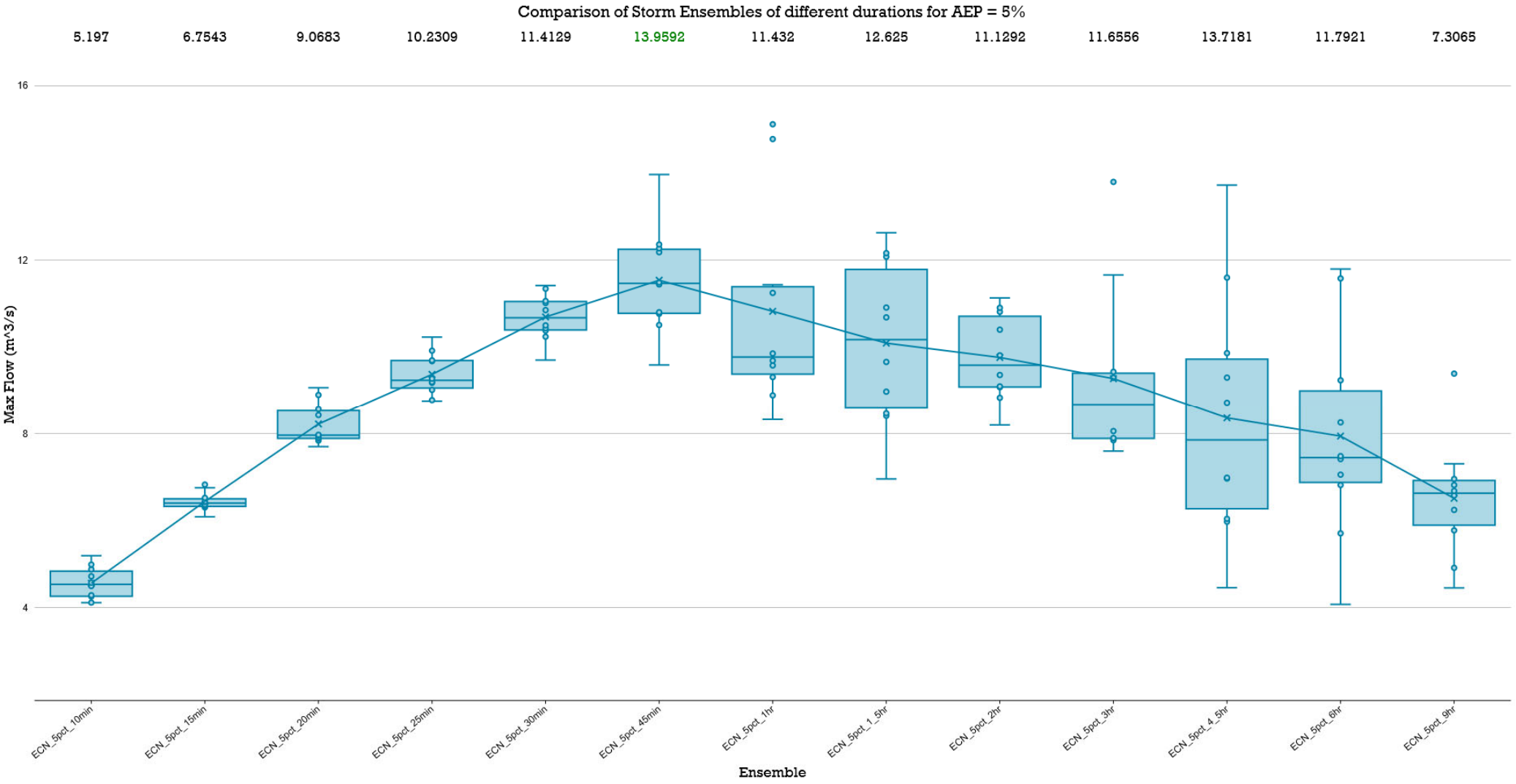
LPoD-1 PRE DEVELOPED ‘MAXIMUM PEAK’ Box & Whisker Plots - *Normal*

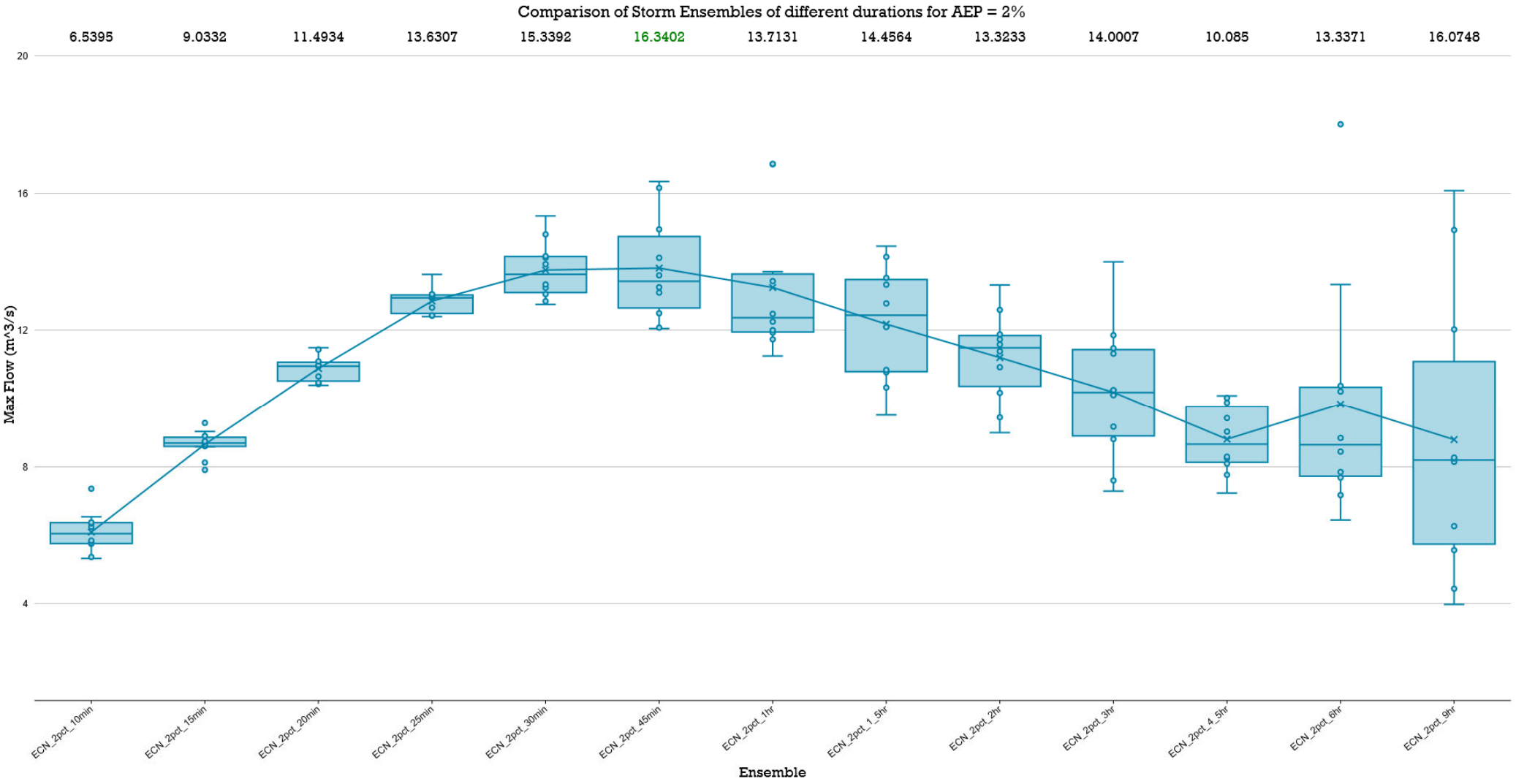

Comparison of Storm Ensembles of different durations for AEP = 63.2%
0.9409
1.2204
2.0172
2.0351
2.7985
3.6038
4.4845
3.8712
4.2238
3.6894
3.1223
3.694
Max Flow (m^3/s)
5
4
3
2
1
ECN_63pct_15min
ECN_63pct_20min
ECN_63pct_25min
ECN_63pct_30min
ECN_63pct_45min
ECN_63pct_1hr
ECN_63pct_1_5hr
ECN_63pct_2hr
ECN_63pct_3hr
ECN_63pct_4_5hr
ECN_63pct_6hr
ECN_63pct_9hr
Ensemble

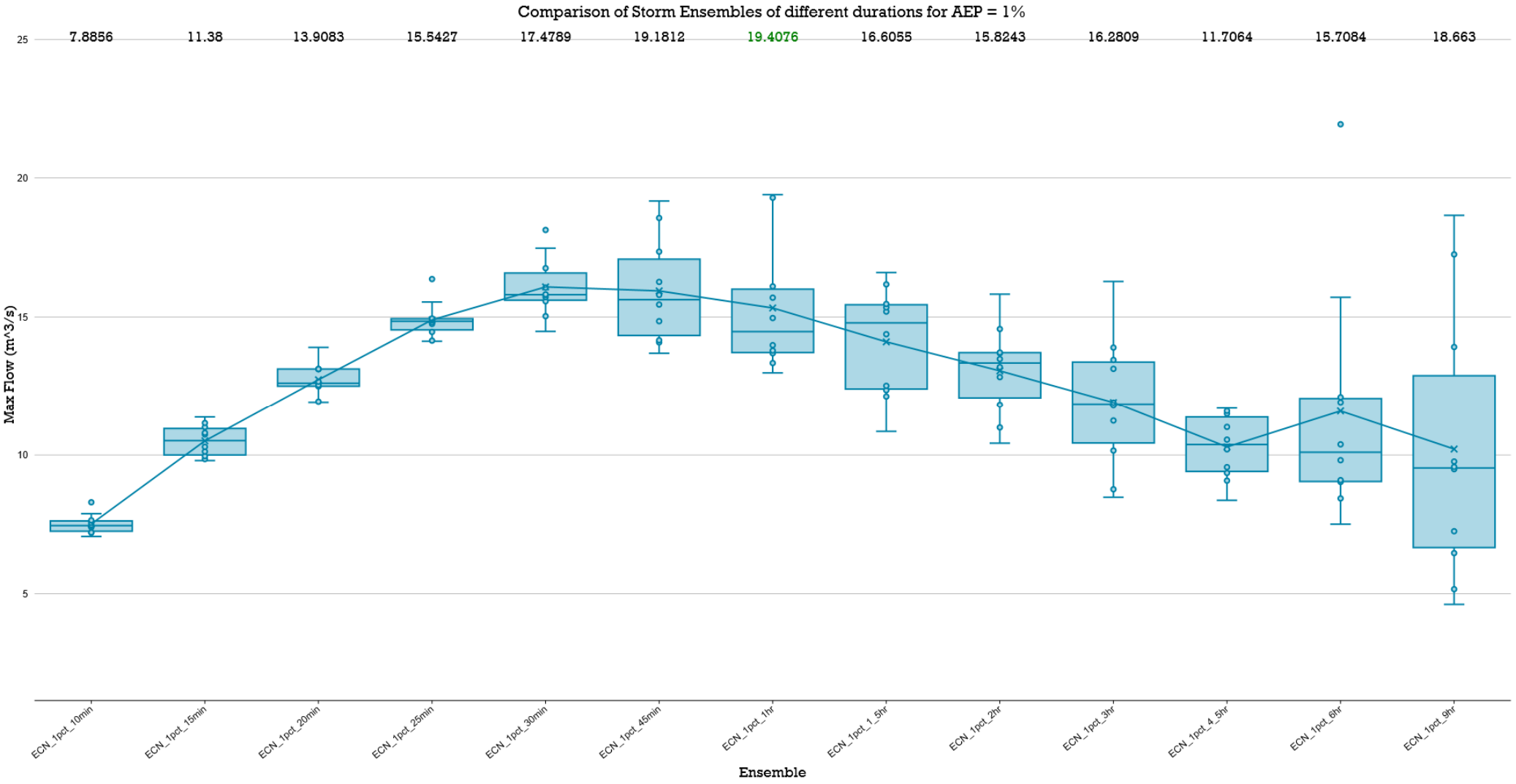

Comparison of Storm Ensembles of different durations for AEP = 0.5EY
0.9003
2.384
2.7498
3.7499
3.7468
5.0034
5.9943
6.4926
6.0482
6.1499
4.1943
3.6608
Max Flow (m^3/s)
Ensemble
ECN_0.5EY_10min
ECN_0.5EY_15min
ECN_0.5EY_20min
ECN_0.5EY_25min
ECN_0.5EY_30min
ECN_0.5EY_45min
ECN_0.5EY_1hr
ECN_0.5EY_1_5hr
ECN_0.5EY_2hr
ECN_0.5EY_3hr
ECN_0.5EY_4_5hr
ECN_0.5EY_6hr
ECN_0.5EY_9hr


Comparison of Storm Ensembles of different durations for AEP = 20%
2.7355
3.6092
4.3145
5.9804
6.5757
7.758
8.7259
9.172
8.6116
9.3301
6.9395
4.8769
6.2877
Max Flow (m^3/s)
10
8
6
4
2
ECN_20pct_10min
ECN_20pct_15min
ECN_20pct_20min
ECN_20pct_25min
ECN_20pct_30min
ECN_20pct_45min
ECN_20pct_1hr
ECN_20pct_1_5hr
ECN_20pct_2hr
ECN_20pct_3hr
ECN_20pct_4_5hr
ECN_20pct_6hr
ECN_20pct_9hr
Ensemble

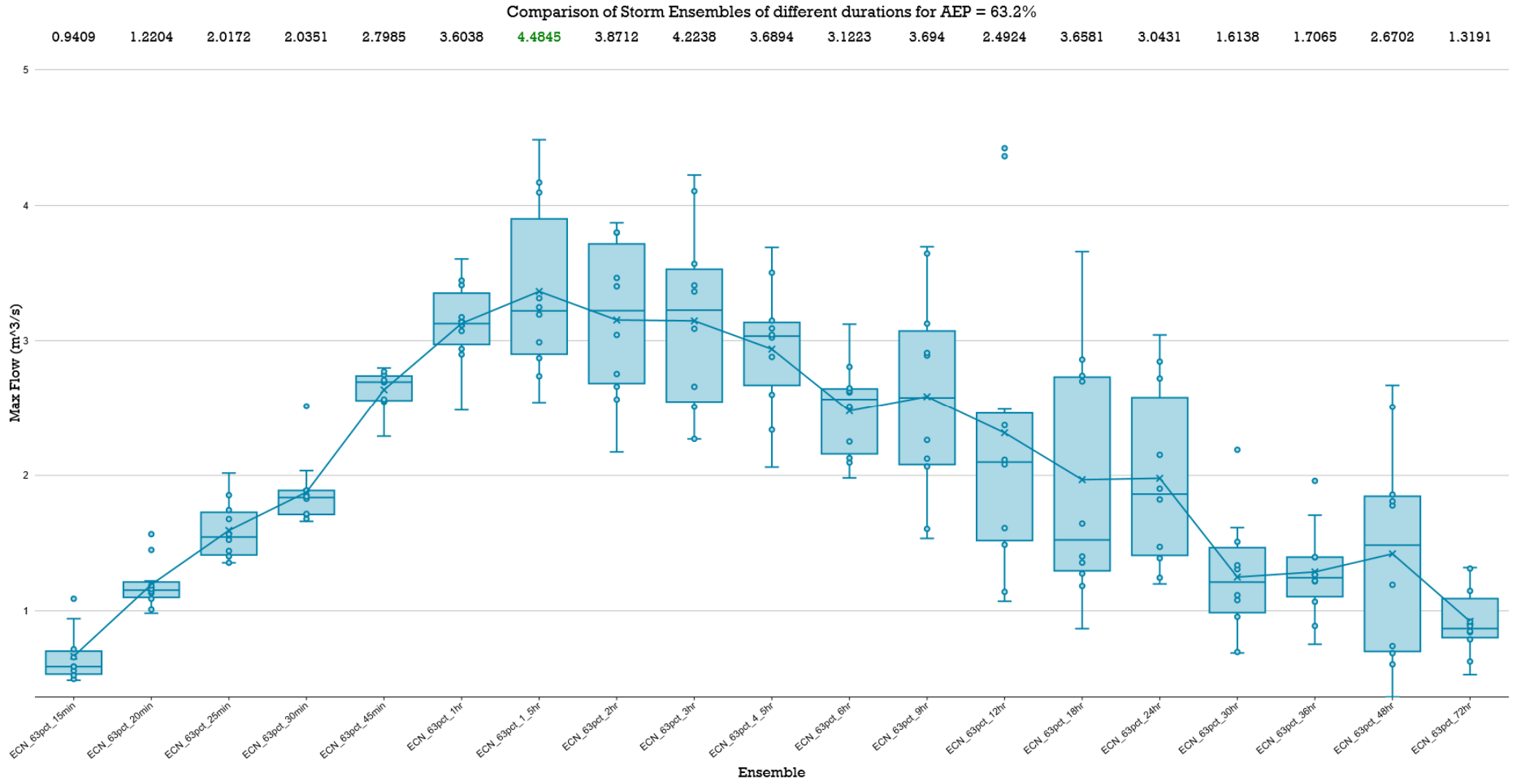

Comparison of Storm Ensembles of different durations for AEP = 10%
4.0131
5.2928
6.8555
7.3152
8.98
11.1359
9.4808
10.5194
9.0949
9.5655
10.8968
9.7081
6.0037
Max Flow (m^3/s)
12
10
8
6
4
2
ECN_10pct_10min
ECN_10pct_15min
ECN_10pct_20min
ECN_10pct_25min
ECN_10pct_30min
ECN_10pct_45min
ECN_10pct_1hr
ECN_10pct_1_5hr
ECN_10pct_2hr
ECN_10pct_3hr
ECN_10pct_4_5hr
ECN_10pct_6hr
ECN_10pct_9hr
Ensemble

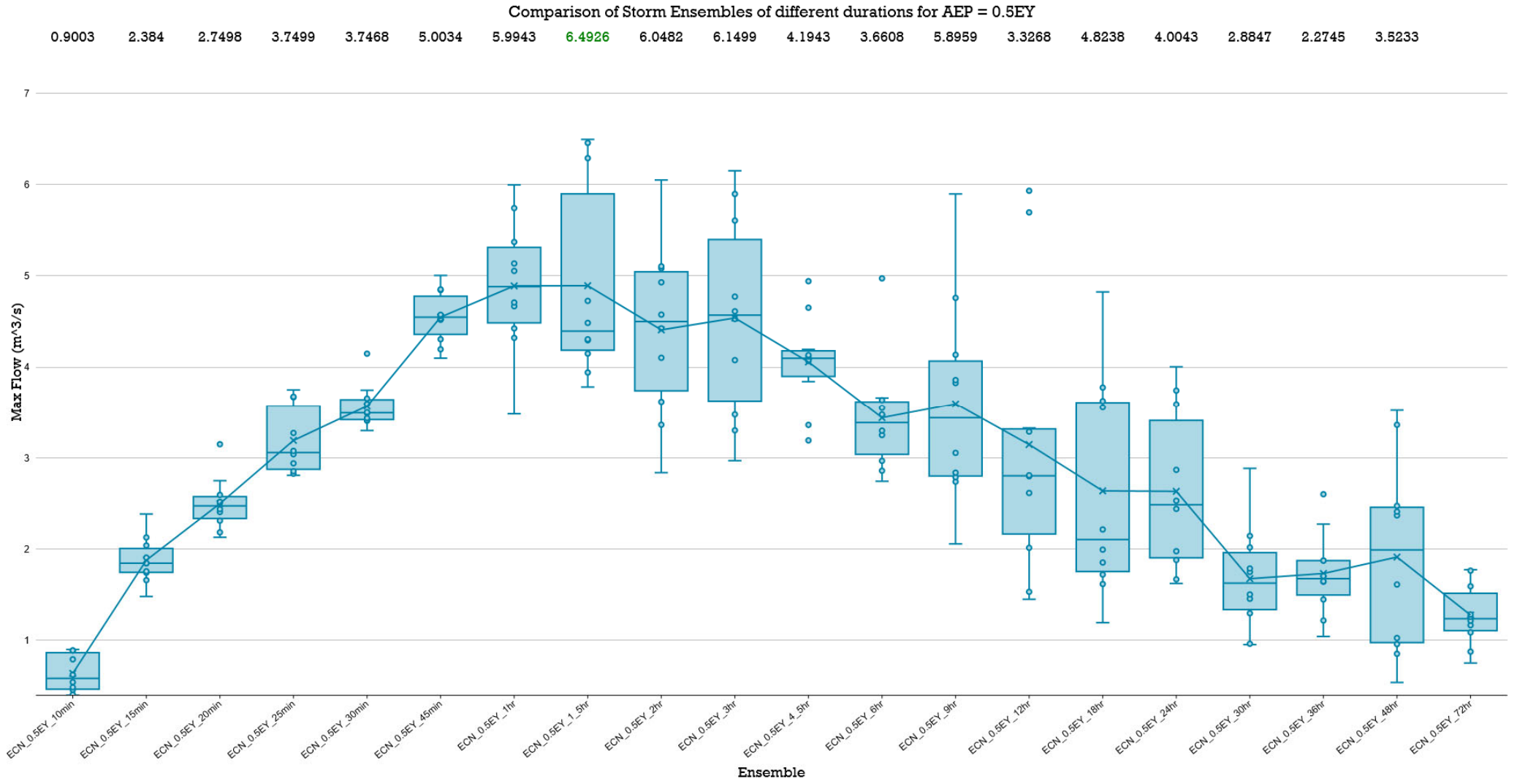

Comparison of Storm Ensembles of different durations for AEP = 5%
5.197
6.7543
9.0683
10.2309
11.4129
13.9592
11.432
12.625
11.1292
11.6556
13.7181
11.7921
7.3065
16
12
8
4
Max Flow (m^3/s)
ECN_5pct_10min
ECN_5pct_15min
ECN_5pct_20min
ECN_5pct_25min
ECN_5pct_30min
ECN_5pct_45min
ECN_5pct_1hr
ECN_5pct_1_5hr
ECN_5pct_2hr
ECN_5pct_3hr
ECN_5pct_4_5hr
ECN_5pct_6hr
ECN_5pct_9hr
Ensemble


Comparison of Storm Ensembles of different durations for AEP = 2%
6.5395
9.0332
11.4934
13.6307
15.3392
16.3402
13.7131
14.4564
13.3233
14.0007
10.085
13.3371
16.0748
20
16
12
8
4
Max Flow (m^3/s)
ECN_2pct_10min
ECN_2pct_15min
ECN_2pct_20min
ECN_2pct_25min
ECN_2pct_30min
ECN_2pct_45min
ECN_2pct_1hr
ECN_2pct_1_5hr
ECN_2pct_2hr
ECN_2pct_3hr
ECN_2pct_4_5hr
ECN_2pct_6hr
ECN_2pct_9hr
Ensemble


Comparison of Storm Ensembles of different durations for AEP = 1%
7.8856
11.38
13.9083
15.5427
17.4789
19.1812
19.4076
16.6055
15.8243
16.2809
11.7064
15.7084
18.663
25
20
15
10
5
Max Flow (m^3/s)
ECN_1pct_10min
ECN_1pct_15min
ECN_1pct_20min
ECN_1pct_25min
ECN_1pct_30min
ECN_1pct_45min
ECN_1pct_1hr
ECN_1pct_1_5hr
ECN_1pct_2hr
ECN_1pct_3hr
ECN_1pct_4_5hr
ECN_1pct_6hr
ECN_1pct_9hr
Ensemble

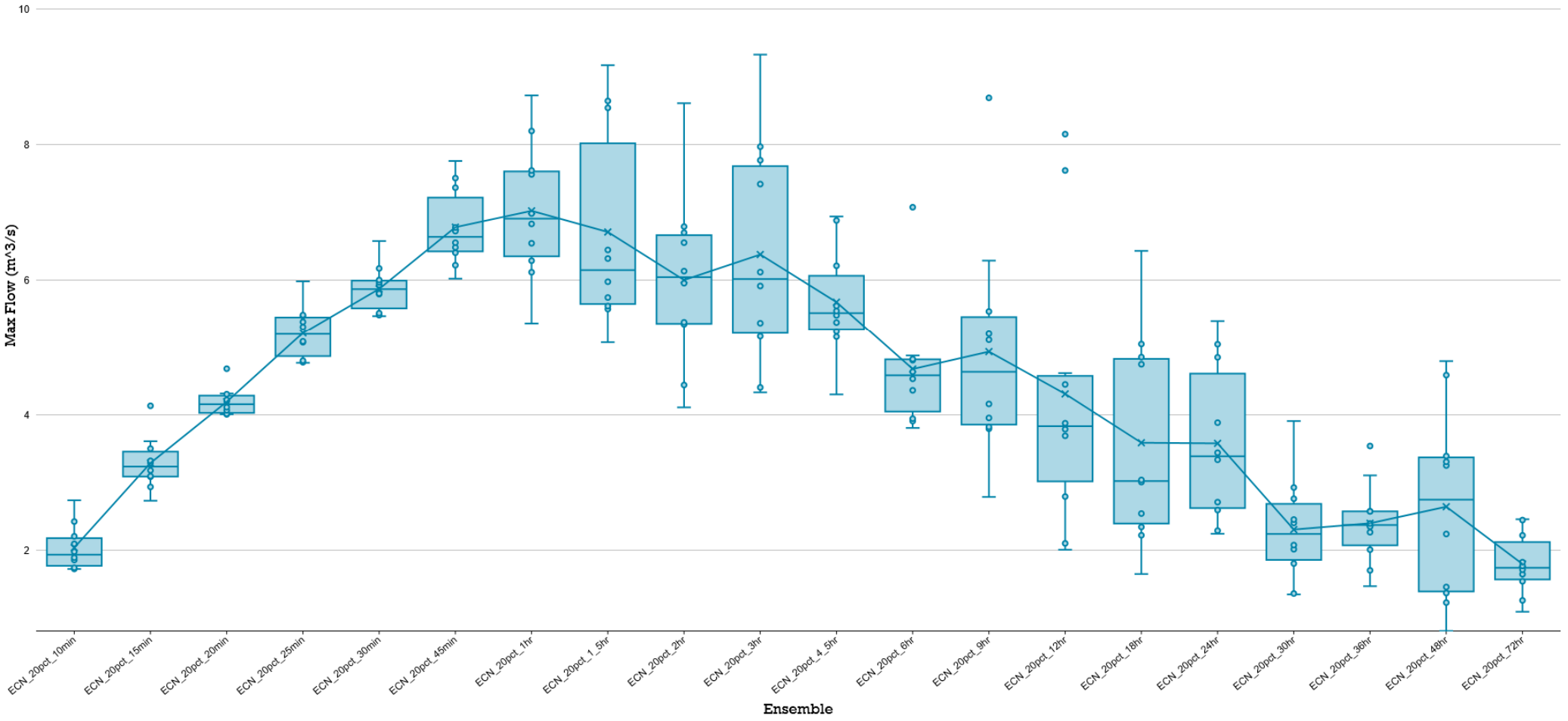
LPoD-1 PRE DEVELOPED ‘MAXIMUM PEAK’ Box & Whisker Plots – *72 Hour*

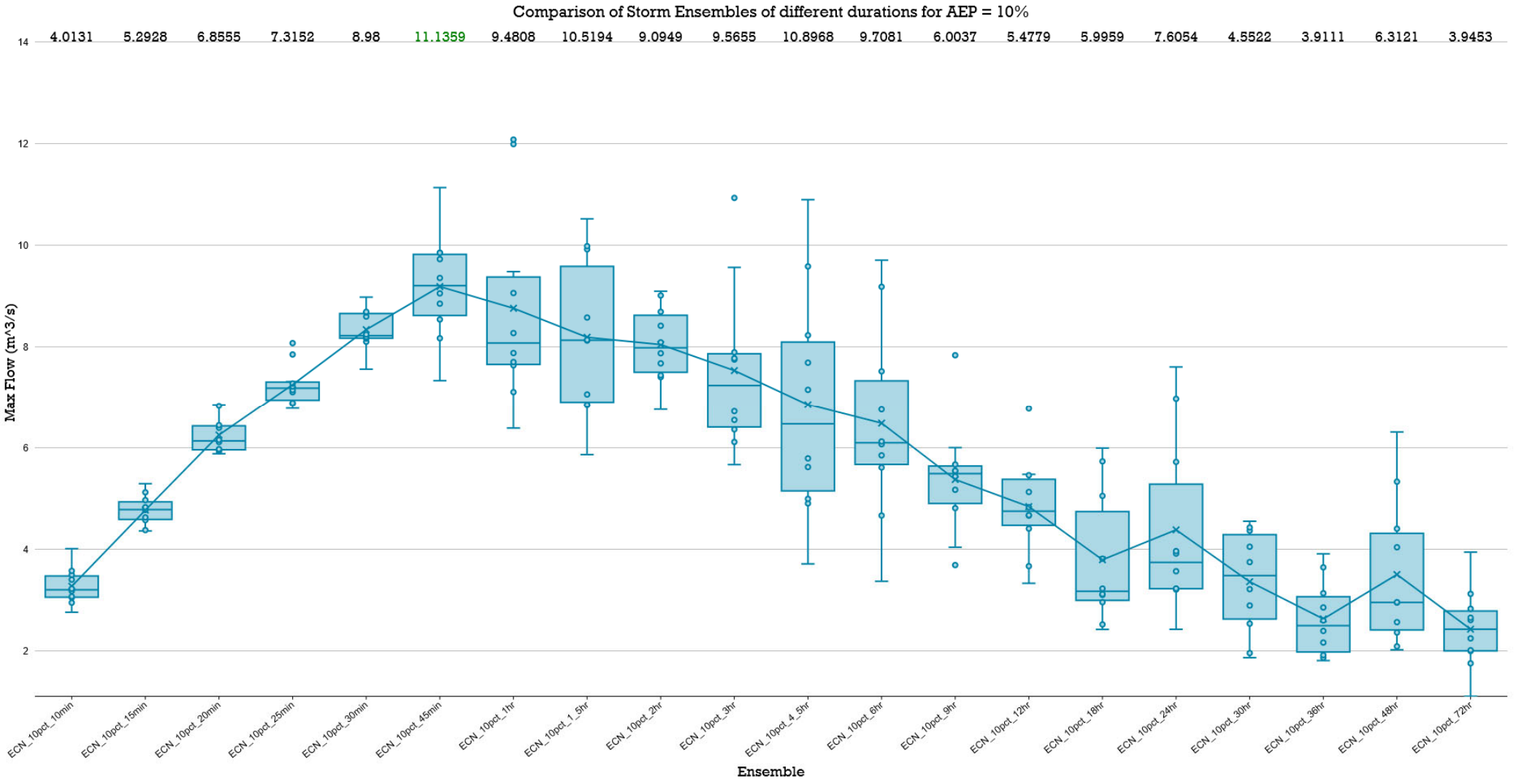

Comparison of Storm Ensembles of different durations for AEP = 63.2%
0.9409
1.2204
2.0172
2.0351
2.7985
3.6038
4.4845
3.8712
4.2238
3.6894
3.1223
3.694
2.4924
3.6581
3.0431
1.6138
1.7065
2.6702
1.3191
Max Flow (m^3/s)
5
4
3
2
1
ECN_63pct_15min
ECN_63pct_20min
ECN_63pct_25min
ECN_63pct_30min
ECN_63pct_45min
ECN_63pct_1hr
ECN_63pct_1_5hr
ECN_63pct_2hr
ECN_63pct_3hr
ECN_63pct_4_5hr
ECN_63pct_6hr
ECN_63pct_9hr
ECN_63pct_12hr
ECN_63pct_18hr
ECN_63pct_24hr
ECN_63pct_30hr
ECN_63pct_36hr
ECN_63pct_48hr
ECN_63pct_72hr
Ensemble

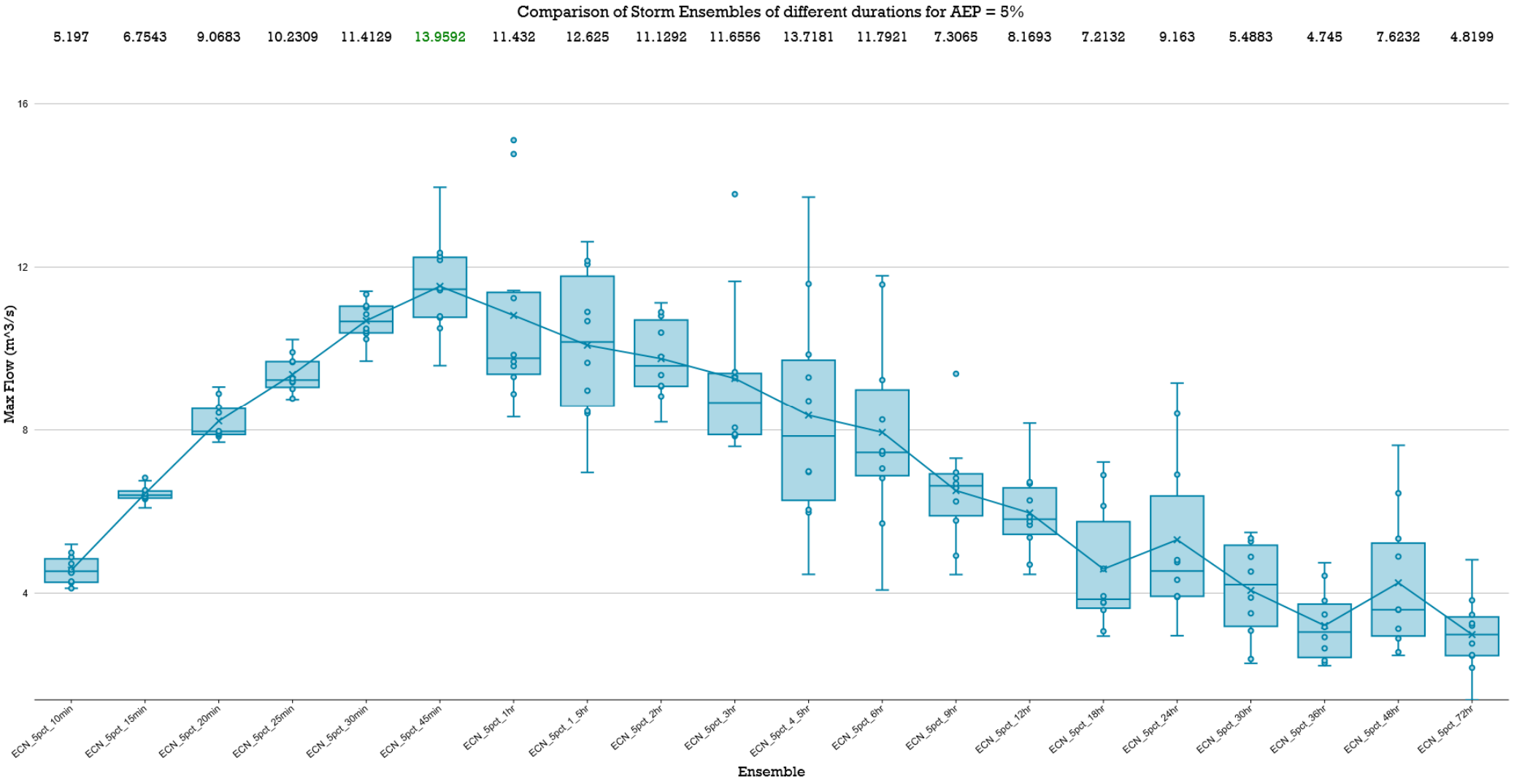

Comparison of Storm Ensembles of different durations for AEP = 0.5EY
0.9003 2.384 2.7498 3.7499 3.7468 5.0034 5.9943 6.4926 6.0482 6.1499 4.1943 3.6608 5.8959 3.3268 4.8238 4.0043 2.8847 2.2745 3.5233
Max Flow (m^3/s)
7
6
5
4
3
2
1
ECN_0.5EY_10min
ECN_0.5EY_15min
ECN_0.5EY_20min
ECN_0.5EY_25min
ECN_0.5EY_30min
ECN_0.5EY_45min
ECN_0.5EY_1hr
ECN_0.5EY_1_5hr
ECN_0.5EY_2hr
ECN_0.5EY_3hr
ECN_0.5EY_4_5hr
ECN_0.5EY_6hr
ECN_0.5EY_9hr
ECN_0.5EY_12hr
ECN_0.5EY_18hr
ECN_0.5EY_24hr
ECN_0.5EY_30hr
ECN_0.5EY_36hr
ECN_0.5EY_48hr
ECN_0.5EY_72hr
Ensemble

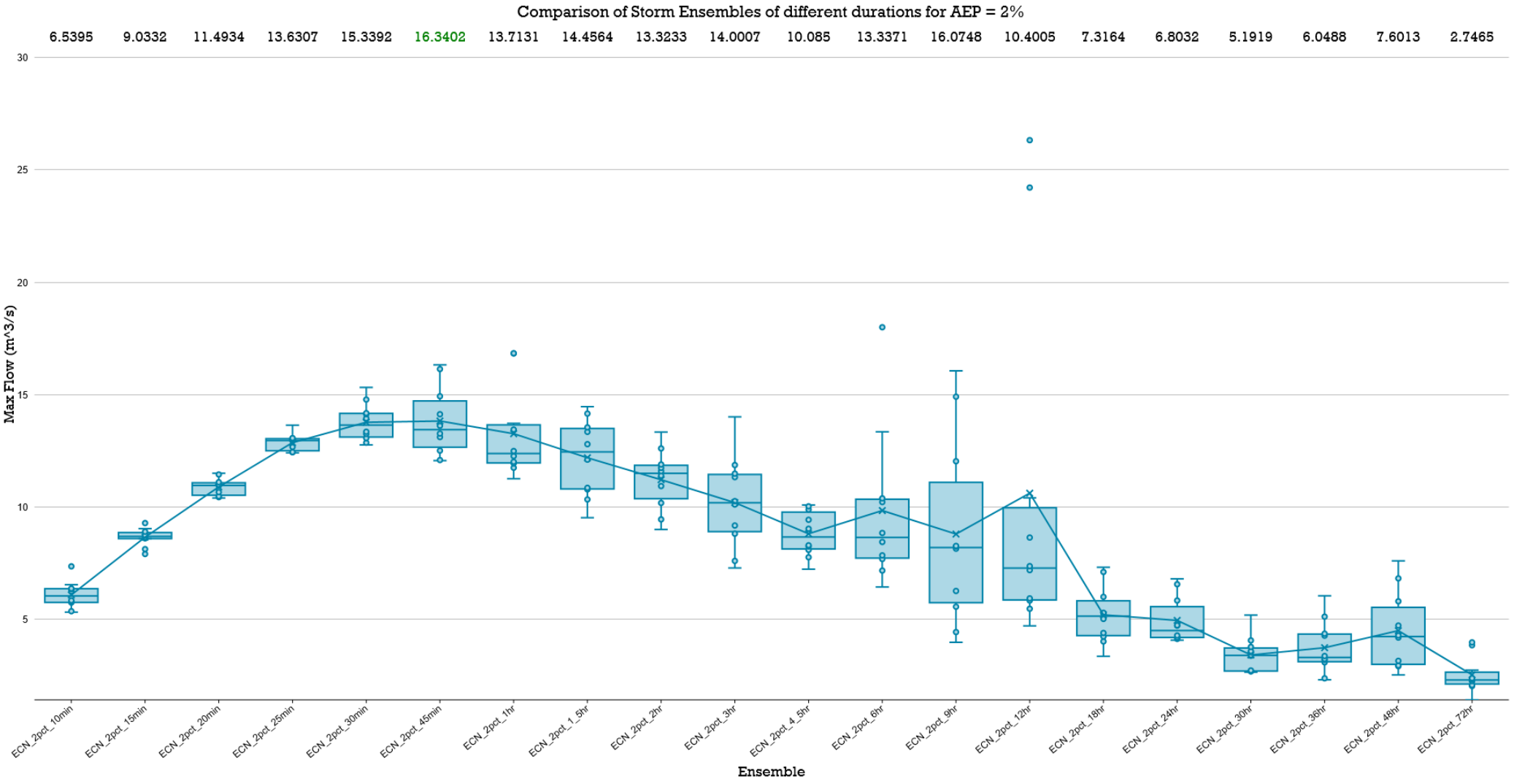
Comparison of Storm Ensembles of different durations for AEP = 20%

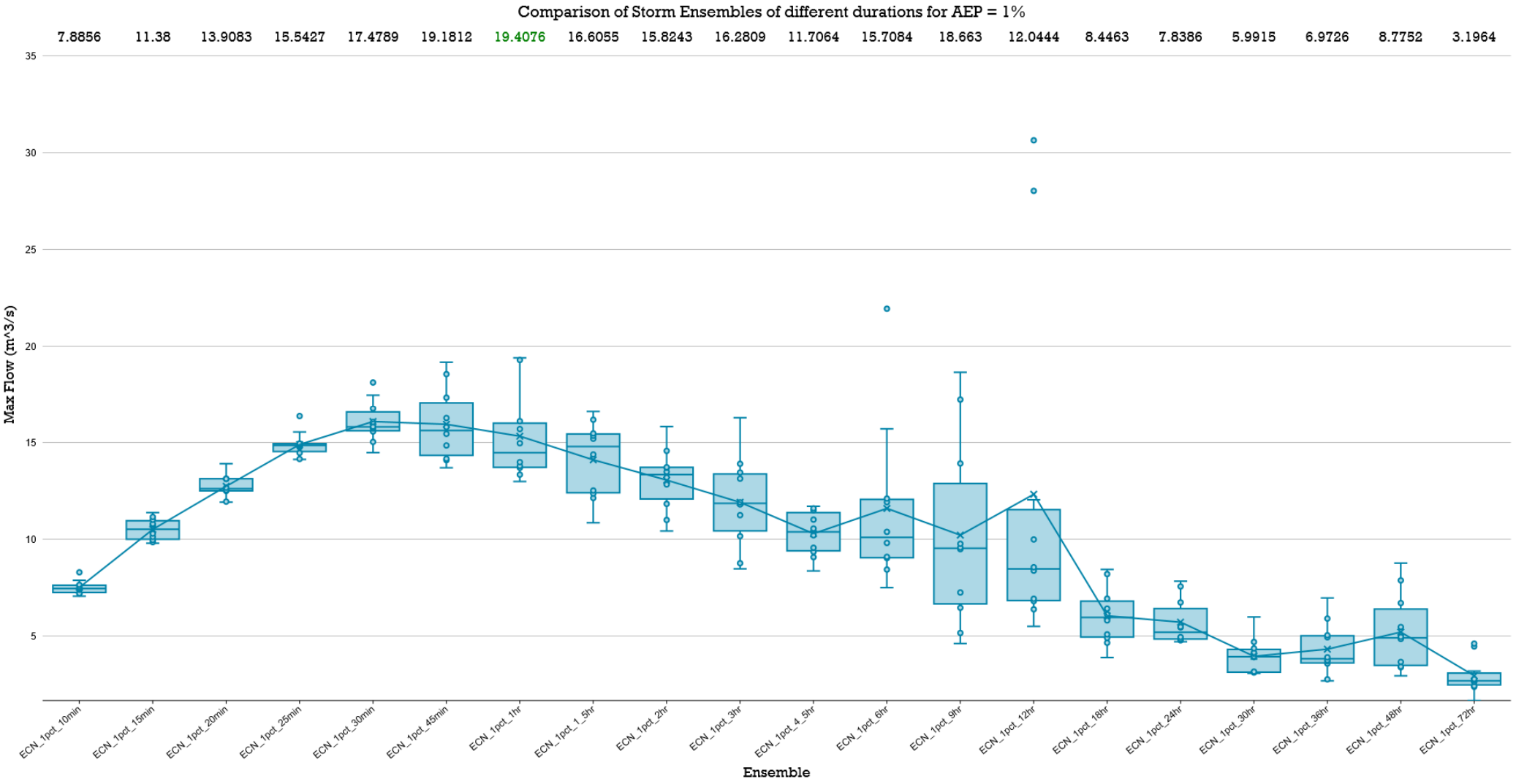
2.7355	3.6092	4.3145	5.9804	6.5757	7.758	8.7259	9.172	8.6116	9.3301	6.9395	4.8769	6.2877	4.6154	6.4322	5.3932	3.9068	3.1035	4.7926	2.4561



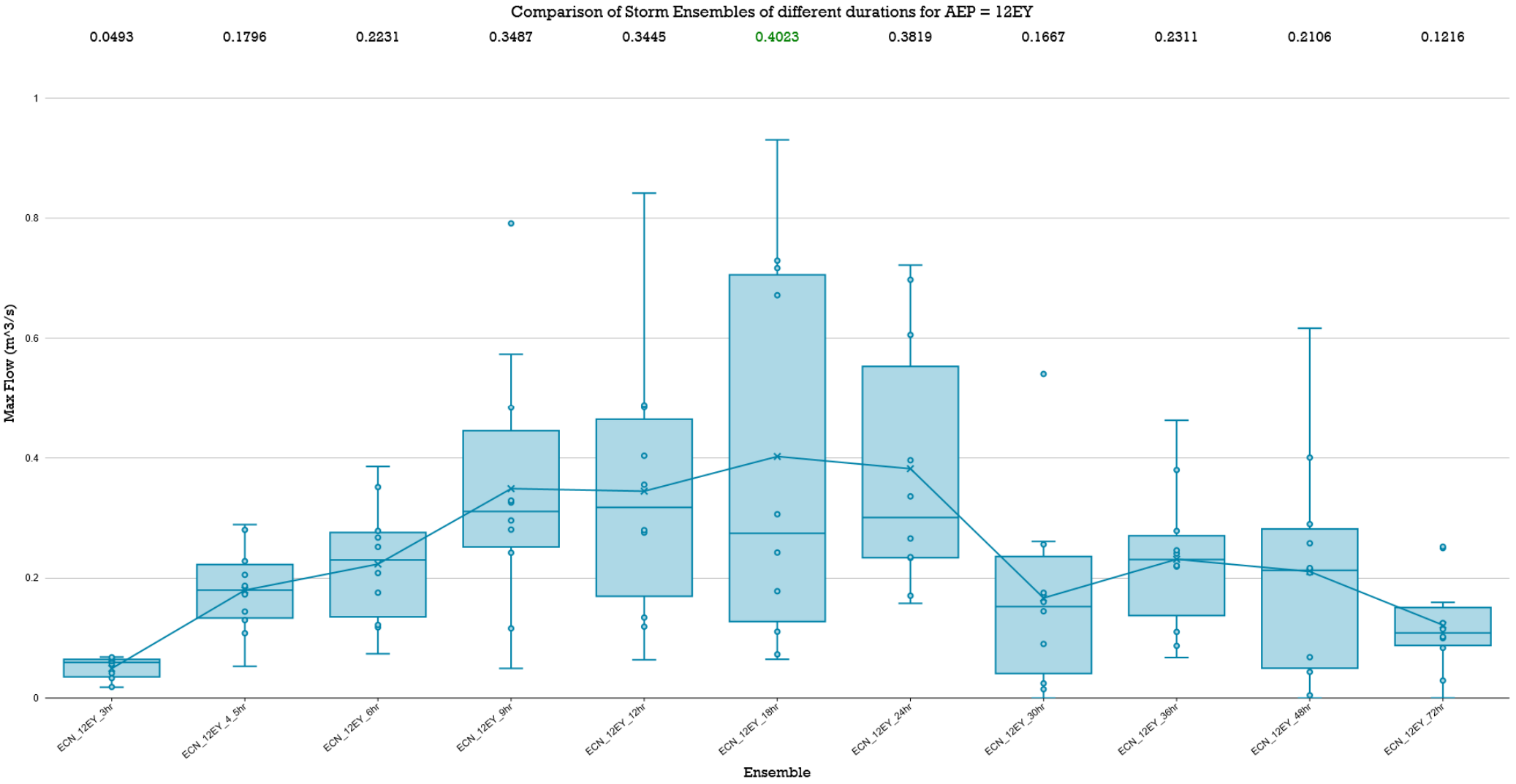

Comparison of Storm Ensembles of different durations for AEP = 10%
4.0131
5.2928
6.8555
7.3152
8.98
11.1359
9.4808
10.5194
9.0949
9.5655
10.8968
9.7081
6.0037
5.4779
5.9959
7.6054
4.5522
3.9111
6.3121
3.9453
Max Flow (m^3/s)
14
12
10
8
6
4
2
ECN_10pct_10min
ECN_10pct_15min
ECN_10pct_20min
ECN_10pct_25min
ECN_10pct_30min
ECN_10pct_45min
ECN_10pct_1hr
ECN_10pct_1_5hr
ECN_10pct_2hr
ECN_10pct_3hr
ECN_10pct_4_5hr
ECN_10pct_6hr
ECN_10pct_9hr
ECN_10pct_12hr
ECN_10pct_18hr
ECN_10pct_24hr
ECN_10pct_30hr
ECN_10pct_36hr
ECN_10pct_48hr
ECN_10pct_72hr
Ensemble

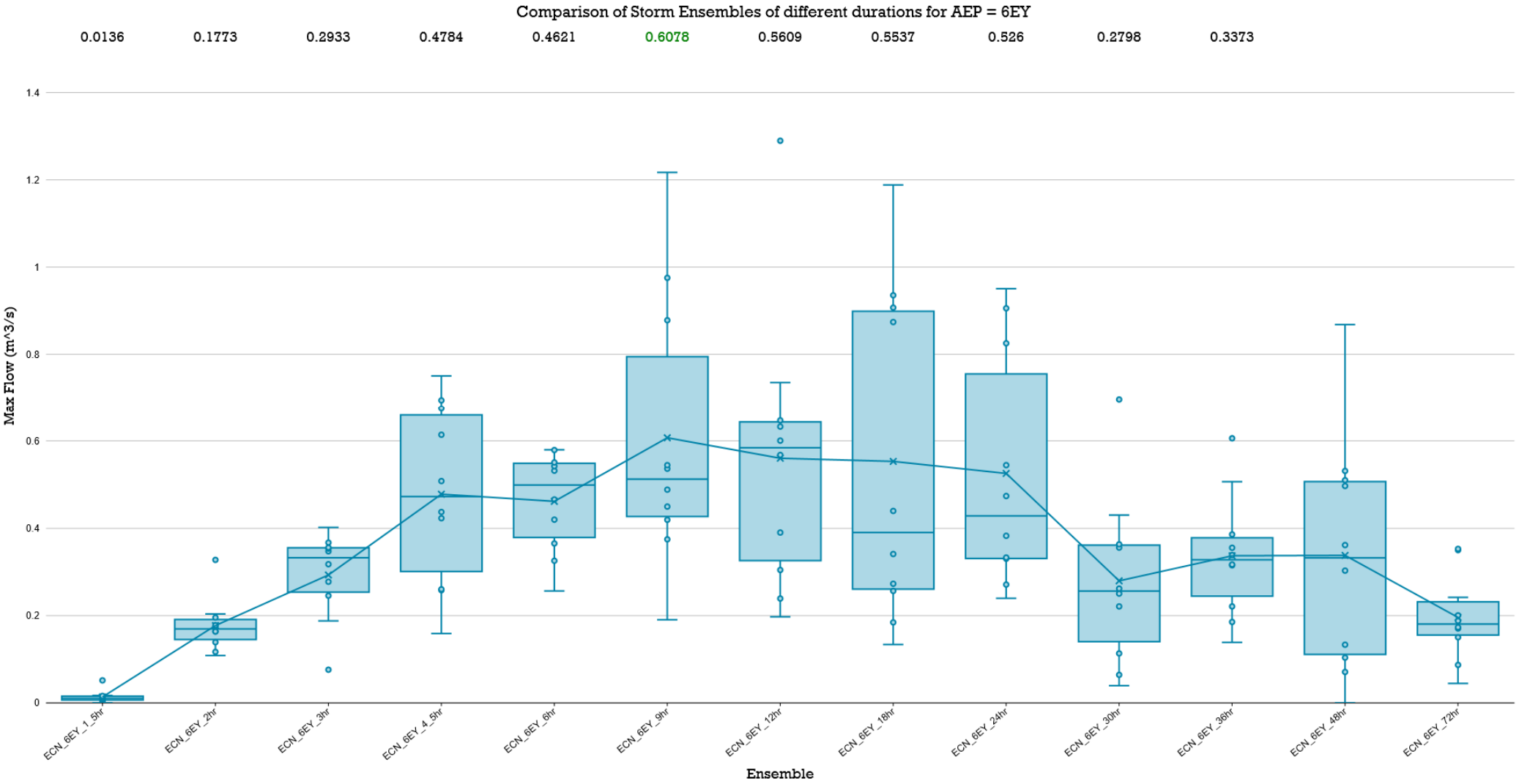

Comparison of Storm Ensembles of different durations for AEP = 5%
5.197 6.7543 9.0683 10.2309 11.4129 13.9592 11.432 12.625 11.1292 11.6556 13.7181 11.7921 7.3065 8.1693 7.2132 9.163 5.4883 4.745 7.6232 4.8199
16
12
8
4
Max Flow (m^3/s)
ECN_5pct_10min
ECN_5pct_15min
ECN_5pct_20min
ECN_5pct_25min
ECN_5pct_30min
ECN_5pct_45min
ECN_5pct_1hr
ECN_5pct_1_5hr
ECN_5pct_2hr
ECN_5pct_3hr
ECN_5pct_4_5hr
ECN_5pct_6hr
ECN_5pct_9hr
ECN_5pct_12hr
ECN_5pct_18hr
ECN_5pct_24hr
ECN_5pct_30hr
ECN_5pct_36hr
ECN_5pct_48hr
ECN_5pct_72hr
Ensemble

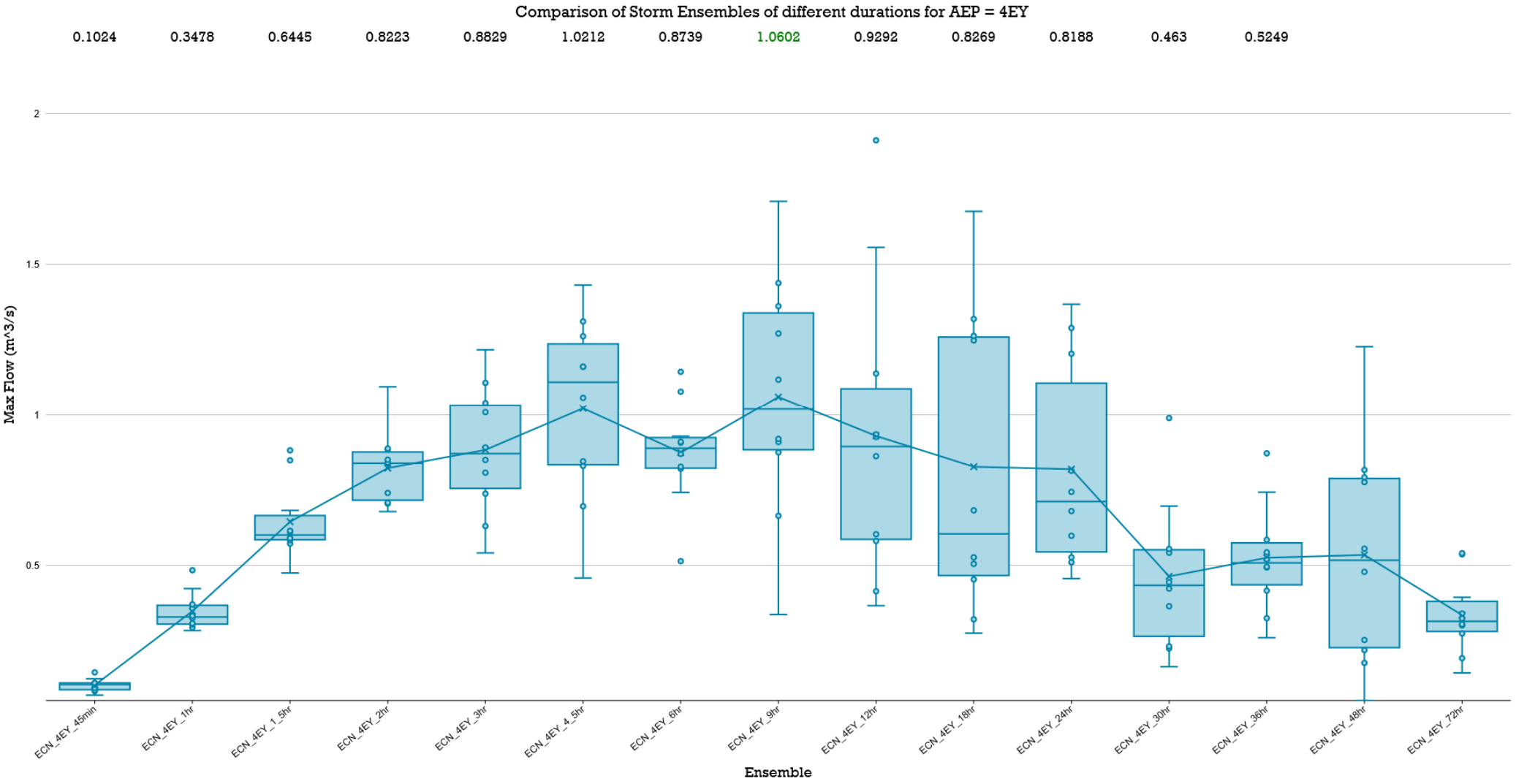

Comparison of Storm Ensembles of different durations for AEP = 2%
6.5395
9.0332
11.4934
13.6307
15.3392
16.3402
13.7131
14.4564
13.3233
14.0007
10.085
13.3371
16.0748
10.4005
7.3164
6.8032
5.1919
6.0488
7.6013
2.7465
Max Flow (m^3/s)
30
25
20
15
10
5
ECN_2pct_10min
ECN_2pct_15min
ECN_2pct_20min
ECN_2pct_25min
ECN_2pct_30min
ECN_2pct_45min
ECN_2pct_1hr
ECN_2pct_1_5hr
ECN_2pct_2hr
ECN_2pct_3hr
ECN_2pct_4_5hr
ECN_2pct_6hr
ECN_2pct_9hr
ECN_2pct_12hr
ECN_2pct_18hr
ECN_2pct_24hr
ECN_2pct_30hr
ECN_2pct_36hr
ECN_2pct_48hr
ECN_2pct_72hr
Ensemble

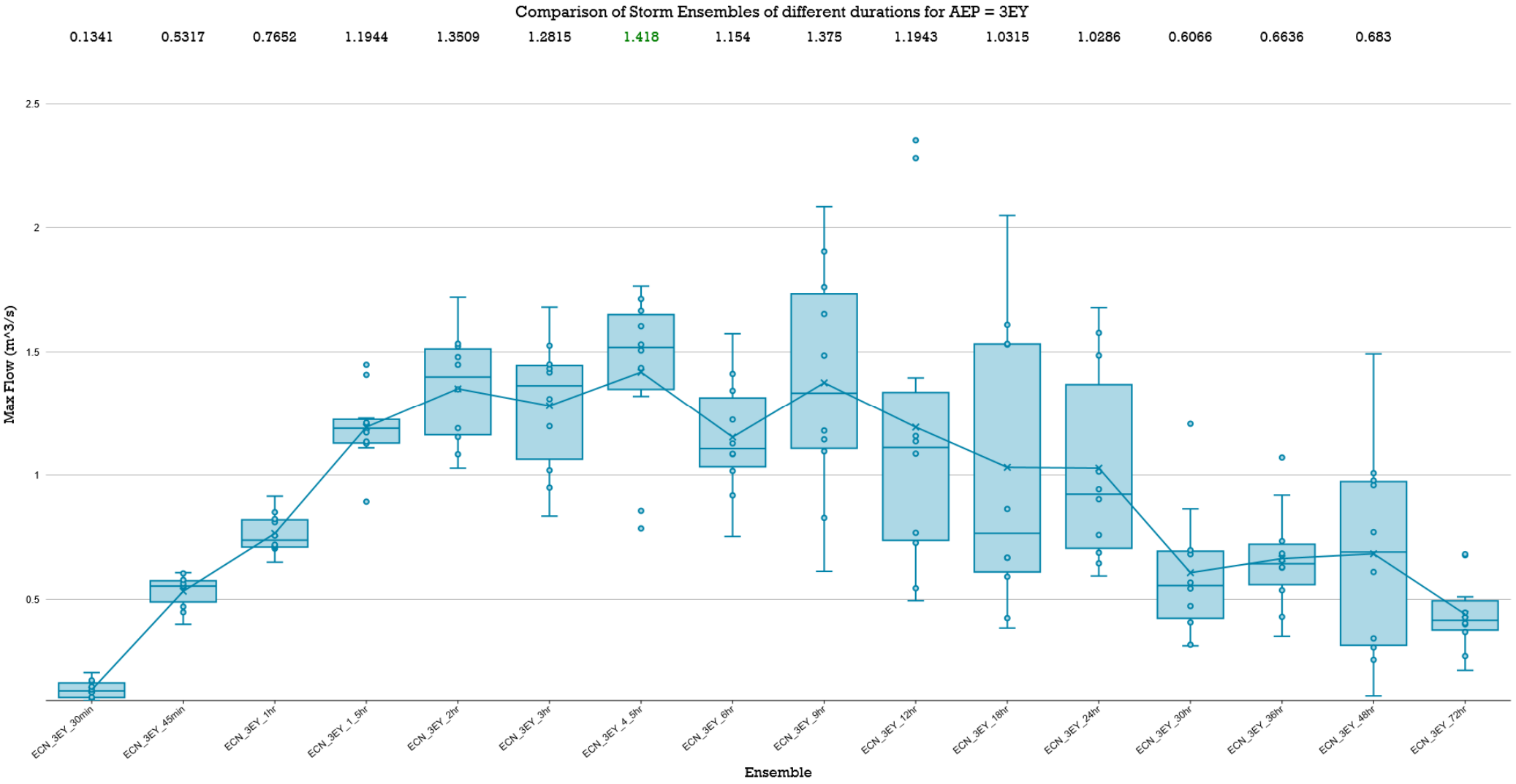

Comparison of Storm Ensembles of different durations for AEP = 1%
7.8856
11.38
13.9083
15.5427
17.4789
19.1812
19.4076
16.6055
15.8243
16.2809
11.7064
15.7084
18.663
12.0444
8.4463
7.8386
5.9915
6.9726
8.7752
3.1964
Max Flow (m^3/s)
35
30
25
20
15
10
5
ECN_1pct_10min
ECN_1pct_15min
ECN_1pct_20min
ECN_1pct_25min
ECN_1pct_30min
ECN_1pct_45min
ECN_1pct_1hr
ECN_1pct_1_5hr
ECN_1pct_2hr
ECN_1pct_3hr
ECN_1pct_4_5hr
ECN_1pct_6hr
ECN_1pct_9hr
ECN_1pct_12hr
ECN_1pct_18hr
ECN_1pct_24hr
ECN_1pct_30hr
ECN_1pct_36hr
ECN_1pct_48hr
ECN_1pct_72hr
Ensemble

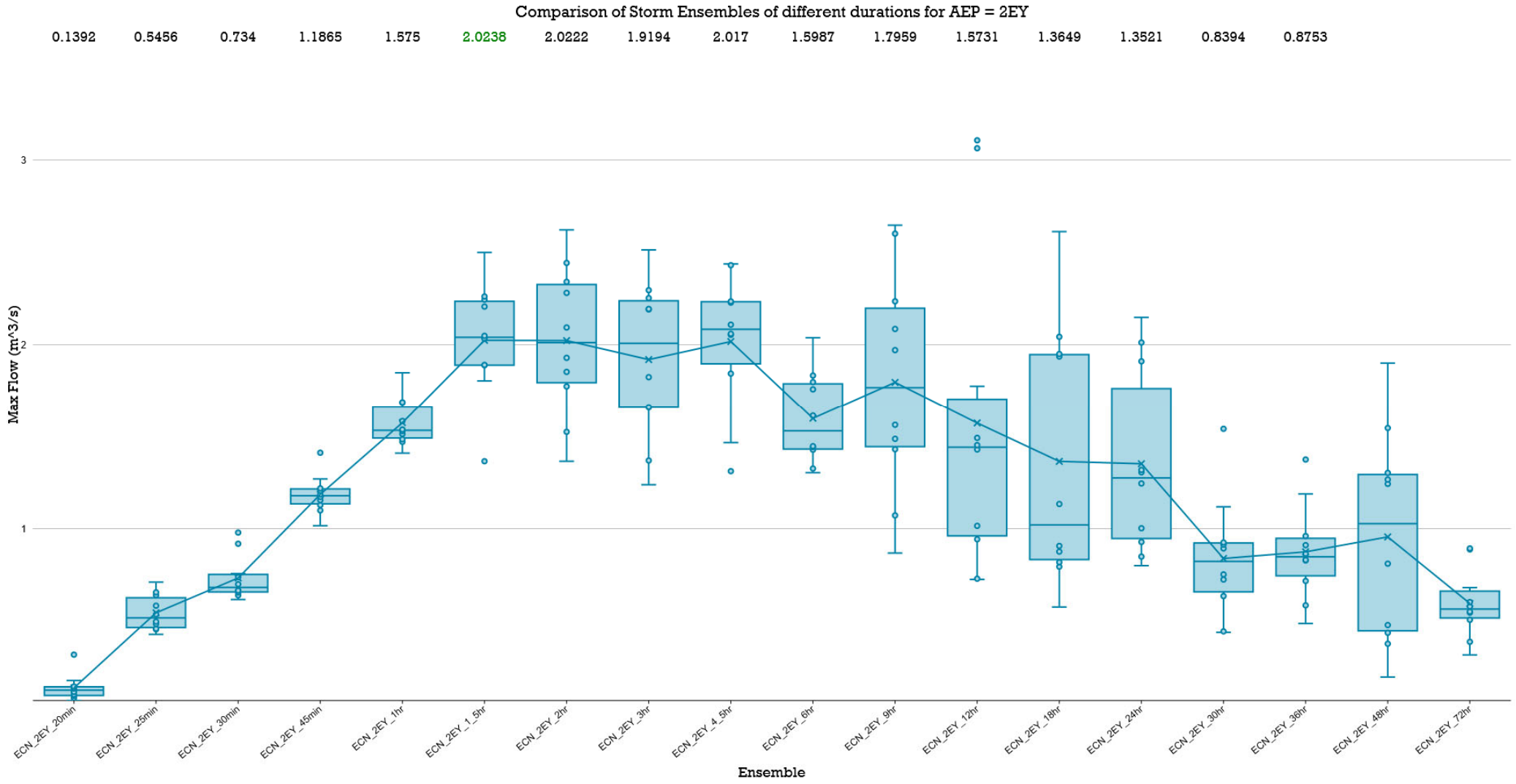
LPoD-1 PRE DEVELOPED ‘MEAN PEAK’ Box & Whisker Plots – *72 Hour*

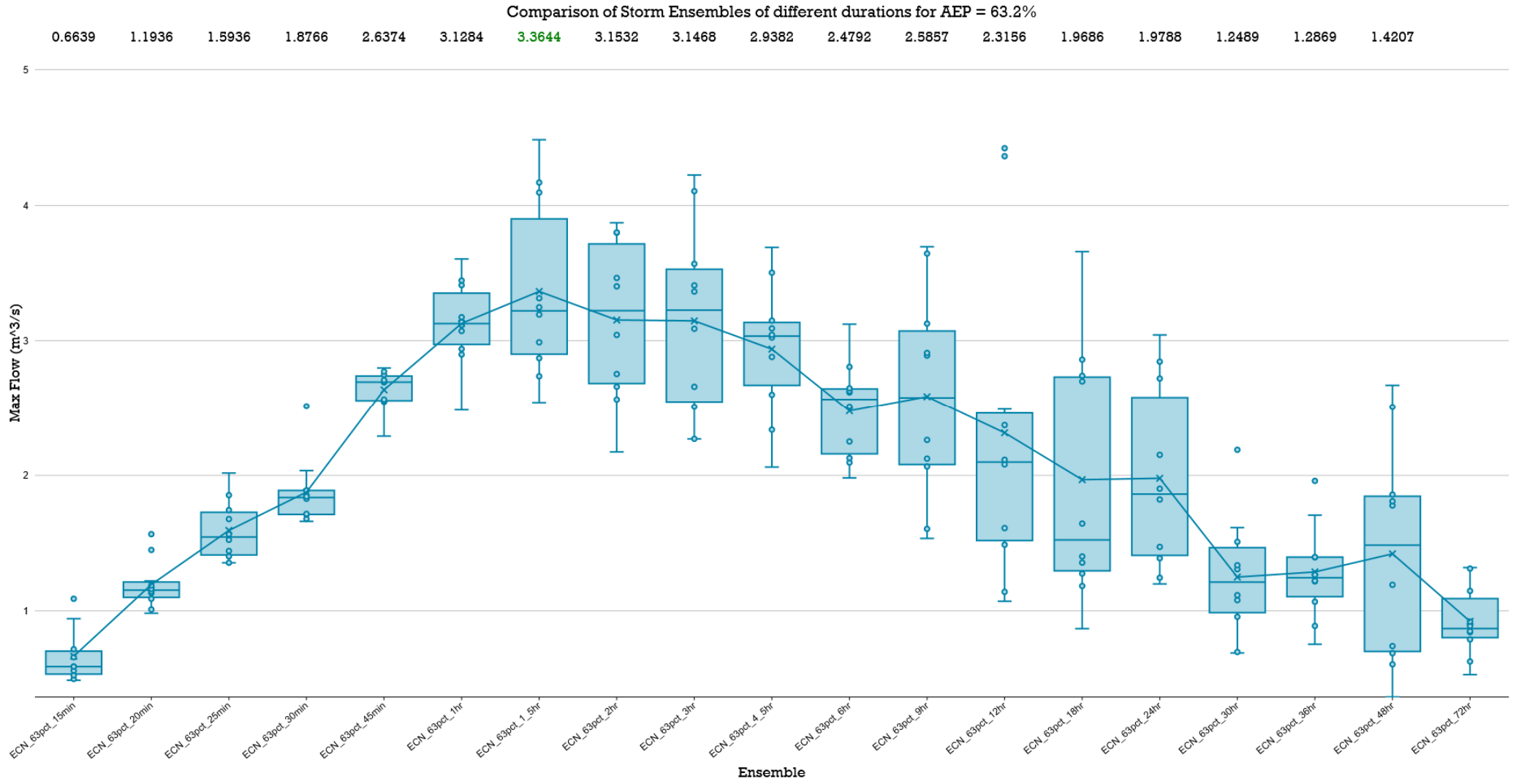

Comparison of Storm Ensembles of different durations for AEP = 12EY
0.0493
0.1796
0.2231
0.3487
0.3445
0.4023
0.3819
0.1667
0.2311
0.2106
0.1216
Max Flow (m^3/s)
1
0.8
0.6
0.4
0.2
0
ECN_12EY_3hr
ECN_12EY_4.5hr
ECN_12EY_6hr
ECN_12EY_9hr
ECN_12EY_12hr
ECN_12EY_18hr
ECN_12EY_24hr
ECN_12EY_30hr
ECN_12EY_36hr
ECN_12EY_48hr
ECN_12EY_72hr
Ensemble

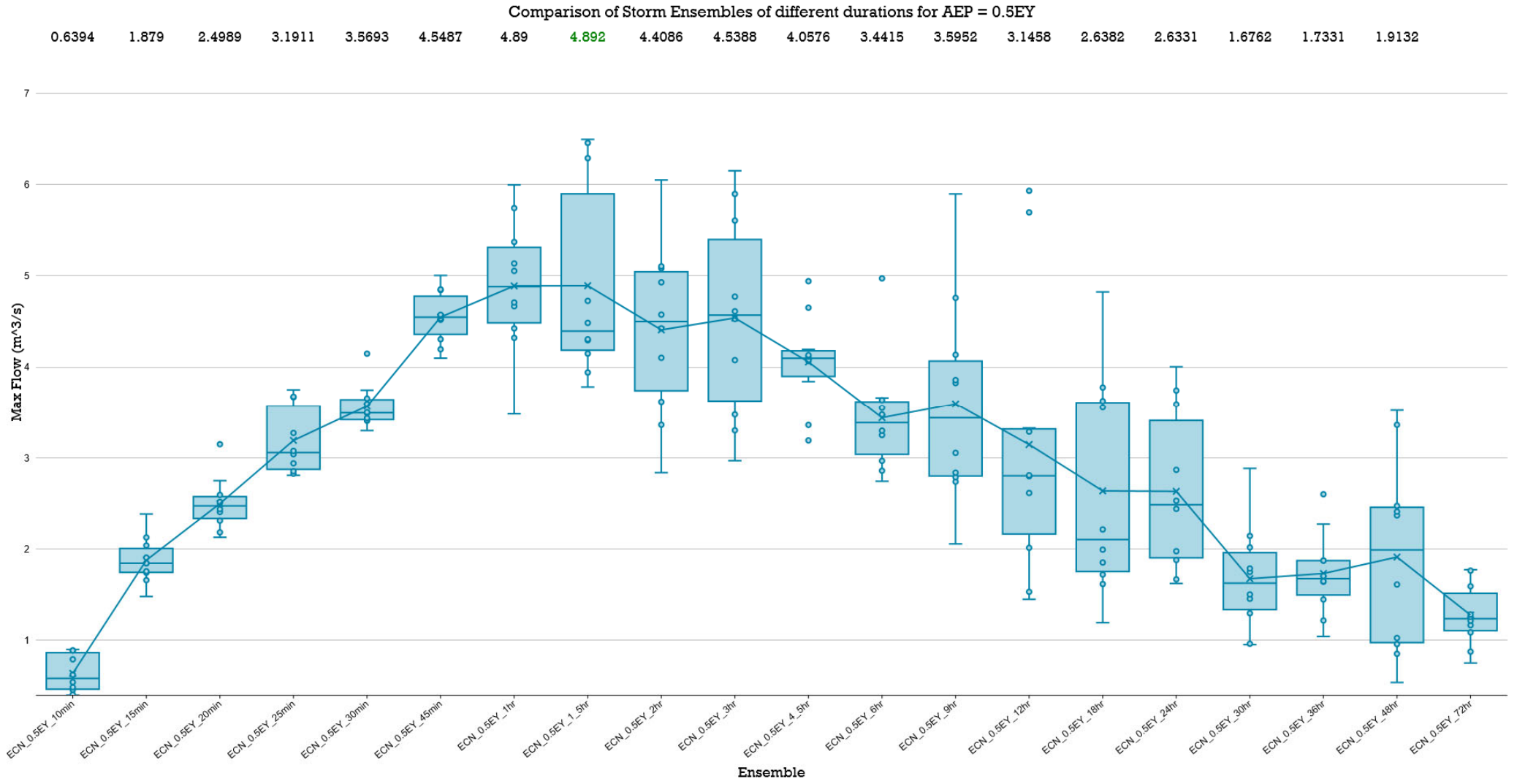

Comparison of Storm Ensembles of different durations for AEP = 6EY
0.0136
0.1773
0.2933
0.4784
0.4621
0.6078
0.5609
0.5537
0.526
0.2798
0.3373
Max Flow (m^3/s)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
ECN_6EY_1.5hr
ECN_6EY_2hr
ECN_6EY_3hr
ECN_6EY_4.5hr
ECN_6EY_6hr
ECN_6EY_9hr
ECN_6EY_12hr
ECN_6EY_18hr
ECN_6EY_24hr
ECN_6EY_30hr
ECN_6EY_36hr
ECN_6EY_48hr
ECN_6EY_72hr
Ensemble


Comparison of Storm Ensembles of different durations for AEP = 4EY
0.1024
0.3478
0.6445
0.8223
0.8829
1.0212
0.8739
1.0602
0.9292
0.8269
0.8188
0.463
0.5249
Max Flow (m^3/s)
2
1.5
1
0.5
ECN_4EY_45min
ECN_4EY_1hr
ECN_4EY_1_5hr
ECN_4EY_2hr
ECN_4EY_3hr
ECN_4EY_4_5hr
ECN_4EY_6hr
ECN_4EY_9hr
ECN_4EY_12hr
ECN_4EY_18hr
ECN_4EY_24hr
ECN_4EY_30hr
ECN_4EY_36hr
ECN_4EY_48hr
ECN_4EY_72hr
Ensemble


Comparison of Storm Ensembles of different durations for AEP = 3EY
0.1341
0.5317
0.7652
1.1944
1.3509
1.2815
1.418
1.154
1.375
1.1943
1.0315
1.0286
0.6066
0.6636
0.683
Max Flow (m^3/s)
2.5
2
1.5
1
0.5
ECN_3EY_30min
ECN_3EY_45min
ECN_3EY_1hr
ECN_3EY_1_5hr
ECN_3EY_2hr
ECN_3EY_3hr
ECN_3EY_4_5hr
ECN_3EY_6hr
ECN_3EY_9hr
ECN_3EY_12hr
ECN_3EY_18hr
ECN_3EY_24hr
ECN_3EY_30hr
ECN_3EY_36hr
ECN_3EY_48hr
ECN_3EY_72hr
Ensemble

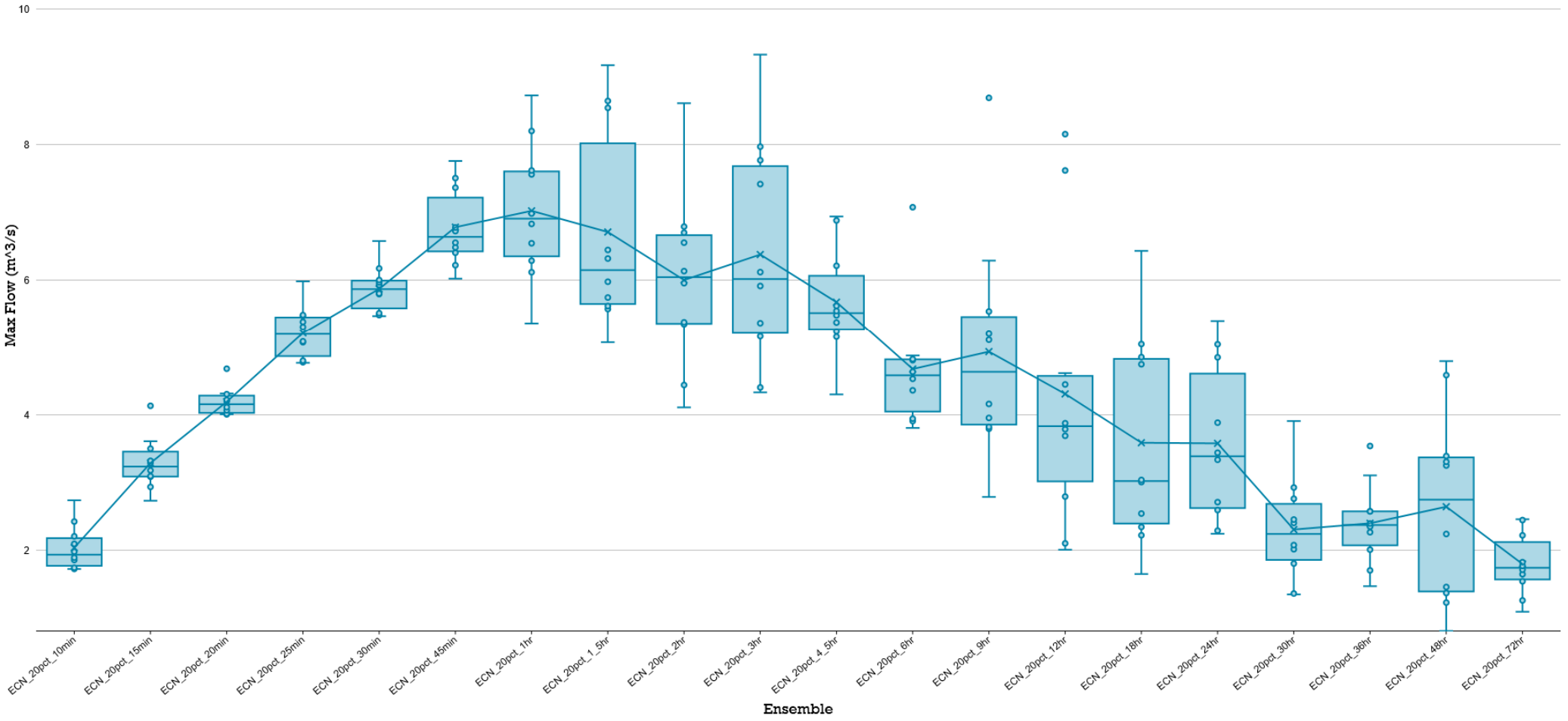

Comparison of Storm Ensembles of different durations for AEP = 2EY
0.1392
0.5456
0.734
1.1865
1.575
2.0238
2.0222
1.9194
2.017
1.5987
1.7959
1.5731
1.3649
1.3521
0.8394
0.8753
Max Flow (m^3/s)
3
2
1
ECN_2EY_20min
ECN_2EY_25min
ECN_2EY_30min
ECN_2EY_45min
ECN_2EY_1hr
ECN_2EY_1_5hr
ECN_2EY_2hr
ECN_2EY_3hr
ECN_2EY_4_5hr
ECN_2EY_6hr
ECN_2EY_9hr
ECN_2EY_12hr
ECN_2EY_18hr
ECN_2EY_24hr
ECN_2EY_30hr
ECN_2EY_36hr
ECN_2EY_48hr
ECN_2EY_72hr
Ensemble

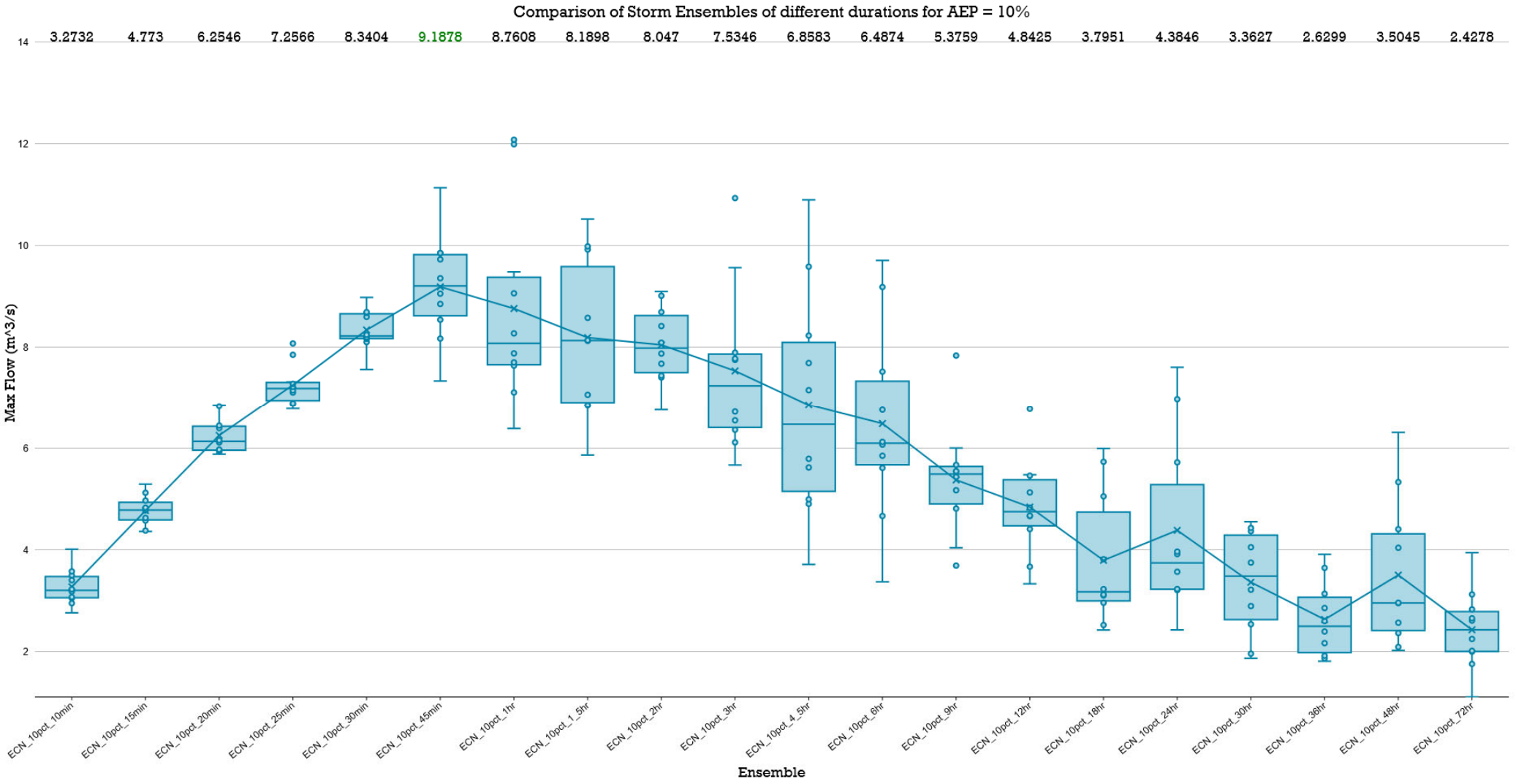

Comparison of Storm Ensembles of different durations for AEP = 63.2%
0.6639
1.1936
1.5936
1.8766
2.6374
3.1284
3.3644
3.1532
3.1468
2.9382
2.4792
2.5857
2.3156
1.9686
1.9788
1.2489
1.2869
1.4207
Max Flow (m^3/s)
5
4
3
2
1
ECN_63pct_15min
ECN_63pct_20min
ECN_63pct_25min
ECN_63pct_30min
ECN_63pct_45min
ECN_63pct_1hr
ECN_63pct_1_5hr
ECN_63pct_2hr
ECN_63pct_3hr
ECN_63pct_4_5hr
ECN_63pct_6hr
ECN_63pct_9hr
ECN_63pct_12hr
ECN_63pct_18hr
ECN_63pct_24hr
ECN_63pct_30hr
ECN_63pct_36hr
ECN_63pct_48hr
ECN_63pct_72hr
Ensemble

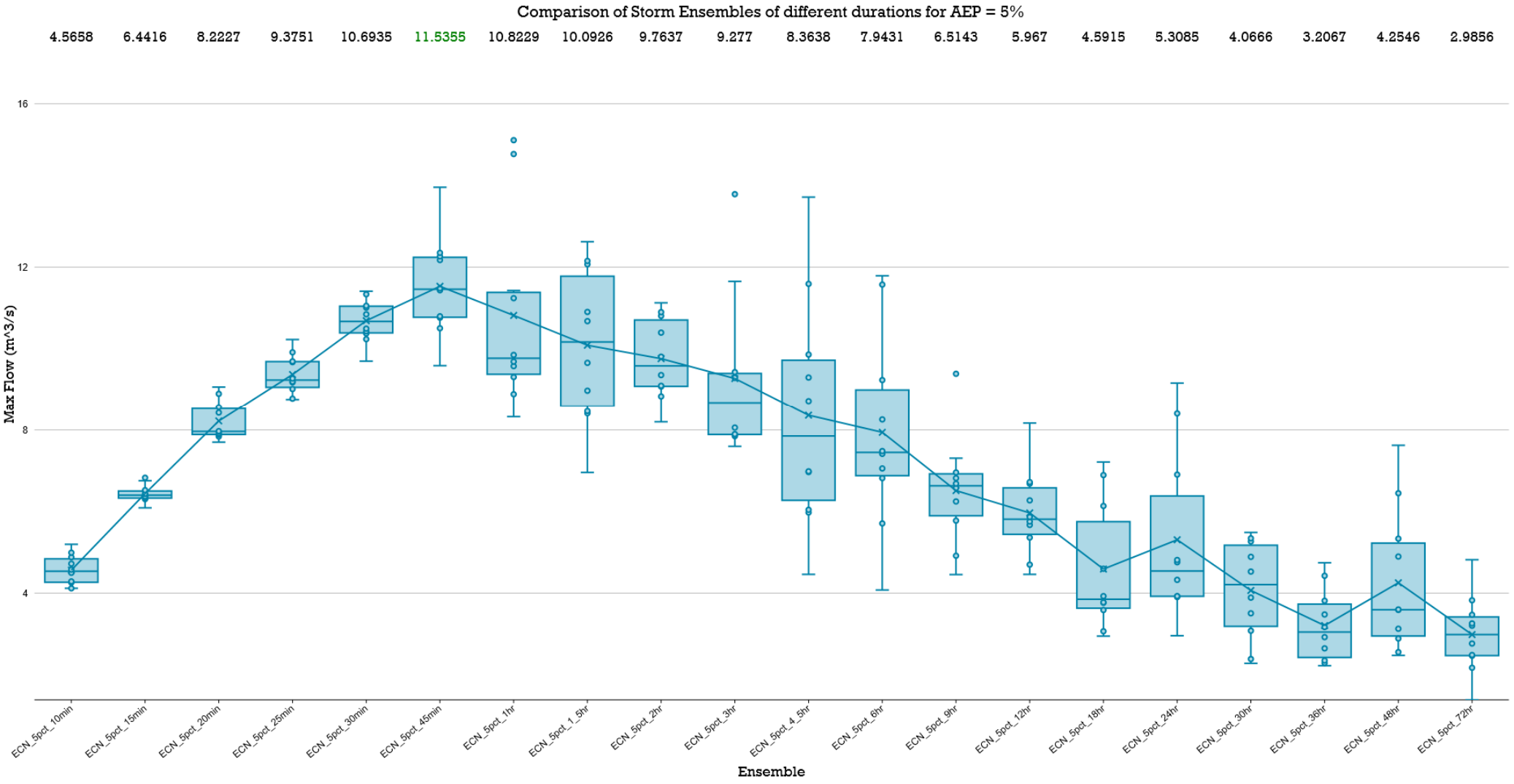

Comparison of Storm Ensembles of different durations for AEP = 0.5EY
0.6394 1.879 2.4989 3.1911 3.5693 4.5487 4.89 4.892 4.4086 4.5388 4.0576 3.4415 3.5952 3.1458 2.6382 2.6331 1.6762 1.7331 1.9132
Max Flow (m^3/s)
Ensemble
ECN_0.5EY_10min
ECN_0.5EY_15min
ECN_0.5EY_20min
ECN_0.5EY_25min
ECN_0.5EY_30min
ECN_0.5EY_45min
ECN_0.5EY_1hr
ECN_0.5EY_1_5hr
ECN_0.5EY_2hr
ECN_0.5EY_3hr
ECN_0.5EY_4_5hr
ECN_0.5EY_6hr
ECN_0.5EY_9hr
ECN_0.5EY_12hr
ECN_0.5EY_18hr
ECN_0.5EY_24hr
ECN_0.5EY_30hr
ECN_0.5EY_36hr
ECN_0.5EY_48hr
ECN_0.5EY_72hr

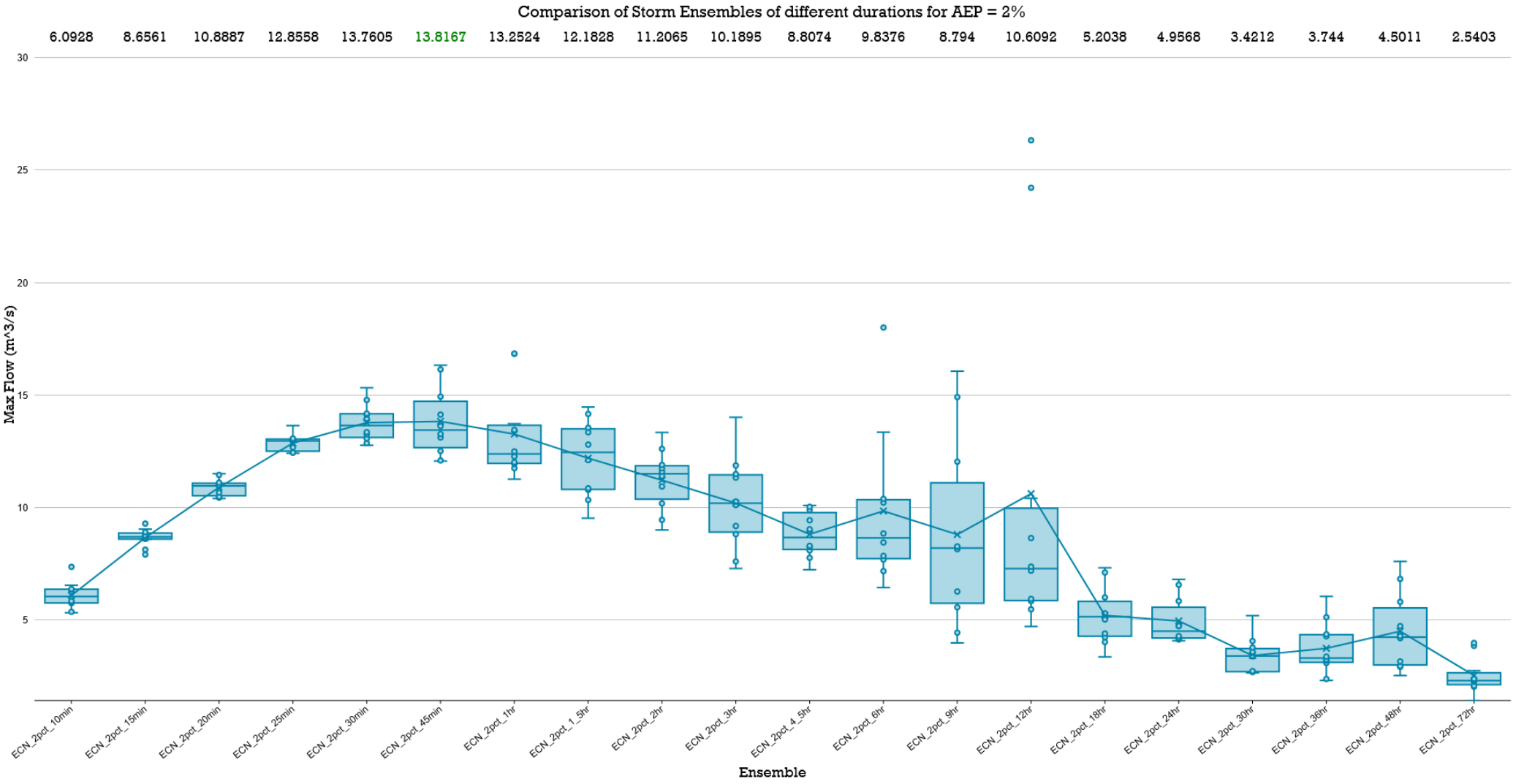
Comparison of Storm Ensembles of different durations for AEP = 20%

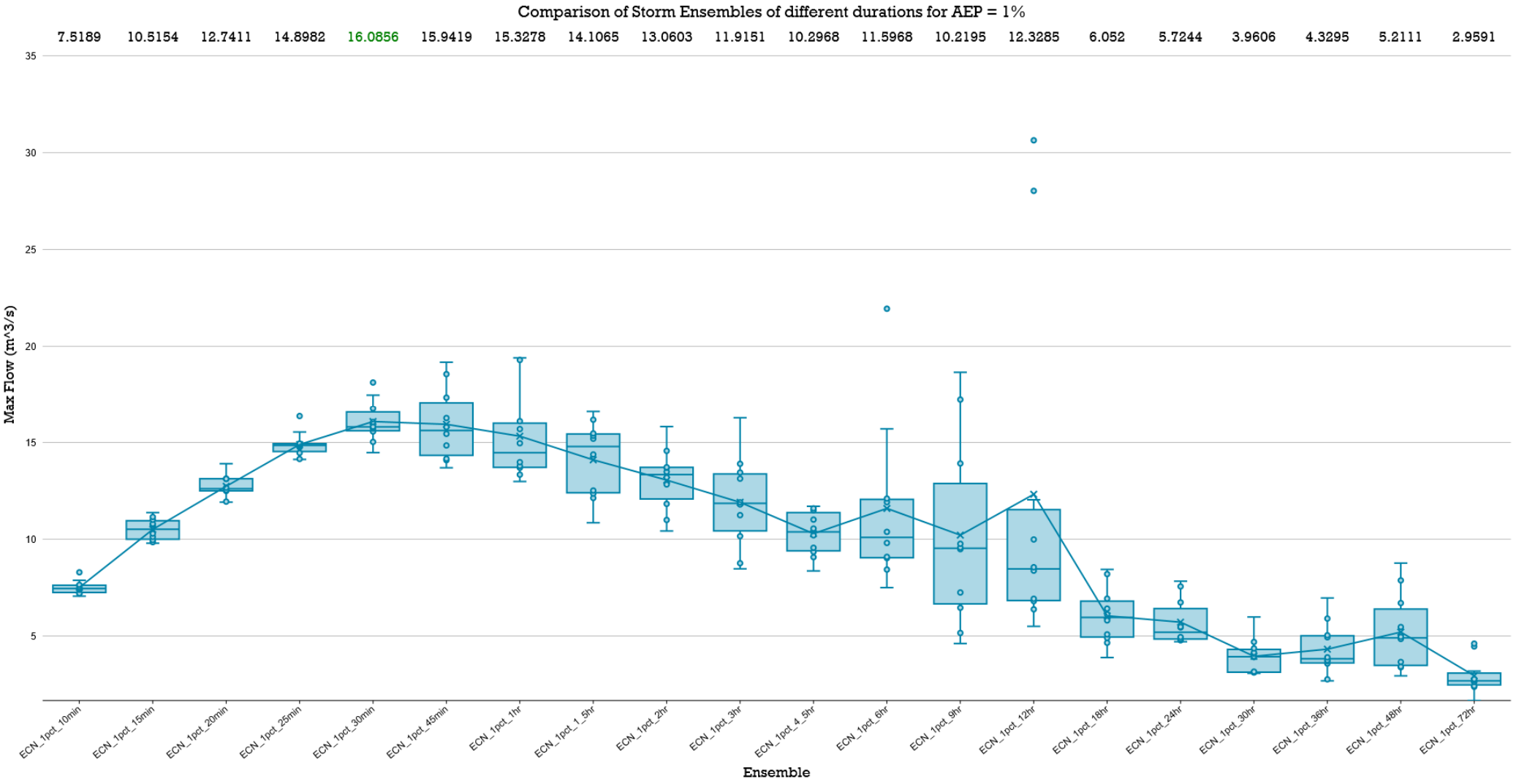
ECN_20pct_10min	ECN_20pct_15min	ECN_20pct_20min	ECN_20pct_25min	ECN_20pct_30min	ECN_20pct_45min	ECN_20pct_1hr	ECN_20pct_1_5hr	ECN_20pct_2hr	ECN_20pct_3hr	ECN_20pct_4_5hr	ECN_20pct_6hr	ECN_20pct_9hr	ECN_20pct_12hr	ECN_20pct_18hr	ECN_20pct_24hr	ECN_20pct_30hr	ECN_20pct_36hr	ECN_20pct_48hr	ECN_20pct_72hr
2.0352	3.2866	4.1923	5.2122	5.8701	6.7812	7.0227	6.7105	6.0015	6.378	5.6739	4.6762	4.9336	4.3083	3.5864	3.577	2.3035	2.3961	2.6409	1.7942



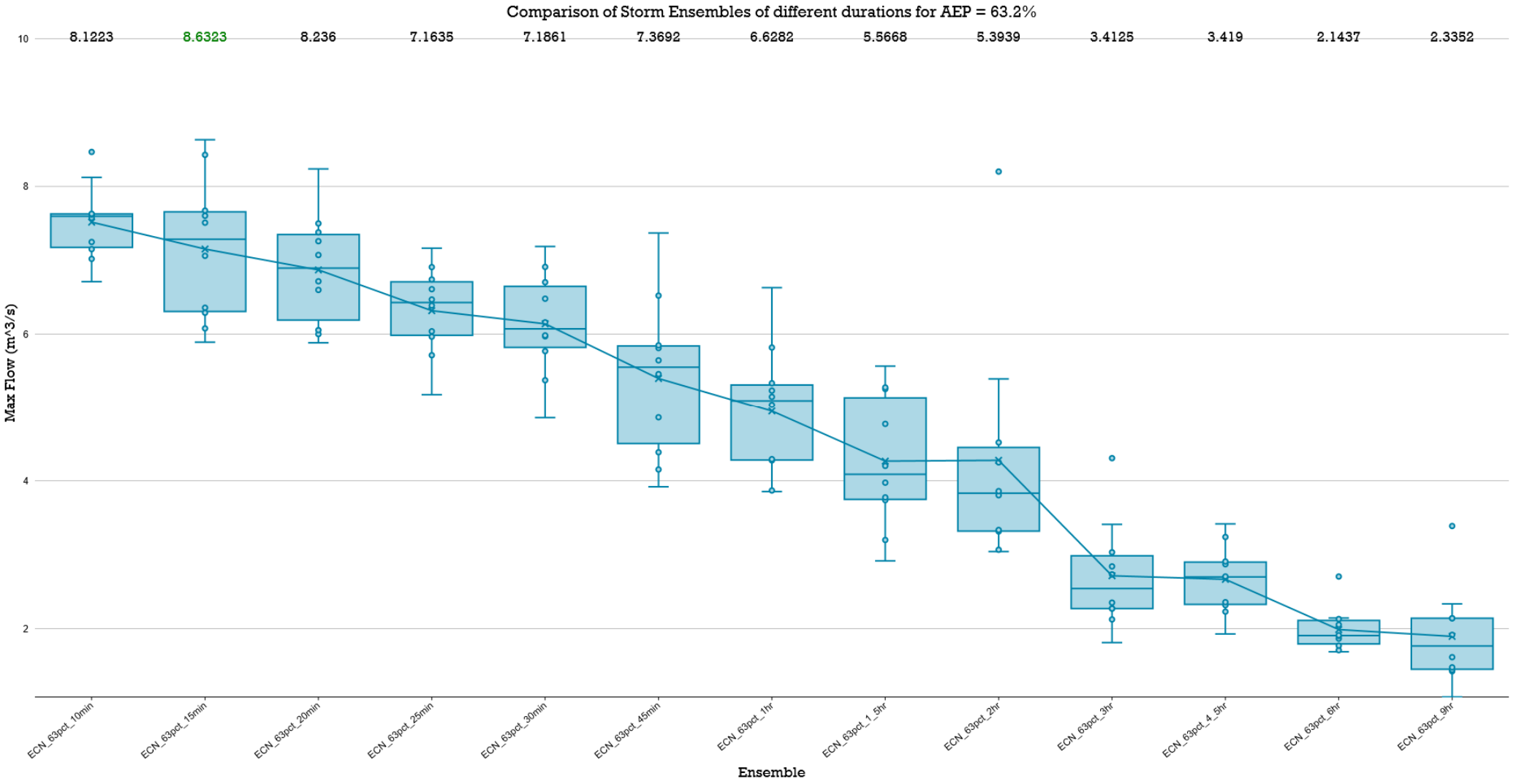

Comparison of Storm Ensembles of different durations for AEP = 10%
3.2732
4.773
6.2546
7.2566
8.3404
9.1878
8.7608
8.1898
8.047
7.5346
6.8583
6.4874
5.3759
4.8425
3.7951
4.3846
3.3627
2.6299
3.5045
2.4278
Max Flow (m^3/s)
14
12
10
8
6
4
2
ECN_10pct_10min
ECN_10pct_15min
ECN_10pct_20min
ECN_10pct_25min
ECN_10pct_30min
ECN_10pct_45min
ECN_10pct_1hr
ECN_10pct_1_5hr
ECN_10pct_2hr
ECN_10pct_3hr
ECN_10pct_4_5hr
ECN_10pct_6hr
ECN_10pct_9hr
ECN_10pct_12hr
ECN_10pct_18hr
ECN_10pct_24hr
ECN_10pct_30hr
ECN_10pct_36hr
ECN_10pct_48hr
ECN_10pct_72hr
Ensemble

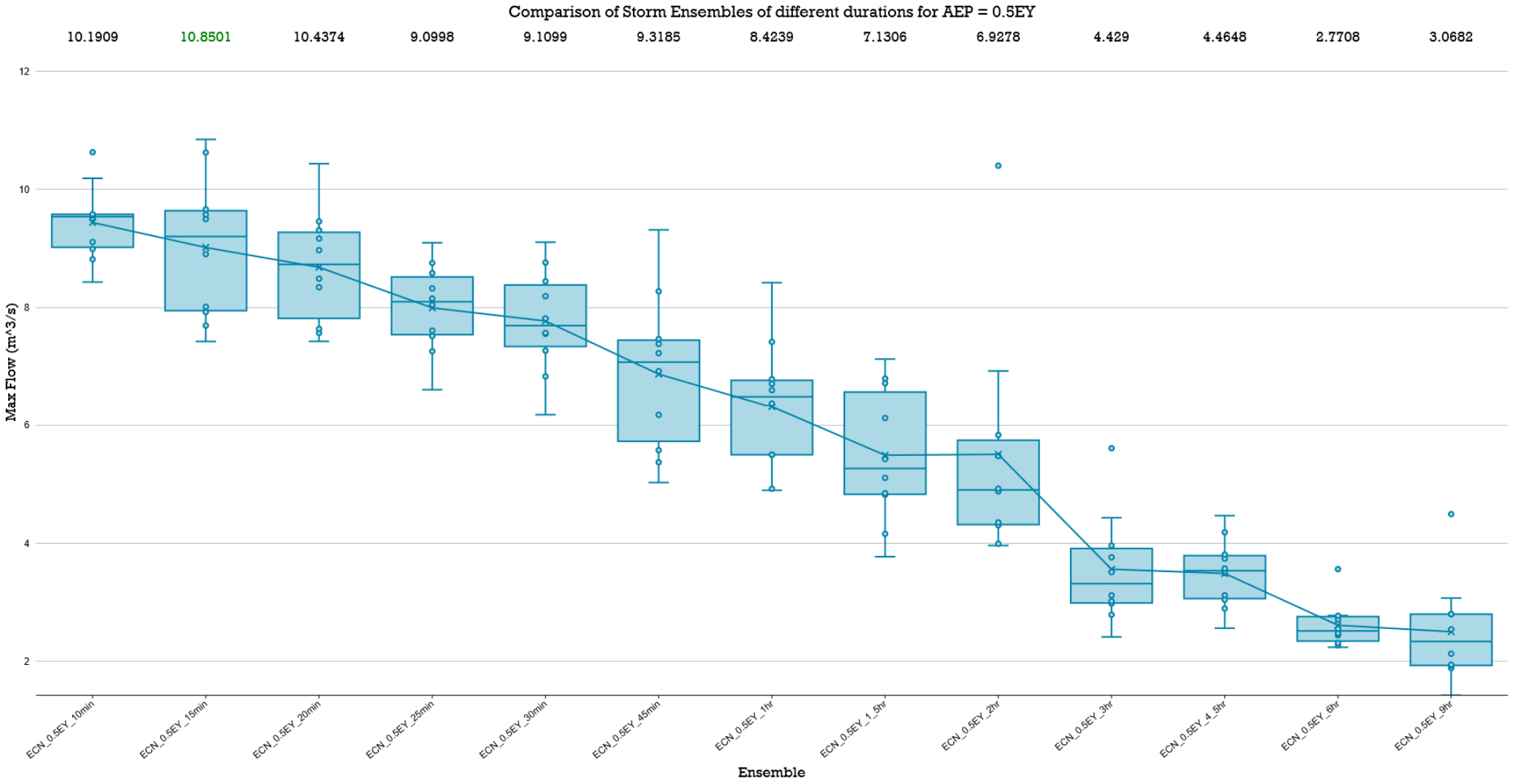

Comparison of Storm Ensembles of different durations for AEP = 5%
4.5658 6.4416 8.2227 9.3751 10.6935 11.5355 10.8229 10.0926 9.7637 9.277 8.3638 7.9431 6.5143 5.967 4.5915 5.3085 4.0666 3.2067 4.2546 2.9856
16
12
8
4
Max Flow (m^3/s)
ECN_5pct_10min
ECN_5pct_15min
ECN_5pct_20min
ECN_5pct_25min
ECN_5pct_30min
ECN_5pct_45min
ECN_5pct_1hr
ECN_5pct_1_5hr
ECN_5pct_2hr
ECN_5pct_3hr
ECN_5pct_4_5hr
ECN_5pct_6hr
ECN_5pct_9hr
ECN_5pct_12hr
ECN_5pct_18hr
ECN_5pct_24hr
ECN_5pct_30hr
ECN_5pct_36hr
ECN_5pct_48hr
ECN_5pct_72hr
Ensemble

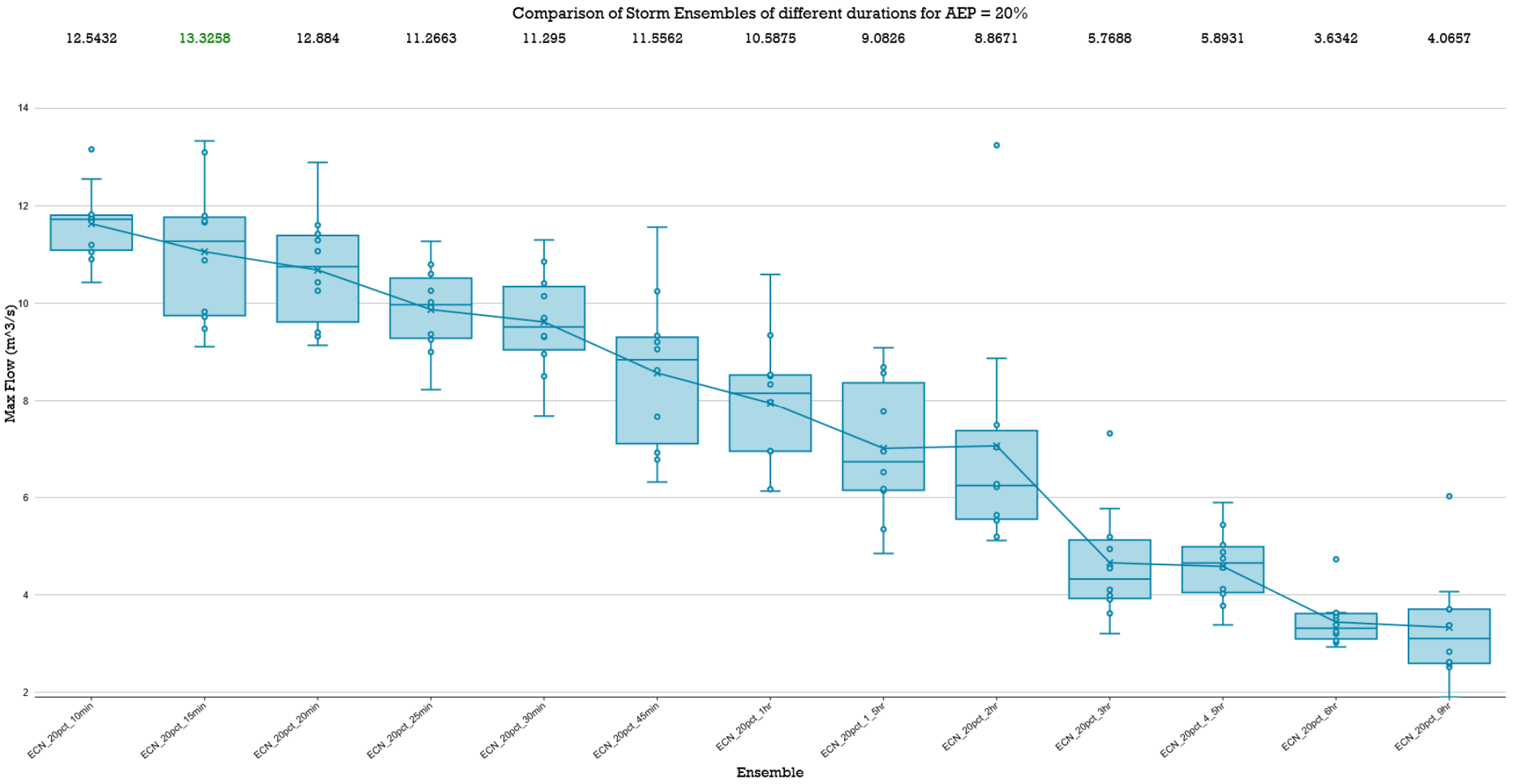

Comparison of Storm Ensembles of different durations for AEP = 2%
6.0928
8.6561
10.8887
12.8558
13.7605
13.8167
13.2524
12.1828
11.2065
10.1895
8.8074
9.8376
8.794
10.6092
5.2038
4.9568
3.4212
3.744
4.5011
2.5403
30
25
20
15
10
5
Max Flow (m^3/s)
ECN_2pct_10min
ECN_2pct_15min
ECN_2pct_20min
ECN_2pct_25min
ECN_2pct_30min
ECN_2pct_45min
ECN_2pct_1hr
ECN_2pct_1_5hr
ECN_2pct_2hr
ECN_2pct_3hr
ECN_2pct_4_5hr
ECN_2pct_6hr
ECN_2pct_9hr
ECN_2pct_12hr
ECN_2pct_18hr
ECN_2pct_24hr
ECN_2pct_30hr
ECN_2pct_36hr
ECN_2pct_48hr
ECN_2pct_72hr
Ensemble

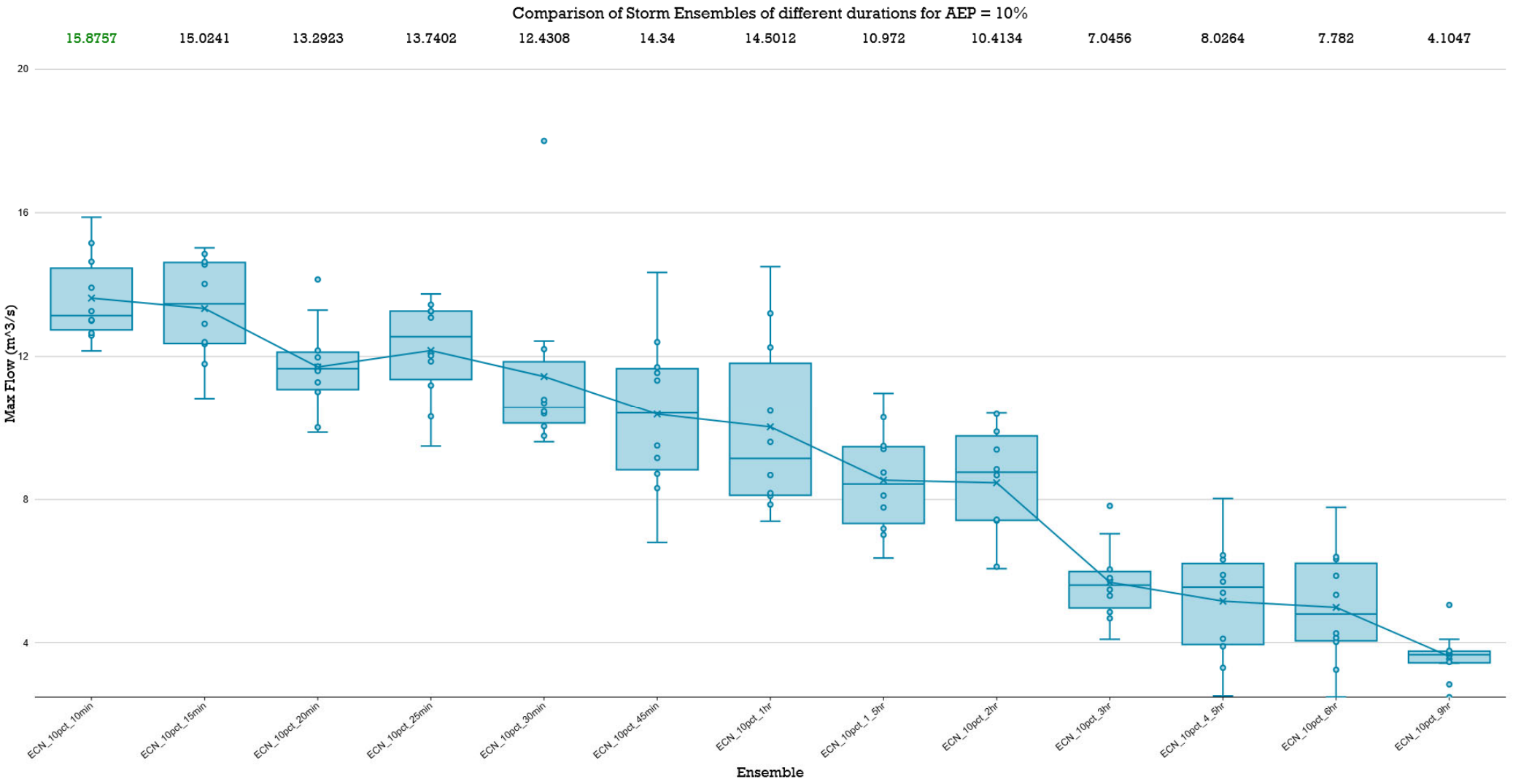

Comparison of Storm Ensembles of different durations for AEP = 1%
7.5189
10.5154
12.7411
14.8982
16.0856
15.9419
15.3278
14.1065
13.0603
11.9151
10.2968
11.5968
10.2195
12.3285
6.052
5.7244
3.9606
4.3295
5.2111
2.9591
Max Flow (m^3/s)
35
30
25
20
15
10
5
ECN_1pct_10min
ECN_1pct_15min
ECN_1pct_20min
ECN_1pct_25min
ECN_1pct_30min
ECN_1pct_45min
ECN_1pct_1hr
ECN_1pct_1_5hr
ECN_1pct_2hr
ECN_1pct_3hr
ECN_1pct_4_5hr
ECN_1pct_6hr
ECN_1pct_9hr
ECN_1pct_12hr
ECN_1pct_18hr
ECN_1pct_24hr
ECN_1pct_30hr
ECN_1pct_36hr
ECN_1pct_48hr
ECN_1pct_72hr
Ensemble

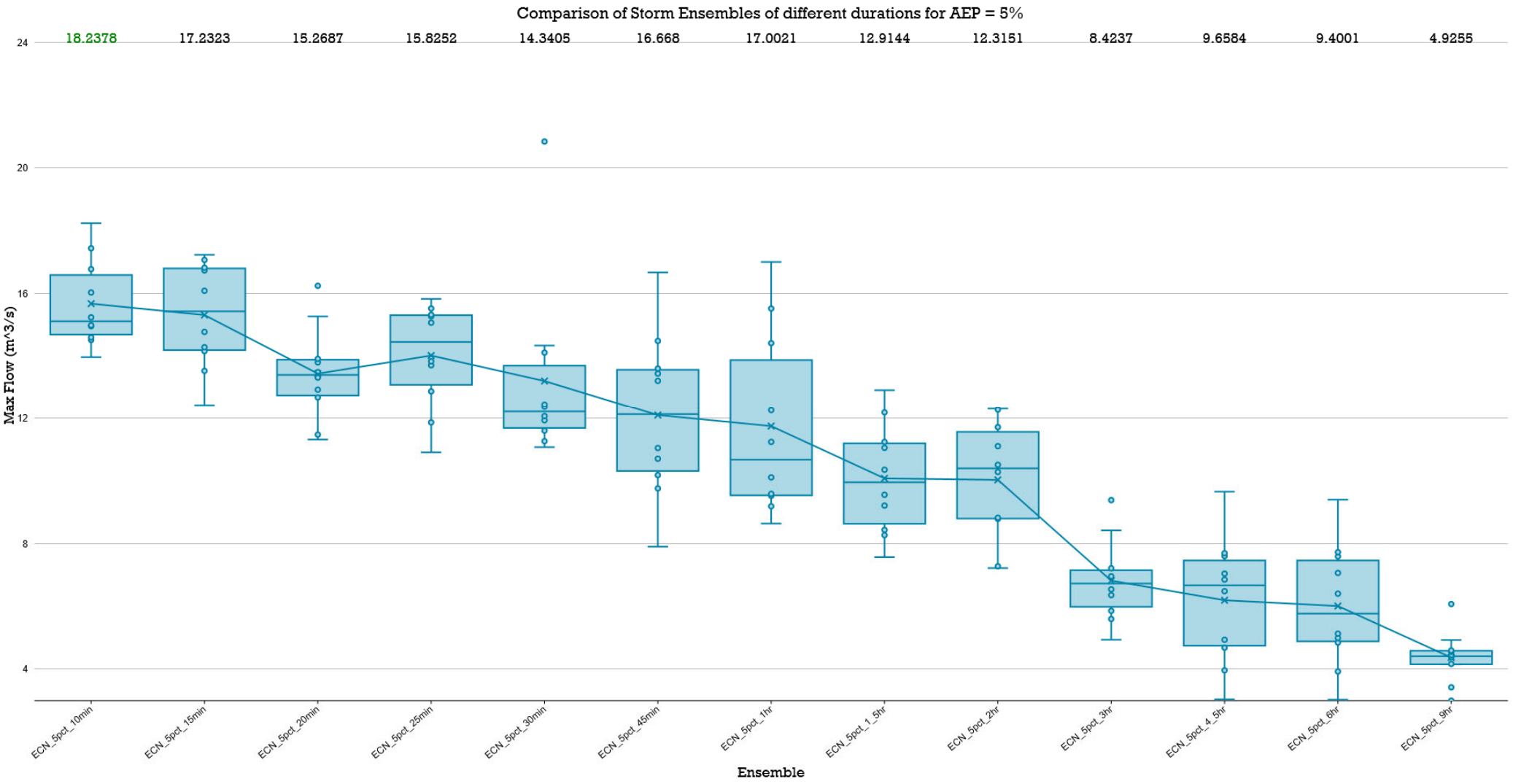
LPoD-1 POST DEVELOPED ‘MAXIMUM PEAK’ Box & Whisker Plots - *Normal*

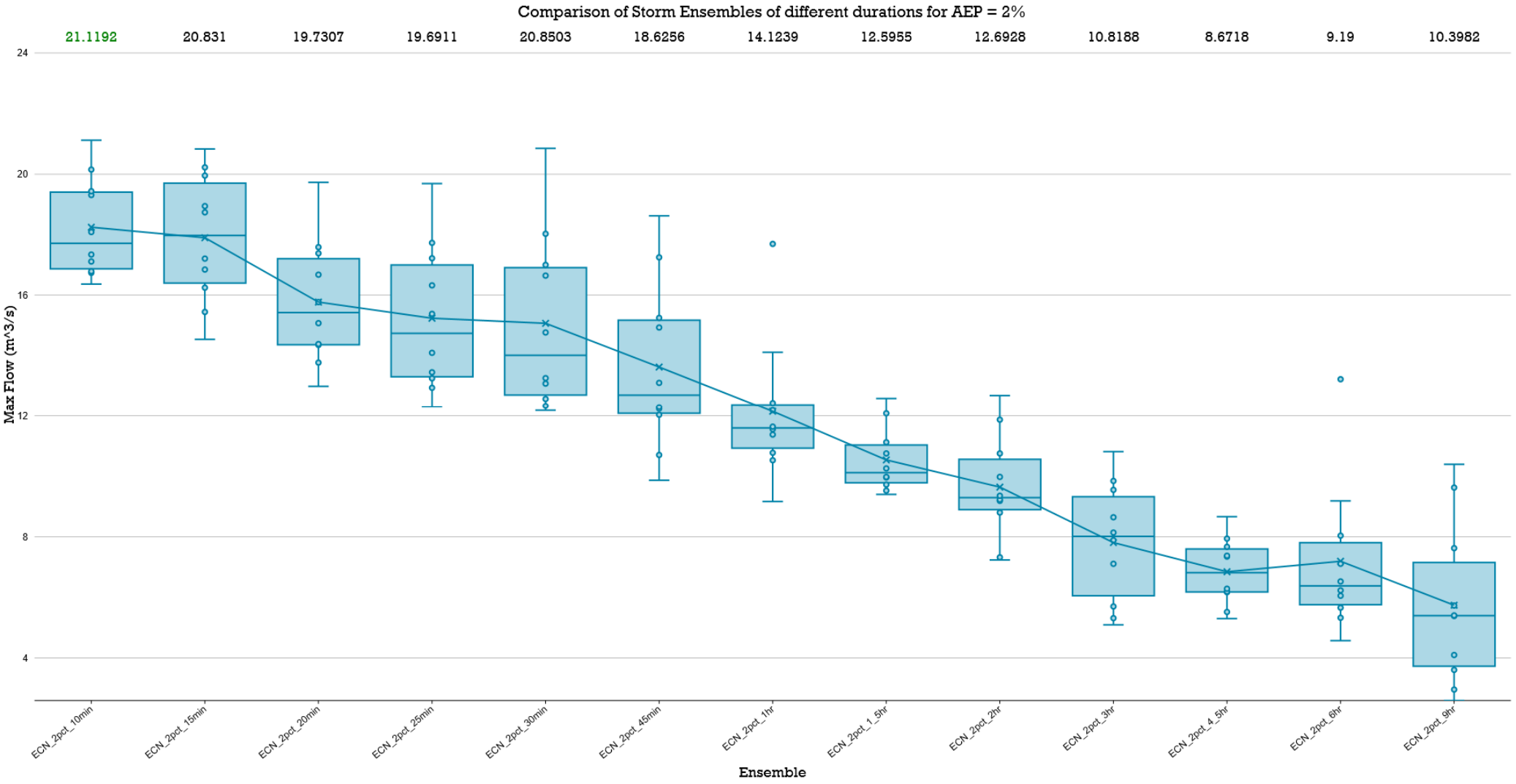

Comparison of Storm Ensembles of different durations for AEP = 63.2%
8.1223
8.6323
8.236
7.1635
7.1861
7.3692
6.6282
5.5668
5.3939
3.4125
3.419
2.1437
2.3352
Max Flow (m^3/s)
10
8
6
4
2
ECN_63pct_10min
ECN_63pct_15min
ECN_63pct_20min
ECN_63pct_25min
ECN_63pct_30min
ECN_63pct_45min
ECN_63pct_1hr
ECN_63pct_1_5hr
ECN_63pct_2hr
ECN_63pct_3hr
ECN_63pct_4_5hr
ECN_63pct_6hr
ECN_63pct_9hr
Ensemble

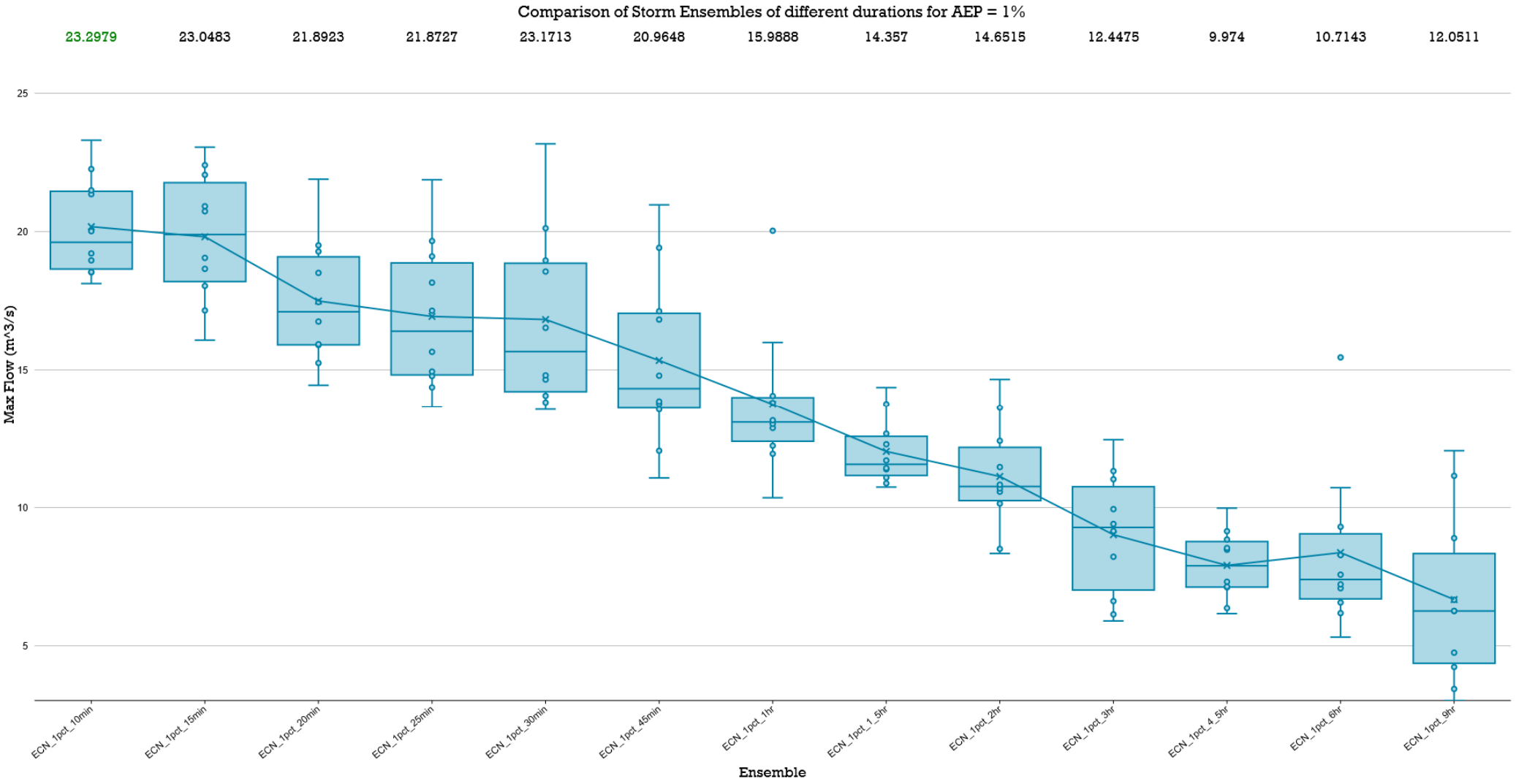

Comparison of Storm Ensembles of different durations for AEP = 0.5EY
10.1909
10.8501
10.4374
9.0998
9.1099
9.3185
8.4239
7.1306
6.9278
4.429
4.4648
2.7708
3.0682
12
10
8
6
4
2
Max Flow (m^3/s)
ECN_0.5EY_10min
ECN_0.5EY_15min
ECN_0.5EY_20min
ECN_0.5EY_25min
ECN_0.5EY_30min
ECN_0.5EY_45min
ECN_0.5EY_1hr
ECN_0.5EY_1_5hr
ECN_0.5EY_2hr
ECN_0.5EY_3hr
ECN_0.5EY_4_5hr
ECN_0.5EY_6hr
ECN_0.5EY_9hr
Ensemble


Comparison of Storm Ensembles of different durations for AEP = 20%
12.5432
13.3258
12.884
11.2663
11.295
11.5562
10.5875
9.0826
8.8671
5.7688
5.8931
3.6342
4.0657
Max Flow (m^3/s)
14
12
10
8
6
4
2
ECN_20pct_10min
ECN_20pct_15min
ECN_20pct_20min
ECN_20pct_25min
ECN_20pct_30min
ECN_20pct_45min
ECN_20pct_1hr
ECN_20pct_1_5hr
ECN_20pct_2hr
ECN_20pct_3hr
ECN_20pct_4_5hr
ECN_20pct_6hr
ECN_20pct_9hr
Ensemble

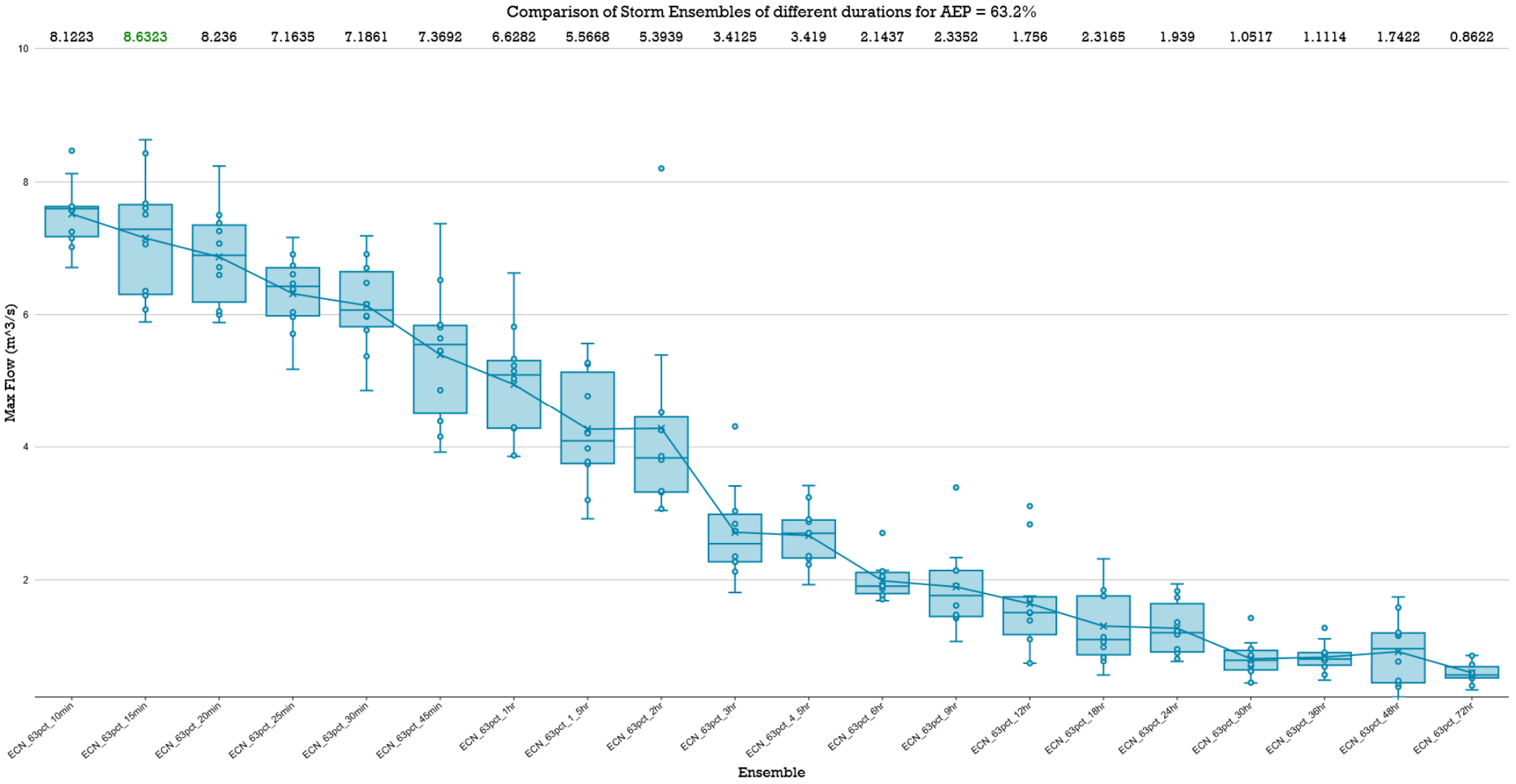

Comparison of Storm Ensembles of different durations for AEP = 10%
15.8757
15.0241
13.2923
13.7402
12.4308
14.34
14.5012
10.972
10.4134
7.0456
8.0264
7.782
4.1047
20
16
12
8
4
Max Flow (m^3/s)
ECN_10pct_10min
ECN_10pct_15min
ECN_10pct_20min
ECN_10pct_25min
ECN_10pct_30min
ECN_10pct_45min
ECN_10pct_1hr
ECN_10pct_1_5hr
ECN_10pct_2hr
ECN_10pct_3hr
ECN_10pct_4_5hr
ECN_10pct_6hr
ECN_10pct_9hr
Ensemble

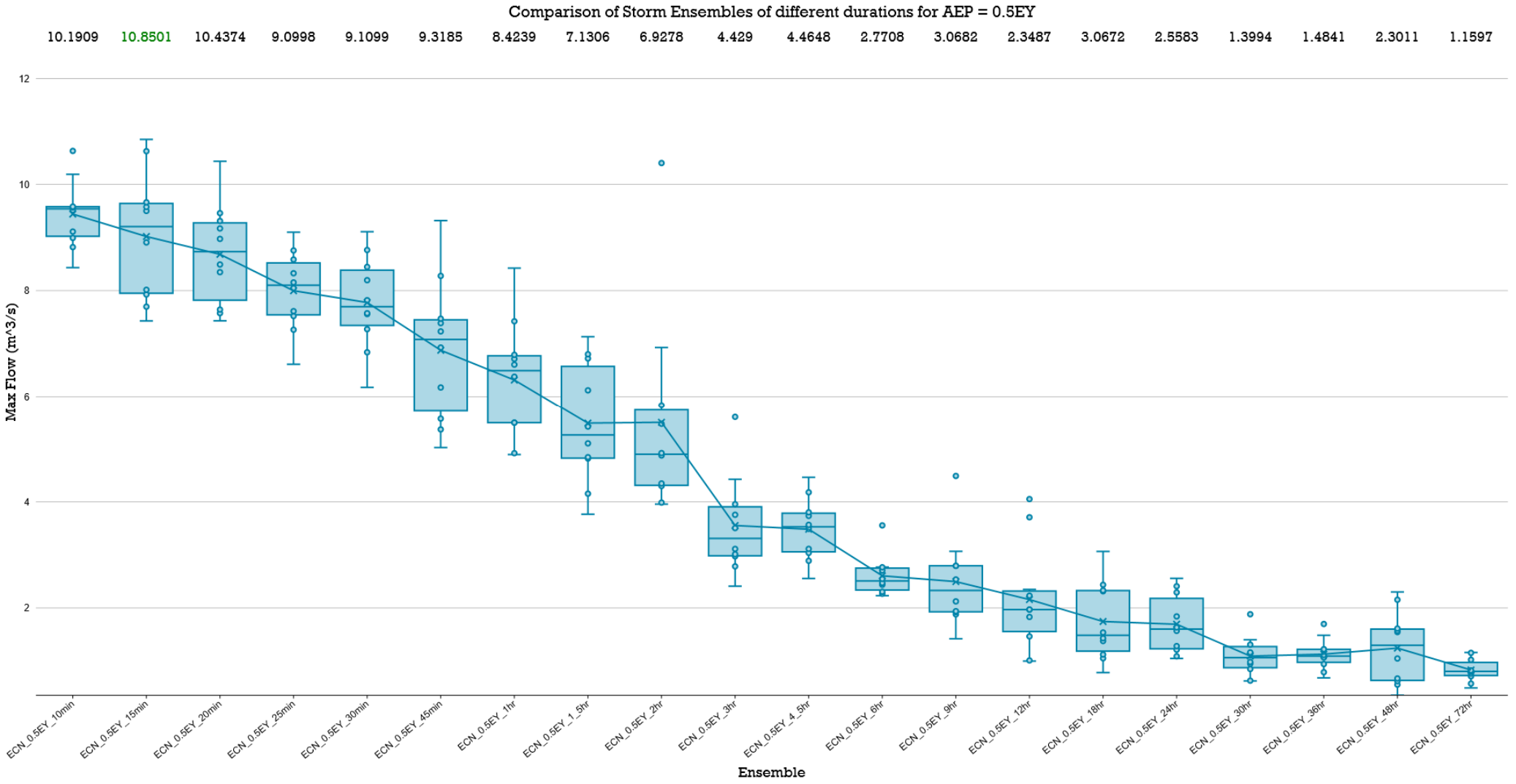

Comparison of Storm Ensembles of different durations for AEP = 5%
18.2378
17.2323
15.2687
15.8252
14.3405
16.668
17.0021
12.9144
12.3151
8.4237
9.6584
9.4001
4.9255
24
20
16
12
8
4
Max Flow (m^3/s)
ECN_5pct_10min
ECN_5pct_15min
ECN_5pct_20min
ECN_5pct_25min
ECN_5pct_30min
ECN_5pct_45min
ECN_5pct_1hr
ECN_5pct_1_5hr
ECN_5pct_2hr
ECN_5pct_3hr
ECN_5pct_4_5hr
ECN_5pct_6hr
ECN_5pct_9hr
Ensemble

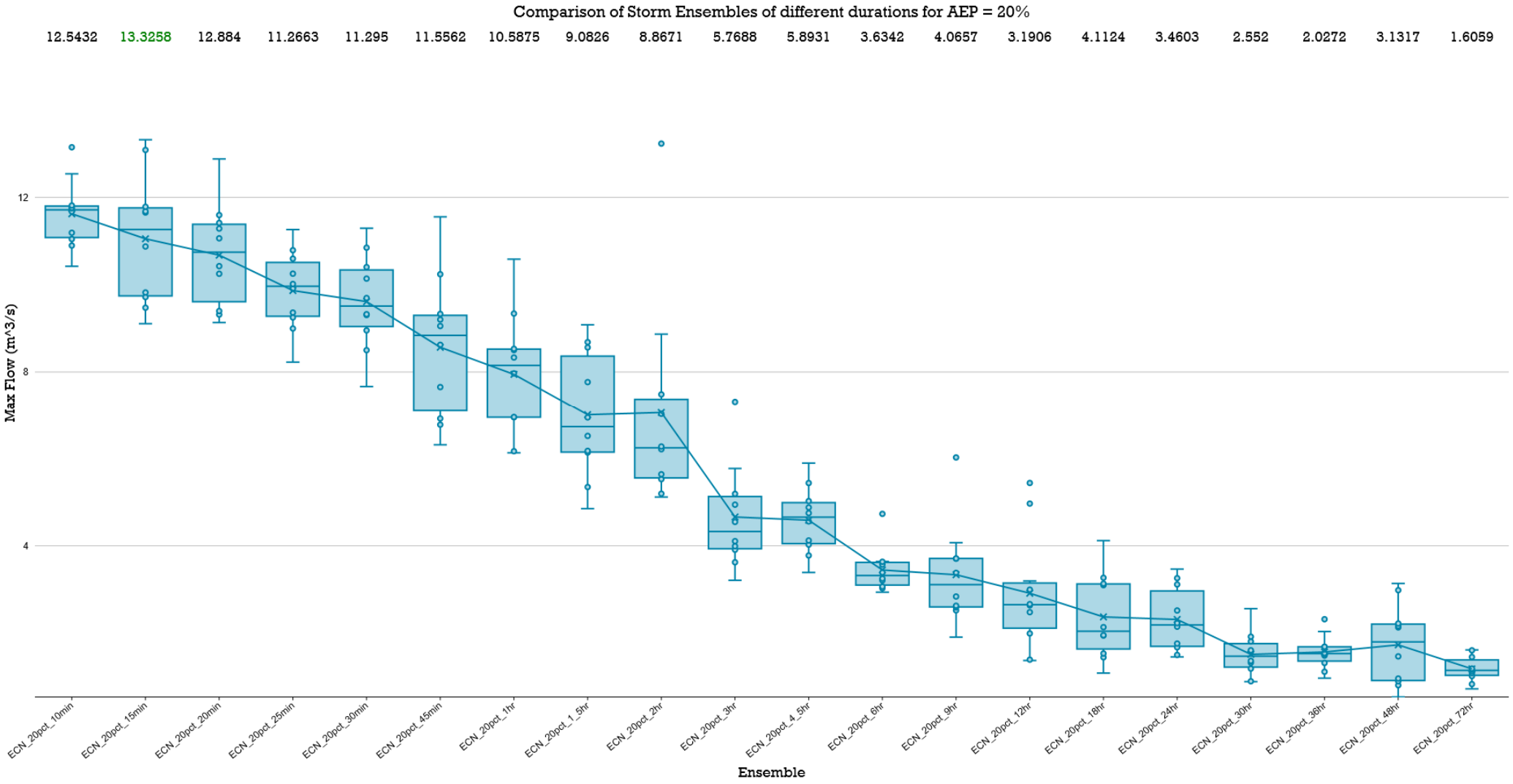

Comparison of Storm Ensembles of different durations for AEP = 2%
21.1192
20.831
19.7307
19.6911
20.8503
18.6256
14.1239
12.5955
12.6928
10.8188
8.6718
9.19
10.3982
24
20
16
12
8
4
Max Flow (m^3/s)
ECN_2pct_10min
ECN_2pct_15min
ECN_2pct_20min
ECN_2pct_25min
ECN_2pct_30min
ECN_2pct_45min
ECN_2pct_1hr
ECN_2pct_1_5hr
ECN_2pct_2hr
ECN_2pct_3hr
ECN_2pct_4_5hr
ECN_2pct_6hr
ECN_2pct_9hr
Ensemble

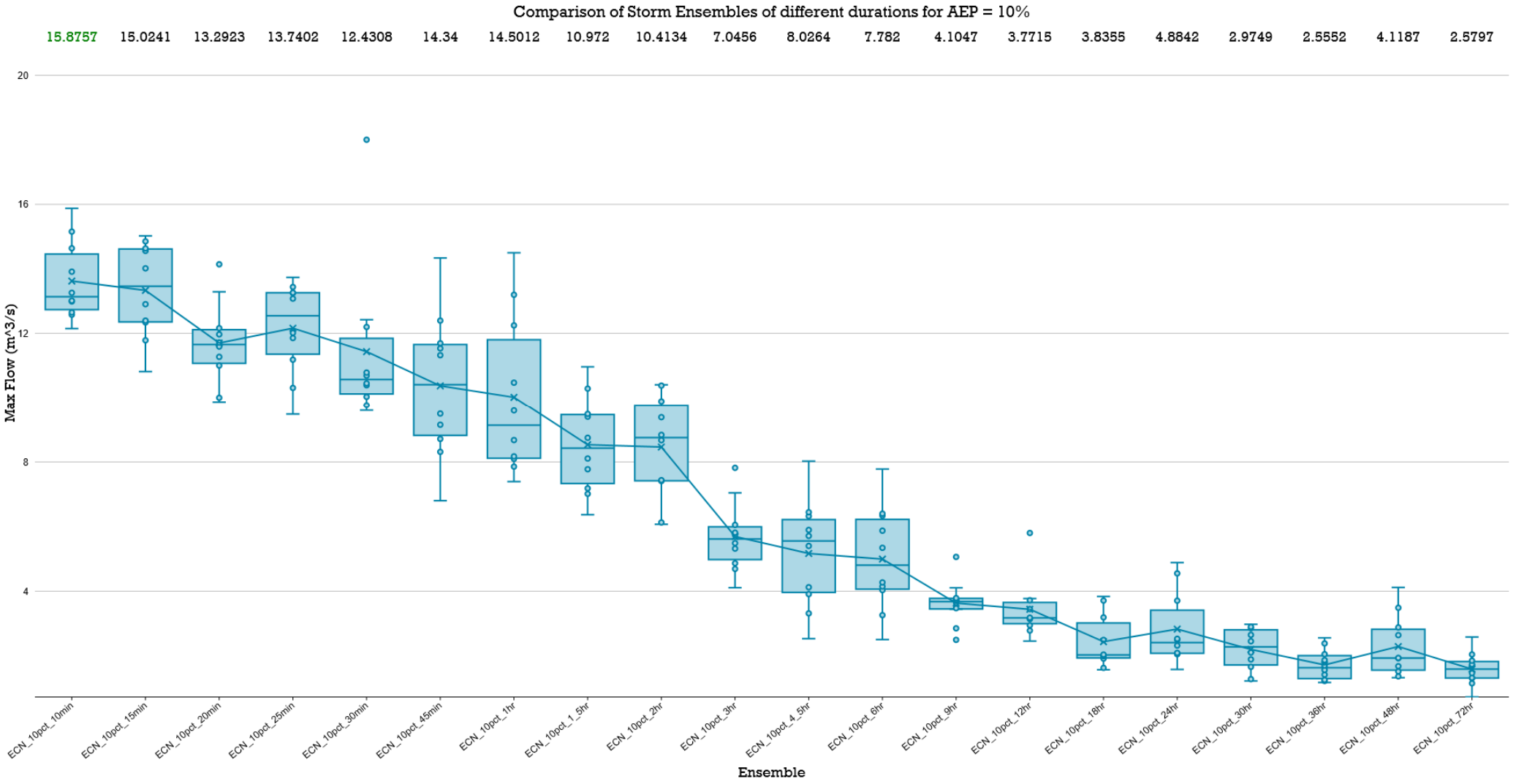

Comparison of Storm Ensembles of different durations for AEP = 1%
23.2979
23.0483
21.8923
21.8727
23.1713
20.9648
15.9888
14.357
14.6515
12.4475
9.974
10.7143
12.0511
Max Flow (m^3/s)
25
20
15
10
5
ECN_1pct_10min
ECN_1pct_15min
ECN_1pct_20min
ECN_1pct_25min
ECN_1pct_30min
ECN_1pct_45min
ECN_1pct_1hr
ECN_1pct_1_5hr
ECN_1pct_2hr
ECN_1pct_3hr
ECN_1pct_4_5hr
ECN_1pct_6hr
ECN_1pct_9hr
Ensemble

LPoD-1 POST DEVELOPED ‘MAXIMUM PEAK’ Box & Whisker Plots – *72 Hour*


Comparison of Storm Ensembles of different durations for AEP = 63.2%
8.1223
8.6323
8.236
7.1635
7.1861
7.3692
6.6282
5.5668
5.3939
3.4125
3.419
2.1437
2.3352
1.756
2.3165
1.939
1.0517
1.1114
1.7422
0.8622
Max Flow (m^3/s)
10
8
6
4
2
ECN_63pct_10min
ECN_63pct_15min
ECN_63pct_20min
ECN_63pct_25min
ECN_63pct_30min
ECN_63pct_45min
ECN_63pct_1hr
ECN_63pct_1_5hr
ECN_63pct_2hr
ECN_63pct_3hr
ECN_63pct_4_5hr
ECN_63pct_6hr
ECN_63pct_9hr
ECN_63pct_12hr
ECN_63pct_18hr
ECN_63pct_24hr
ECN_63pct_30hr
ECN_63pct_36hr
ECN_63pct_48hr
ECN_63pct_72hr
Ensemble

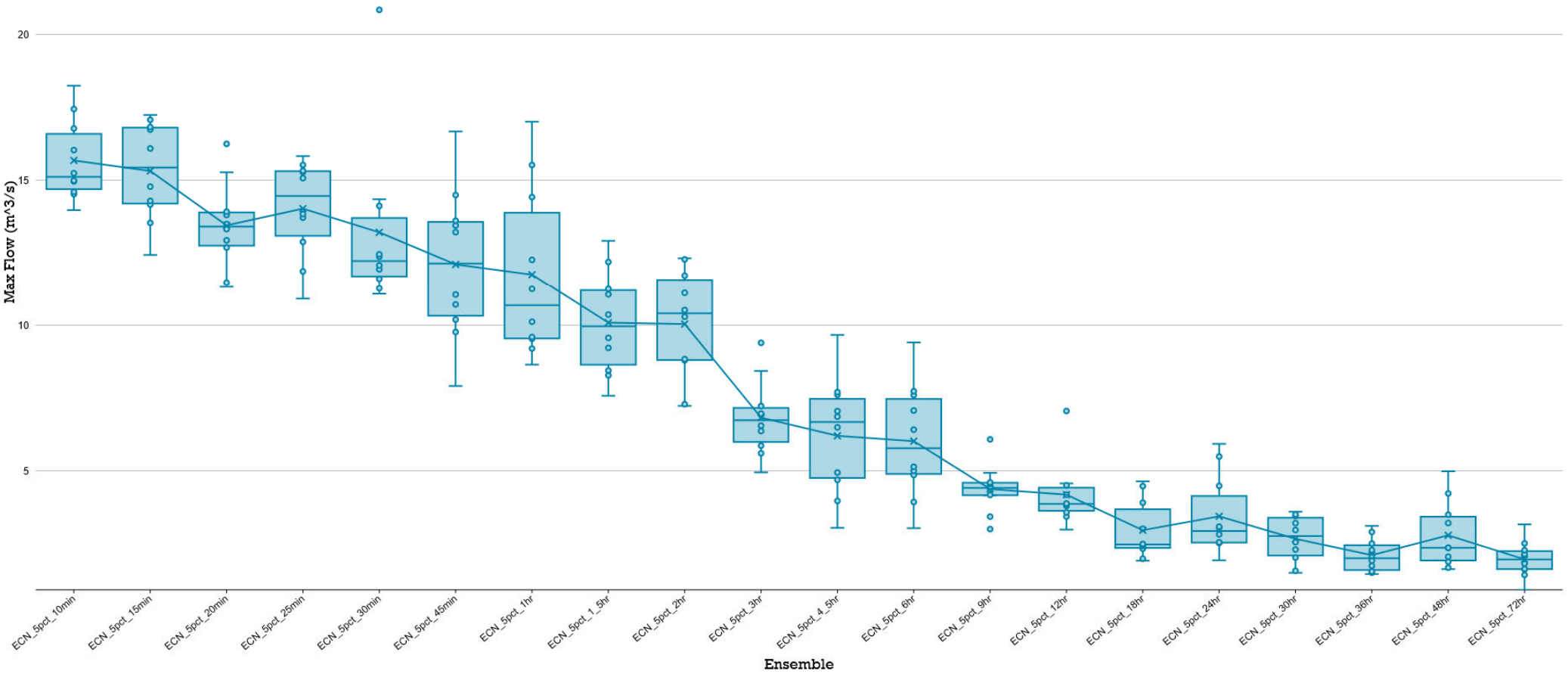

Comparison of Storm Ensembles of different durations for AEP = 0.5EY
10.1909
10.8501
10.4374
9.0998
9.1099
9.3185
8.4239
7.1306
6.9278
4.429
4.4648
2.7708
3.0682
2.3487
3.0672
2.5583
1.3994
1.4841
2.3011
1.1597
Max Flow (m^3/s)
12
10
8
6
4
2
ECN_0.5EY_10min
ECN_0.5EY_15min
ECN_0.5EY_20min
ECN_0.5EY_25min
ECN_0.5EY_30min
ECN_0.5EY_45min
ECN_0.5EY_1hr
ECN_0.5EY_1_5hr
ECN_0.5EY_2hr
ECN_0.5EY_3hr
ECN_0.5EY_4_5hr
ECN_0.5EY_6hr
ECN_0.5EY_9hr
ECN_0.5EY_12hr
ECN_0.5EY_18hr
ECN_0.5EY_24hr
ECN_0.5EY_30hr
ECN_0.5EY_36hr
ECN_0.5EY_48hr
ECN_0.5EY_72hr
Ensemble

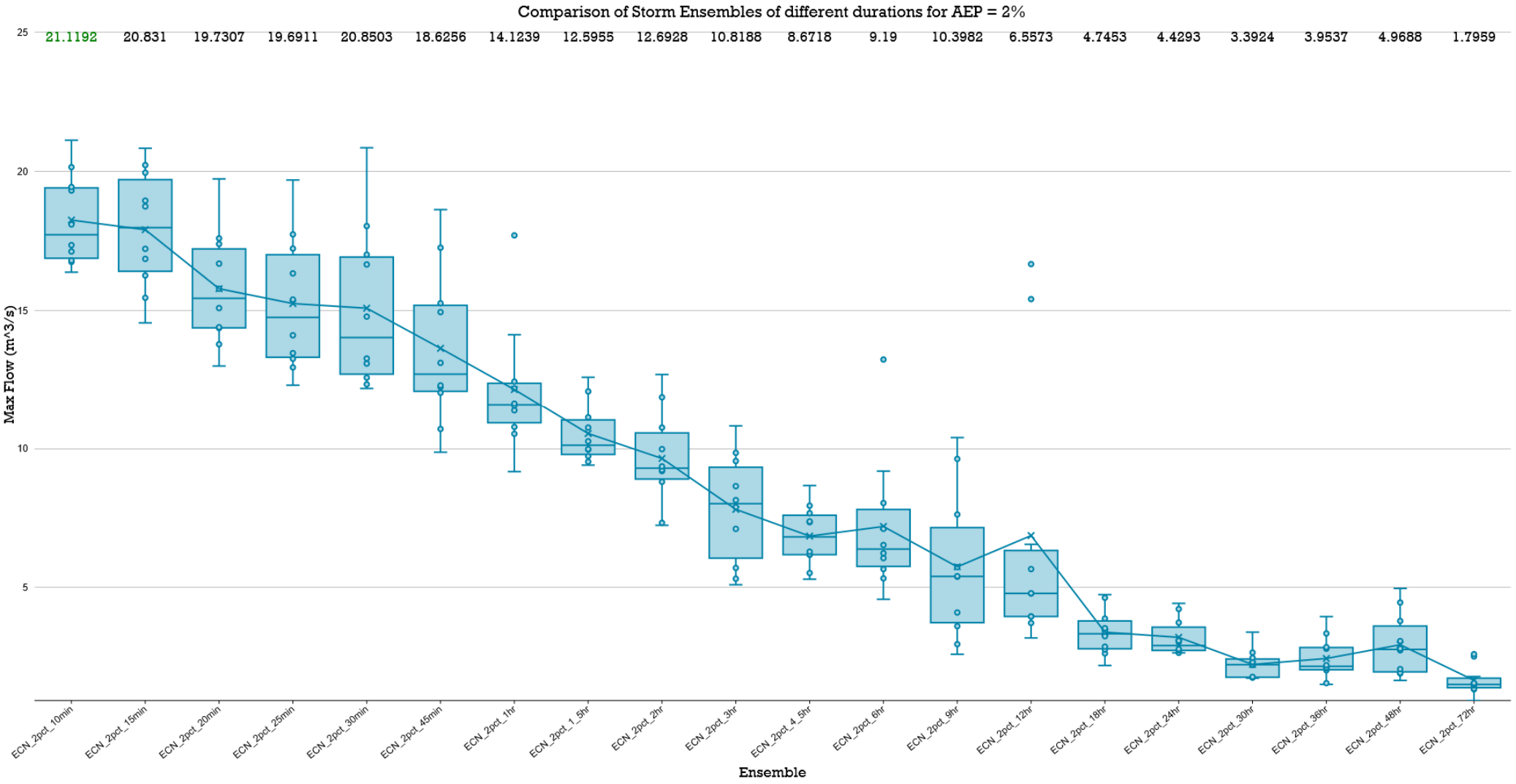

Comparison of Storm Ensembles of different durations for AEP = 20%
12.5432
13.3258
12.884
11.2663
11.295
11.5562
10.5875
9.0826
8.8671
5.7688
5.8931
3.6342
4.0657
3.1906
4.1124
3.4603
2.552
2.0272
3.1317
1.6059
Max Flow (m^3/s)
12
8
4
ECN_20pct_10min
ECN_20pct_15min
ECN_20pct_20min
ECN_20pct_25min
ECN_20pct_30min
ECN_20pct_45min
ECN_20pct_1hr
ECN_20pct_1_5hr
ECN_20pct_2hr
ECN_20pct_3hr
ECN_20pct_4_5hr
ECN_20pct_6hr
ECN_20pct_9hr
ECN_20pct_12hr
ECN_20pct_18hr
ECN_20pct_24hr
ECN_20pct_30hr
ECN_20pct_36hr
ECN_20pct_48hr
ECN_20pct_72hr
Ensemble


Comparison of Storm Ensembles of different durations for AEP = 10%
15.8757
15.0241
13.2923
13.7402
12.4308
14.34
14.5012
10.972
10.4134
7.0456
8.0264
7.782
4.1047
3.7715
3.8355
4.8842
2.9749
2.5552
4.1187
2.5797
20
16
12
8
4
Max Flow (m^3/s)
ECN_10pct_10min
ECN_10pct_15min
ECN_10pct_20min
ECN_10pct_25min
ECN_10pct_30min
ECN_10pct_45min
ECN_10pct_1hr
ECN_10pct_1_5hr
ECN_10pct_2hr
ECN_10pct_3hr
ECN_10pct_4_5hr
ECN_10pct_6hr
ECN_10pct_9hr
ECN_10pct_12hr
ECN_10pct_18hr
ECN_10pct_24hr
ECN_10pct_30hr
ECN_10pct_36hr
ECN_10pct_48hr
ECN_10pct_72hr
Ensemble

Comparison of Storm Ensembles of different durations for AEP = 5%

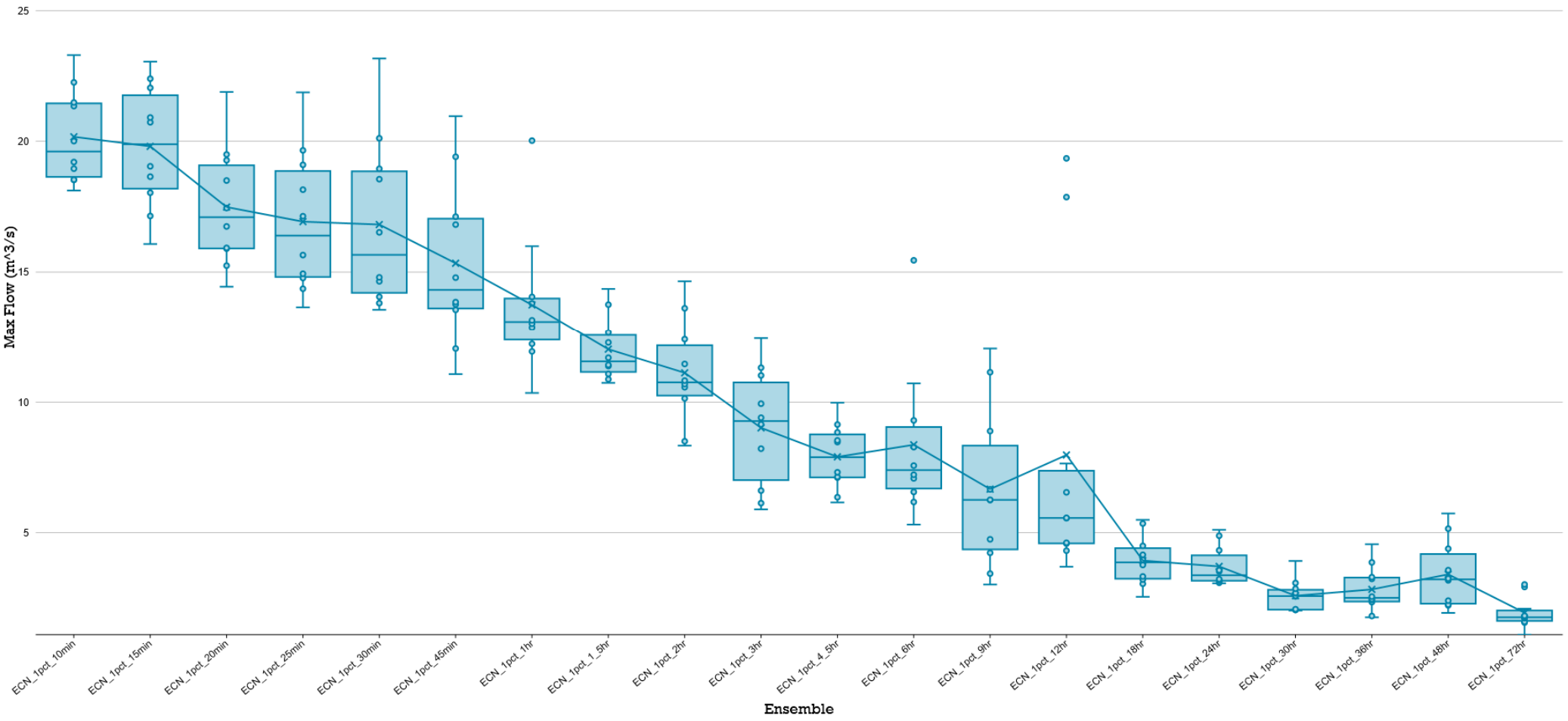
18.2378	17.2323	15.2687	15.8252	14.3405	16.668	17.0021	12.9144	12.3151	8.4237	9.6584	9.4001	4.9255	4.5602	4.6299	5.9171	3.5871	3.1008	4.9793	3.1517




Comparison of Storm Ensembles of different durations for AEP = 2%
21.1192
20.831
19.7307
19.6911
20.8503
18.6256
14.1239
12.5955
12.6928
10.8188
8.6718
9.19
10.3982
6.5573
4.7453
4.4293
3.3924
3.9537
4.9688
1.7959
Max Flow (m^3/s)
25
20
15
10
5
ECN_2pct_10min
ECN_2pct_15min
ECN_2pct_20min
ECN_2pct_25min
ECN_2pct_30min
ECN_2pct_45min
ECN_2pct_1hr
ECN_2pct_1_5hr
ECN_2pct_2hr
ECN_2pct_3hr
ECN_2pct_4_5hr
ECN_2pct_6hr
ECN_2pct_9hr
ECN_2pct_12hr
ECN_2pct_18hr
ECN_2pct_24hr
ECN_2pct_30hr
ECN_2pct_36hr
ECN_2pct_48hr
ECN_2pct_72hr
Ensemble

Comparison of Storm Ensembles of different durations for AEP = 1%

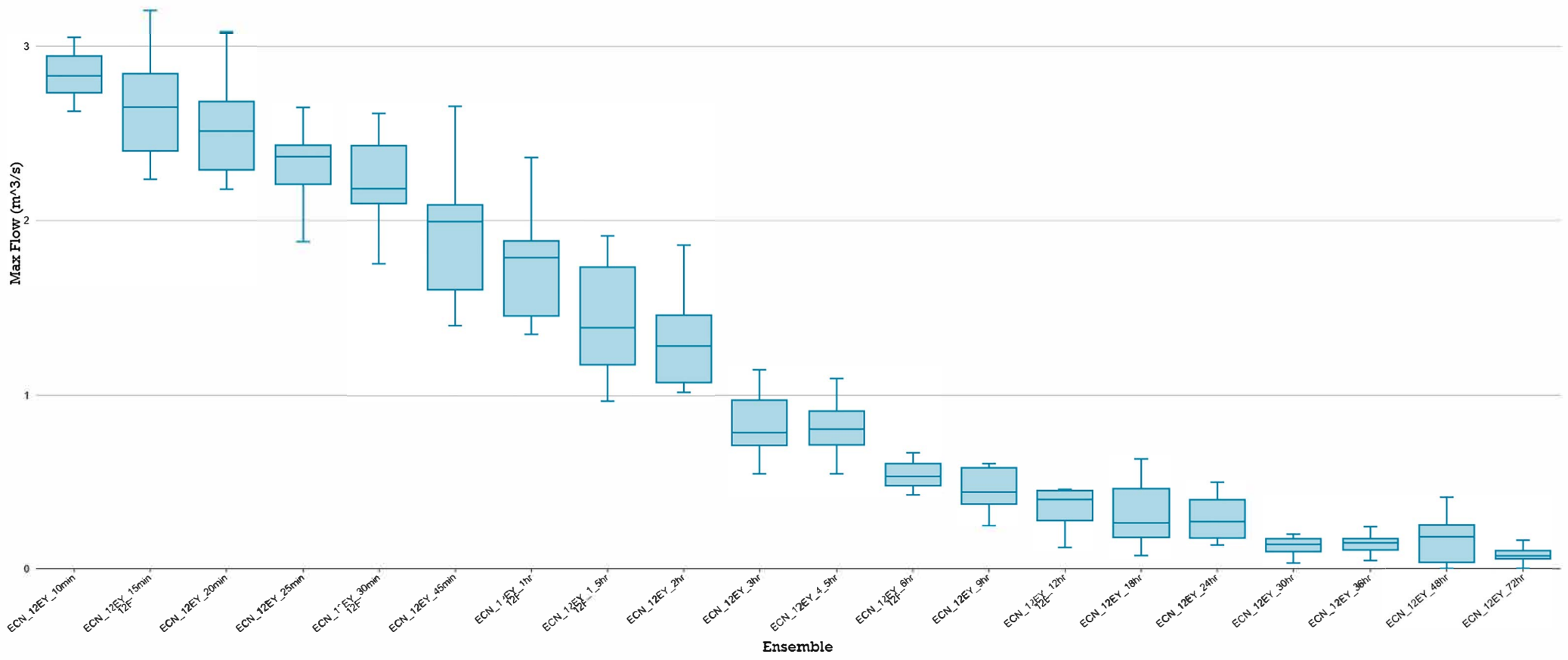
ECN_1pct_10min	ECN_1pct_15min	ECN_1pct_20min	ECN_1pct_25min	ECN_1pct_30min	ECN_1pct_45min	ECN_1pct_1hr	ECN_1pct_1_5hr	ECN_1pct_2hr	ECN_1pct_3hr	ECN_1pct_4_5hr	ECN_1pct_6hr	ECN_1pct_9hr	ECN_1pct_12hr	ECN_1pct_18hr	ECN_1pct_24hr	ECN_1pct_30hr	ECN_1pct_36hr	ECN_1pct_48hr	ECN_1pct_72hr
23.2979	23.0483	21.8923	21.8727	23.1713	20.9648	15.9888	14.357	14.6515	12.4475	9.974	10.7143	12.0511	7.646	5.4895	5.1063	3.9156	4.558	5.7366	2.0902



LPoD-1 POST DEVELOPED ‘MEAN PEAK’ Box & Whisker Plots – *72 Hour*

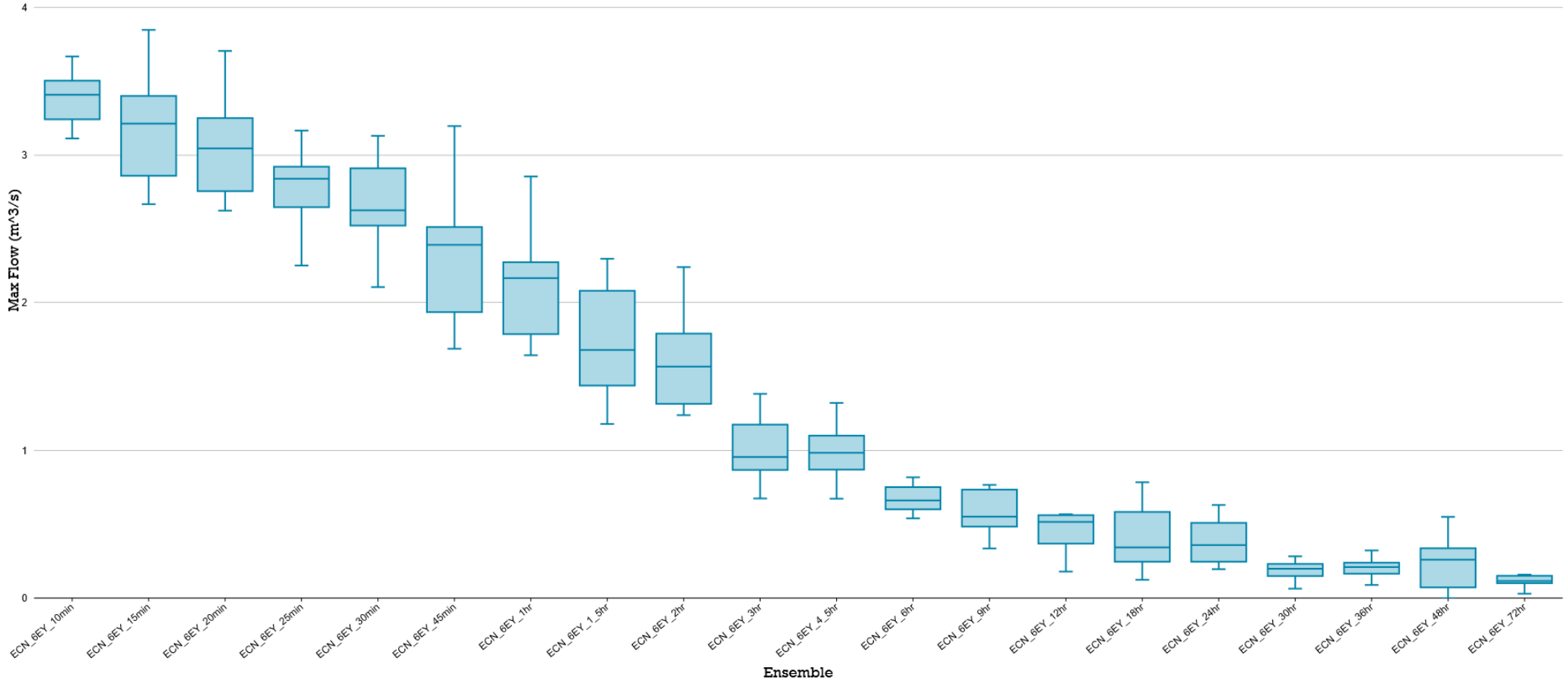
Comparison of Storm Ensembles of different durations for AEP = 12EY

2.8654	2.6711	2.5241	2.3171	2.2151	1.913	1.7325	1.4381	1.4313	0.8615	0.8059	0.5621	0.4997	0.4119	0.3157	0.2882	0.1417	0.151	0.1697	0.0794



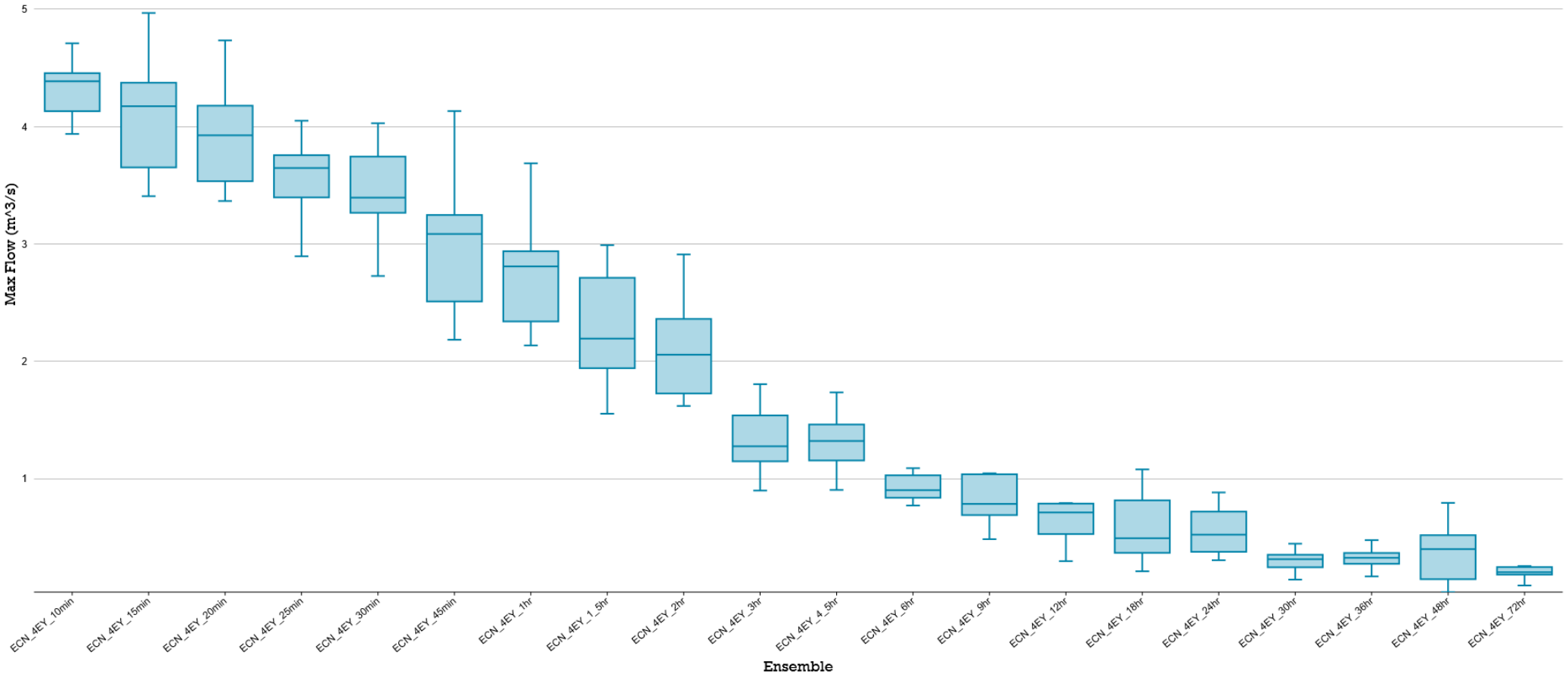
Comparison of Storm Ensembles of different durations for AEP = 6EY

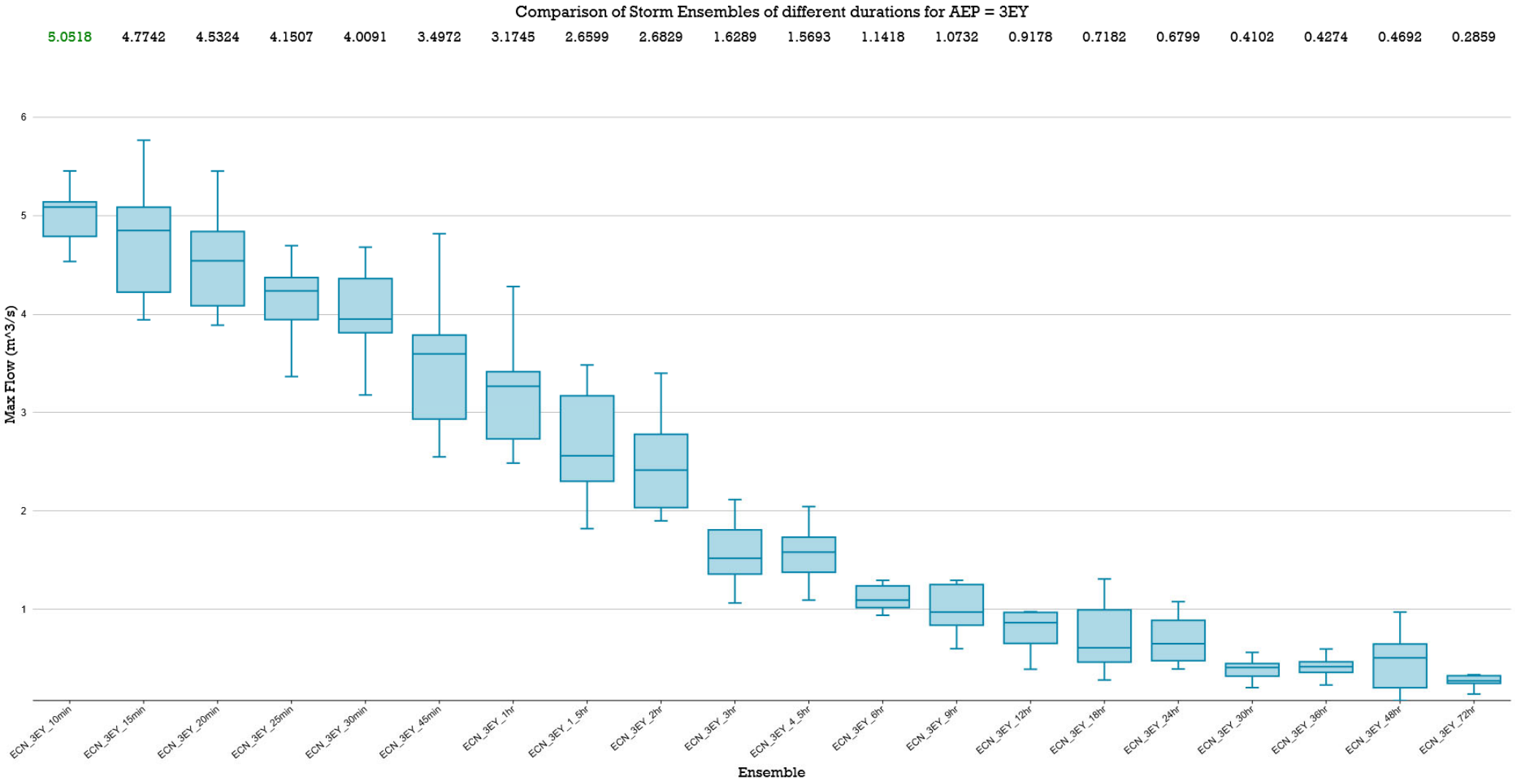
3.4185	3.2049	3.0468	2.7816	2.6634	2.3093	2.104	1.7373	1.7445	1.045	0.9821	0.6941	0.6317	0.5318	0.4093	0.3786	0.2031	0.216	0.2382	0.1268

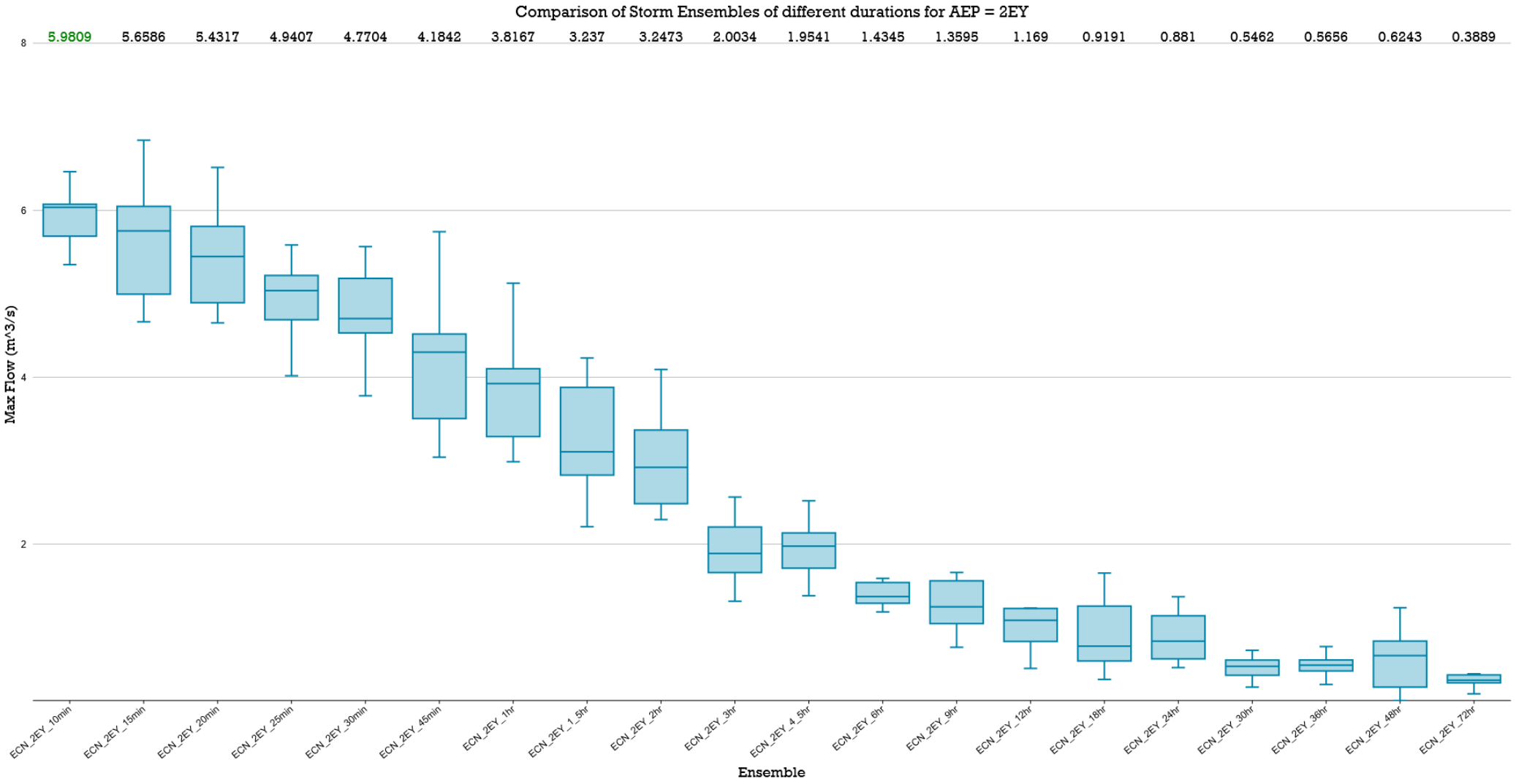


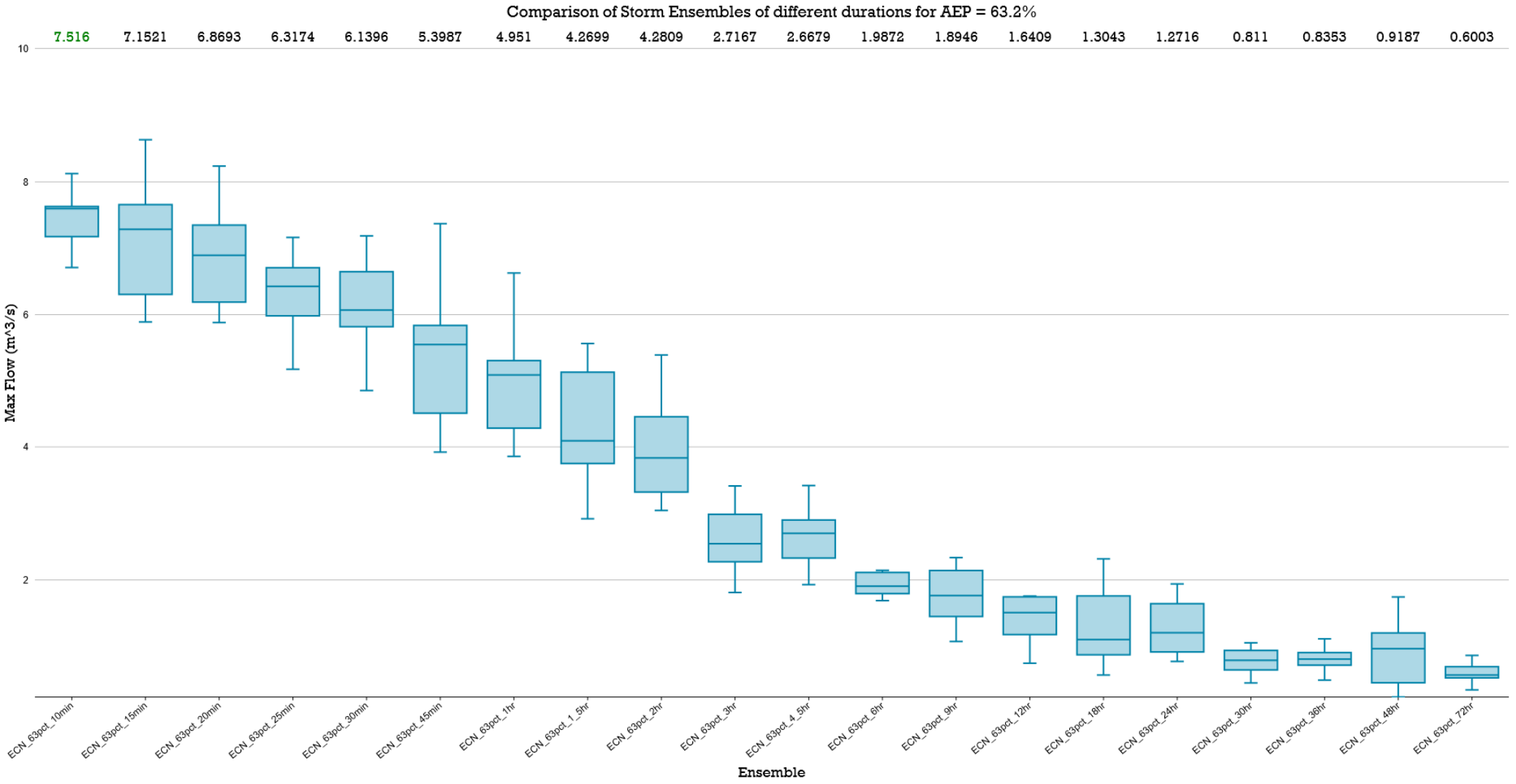
Comparison of Storm Ensembles of different durations for AEP = 4EY

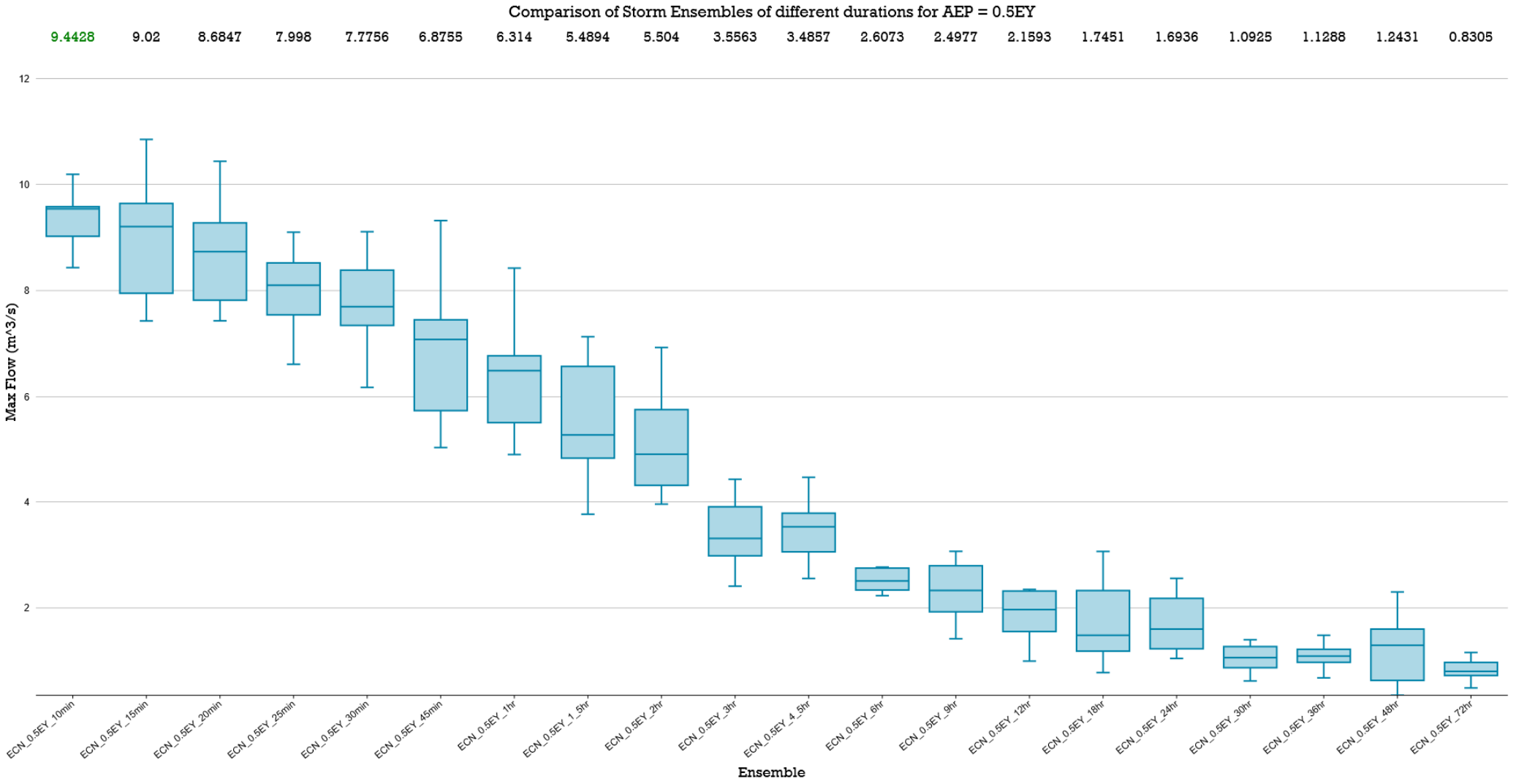
4.3664	4.1173	3.9193	3.5722	3.4406	2.9934	2.728	2.2753	2.2867	1.3793	1.3164	0.9473	0.8817	0.7504	0.5848	0.549	0.3212	0.3365	0.37	0.2174




Comparison of Storm Ensembles of different durations for AEP = 3EY
5.0518 4.7742 4.5324 4.1507 4.0091 3.4972 3.1745 2.6599 2.6829 1.6289 1.5693 1.1418 1.0732 0.9178 0.7182 0.6799 0.4102 0.4274 0.4692 0.2859
Max Flow (m^3/s)
6
5
4
3
2
1
ECN_3EY_10min
ECN_3EY_15min
ECN_3EY_20min
ECN_3EY_25min
ECN_3EY_30min
ECN_3EY_45min
ECN_3EY_1hr
ECN_3EY_1_5hr
ECN_3EY_2hr
ECN_3EY_3hr
ECN_3EY_4_5hr
ECN_3EY_6hr
ECN_3EY_9hr
ECN_3EY_12hr
ECN_3EY_18hr
ECN_3EY_24hr
ECN_3EY_30hr
ECN_3EY_36hr
ECN_3EY_48hr
ECN_3EY_72hr
Ensemble

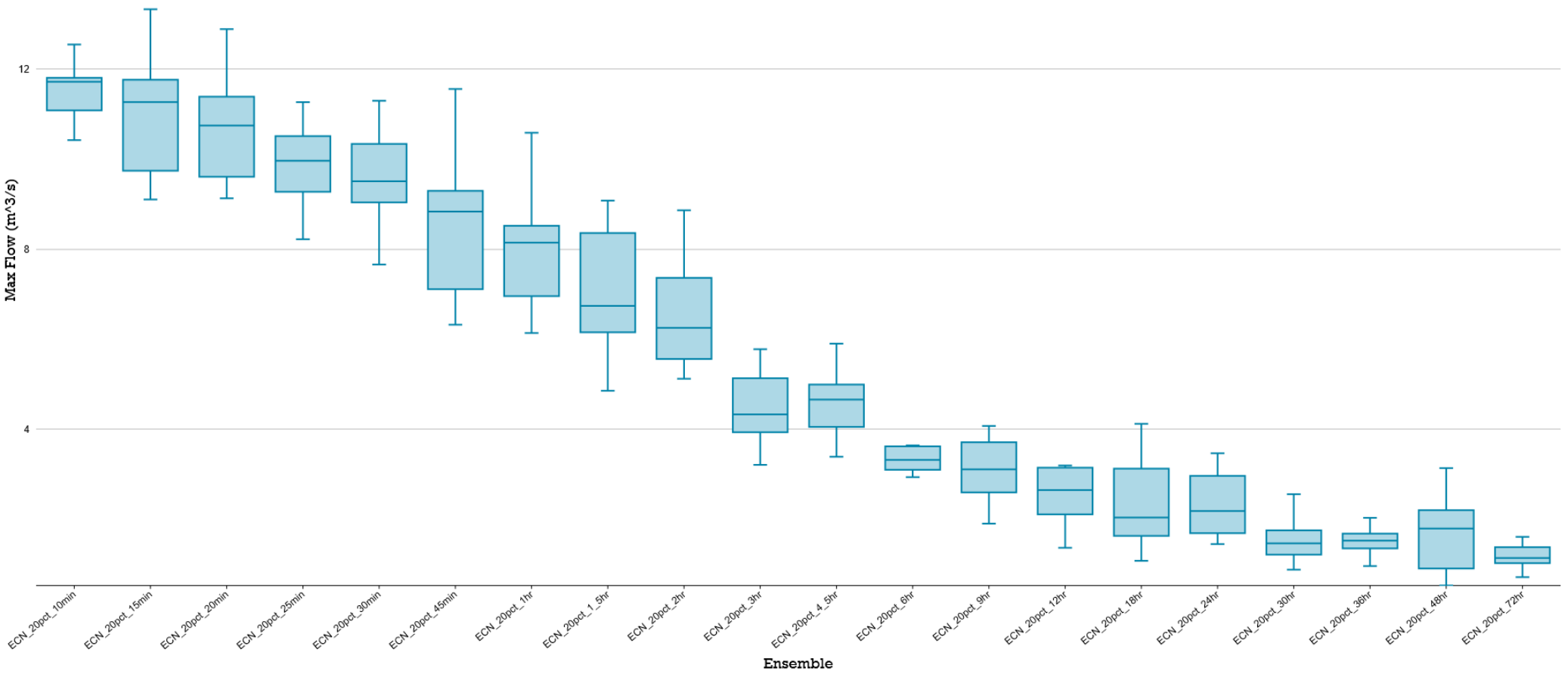

Comparison of Storm Ensembles of different durations for AEP = 2EY
5.9809
5.6586
5.4317
4.9407
4.7704
4.1842
3.8167
3.237
3.2473
2.0034
1.9541
1.4345
1.3595
1.169
0.9191
0.881
0.5462
0.5656
0.6243
0.3889
Max Flow (m^3/s)
8
6
4
2
ECN_2EY_10min
ECN_2EY_15min
ECN_2EY_20min
ECN_2EY_25min
ECN_2EY_30min
ECN_2EY_45min
ECN_2EY_1hr
ECN_2EY_1_5hr
ECN_2EY_2hr
ECN_2EY_3hr
ECN_2EY_4_5hr
ECN_2EY_6hr
ECN_2EY_9hr
ECN_2EY_12hr
ECN_2EY_18hr
ECN_2EY_24hr
ECN_2EY_30hr
ECN_2EY_36hr
ECN_2EY_48hr
ECN_2EY_72hr
Ensemble

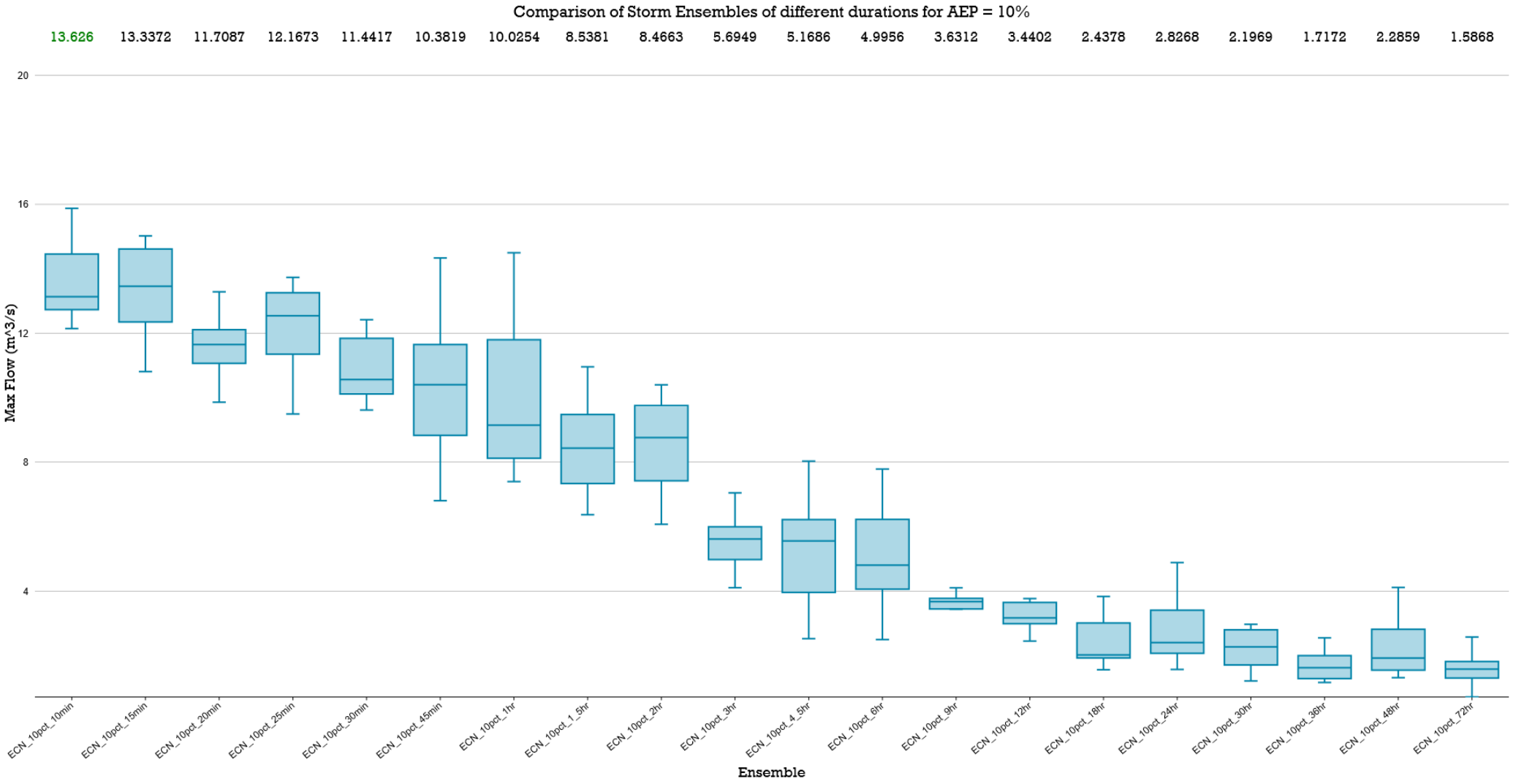

Comparison of Storm Ensembles of different durations for AEP = 63.2%
7.516
7.1521
6.8693
6.3174
6.1396
5.3987
4.951
4.2699
4.2809
2.7167
2.6679
1.9872
1.8946
1.6409
1.3043
1.2716
0.811
0.8353
0.9187
0.6003
Max Flow (m^3/s)
10
8
6
4
2
ECN_63pct_10min
ECN_63pct_15min
ECN_63pct_20min
ECN_63pct_25min
ECN_63pct_30min
ECN_63pct_45min
ECN_63pct_1hr
ECN_63pct_1_5hr
ECN_63pct_2hr
ECN_63pct_3hr
ECN_63pct_4_5hr
ECN_63pct_6hr
ECN_63pct_9hr
ECN_63pct_12hr
ECN_63pct_18hr
ECN_63pct_24hr
ECN_63pct_30hr
ECN_63pct_36hr
ECN_63pct_48hr
ECN_63pct_72hr
Ensemble


Comparison of Storm Ensembles of different durations for AEP = 0.5EY
9.4428
9.02
8.6847
7.998
7.7756
6.8755
6.314
5.4894
5.504
3.5563
3.4857
2.6073
2.4977
2.1593
1.7451
1.6936
1.0925
1.1288
1.2431
0.8305
Max Flow (m^3/s)
12
10
8
6
4
2
ECN_0.5EY_10min
ECN_0.5EY_15min
ECN_0.5EY_20min
ECN_0.5EY_25min
ECN_0.5EY_30min
ECN_0.5EY_45min
ECN_0.5EY_1hr
ECN_0.5EY_1_5hr
ECN_0.5EY_2hr
ECN_0.5EY_3hr
ECN_0.5EY_4_5hr
ECN_0.5EY_6hr
ECN_0.5EY_9hr
ECN_0.5EY_12hr
ECN_0.5EY_18hr
ECN_0.5EY_24hr
ECN_0.5EY_30hr
ECN_0.5EY_36hr
ECN_0.5EY_48hr
ECN_0.5EY_72hr
Ensemble

Comparison of Storm Ensembles of different durations for AEP = 20%

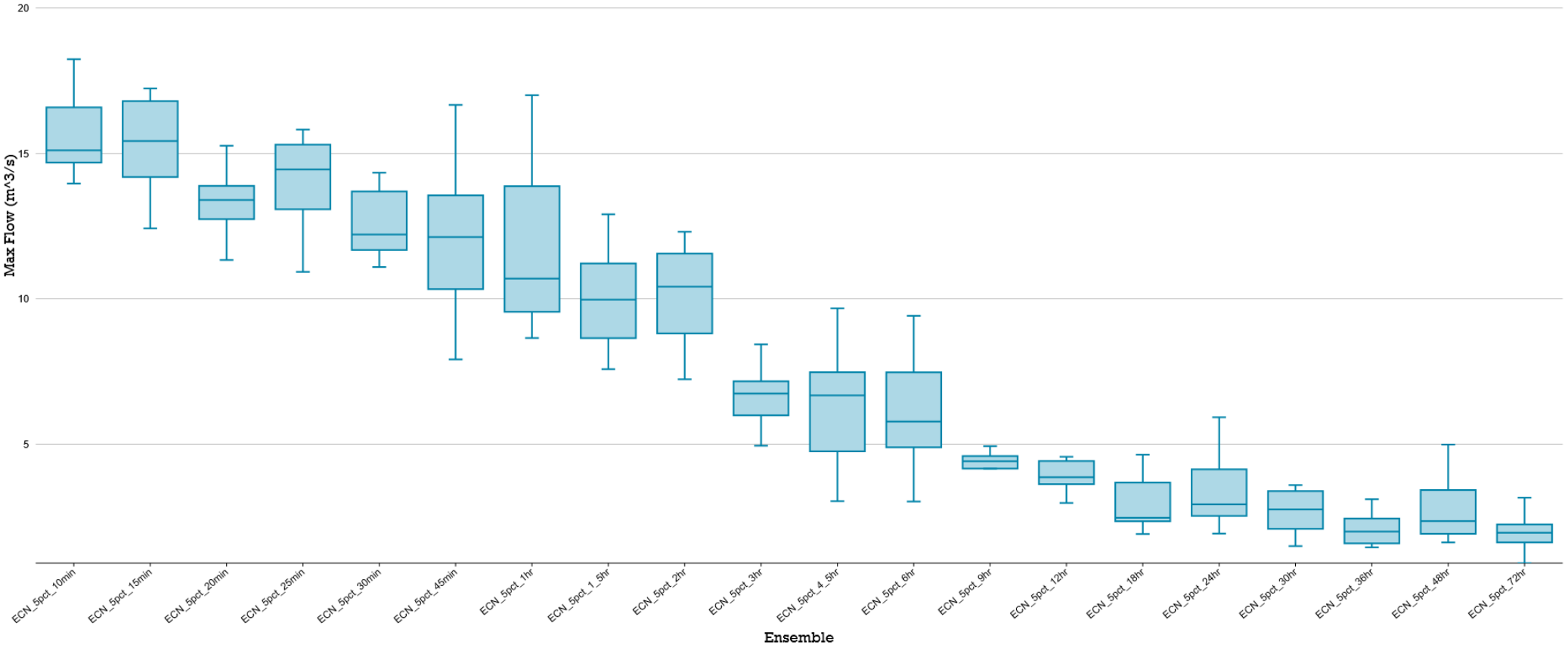
11.6273	11.0543	10.6785	9.8678	9.6142	8.567	7.9457	7.0062	7.057	4.6567	4.5827	3.4398	3.3319	2.9072	2.364	2.3052	1.5041	1.5587	1.7221	1.1714

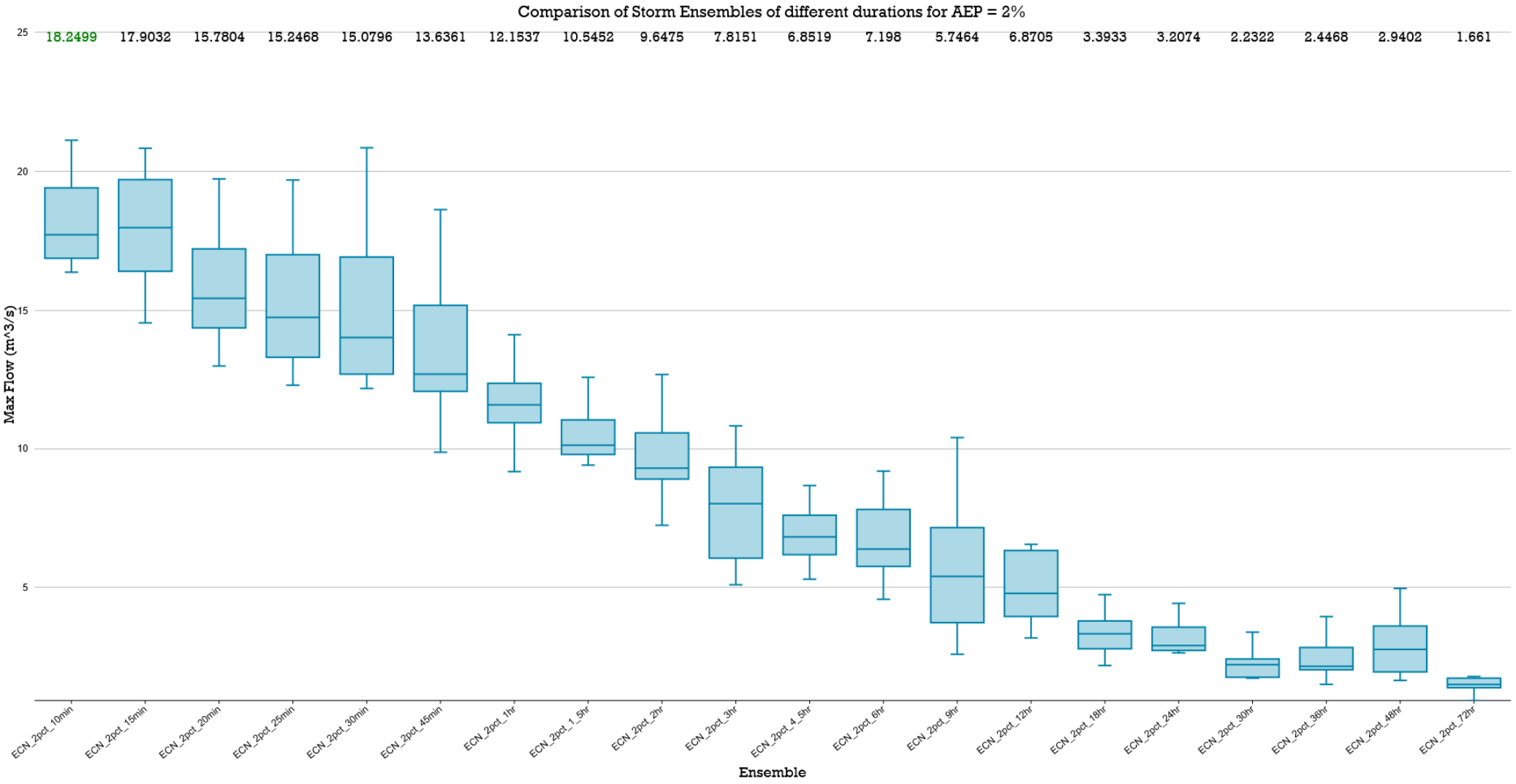


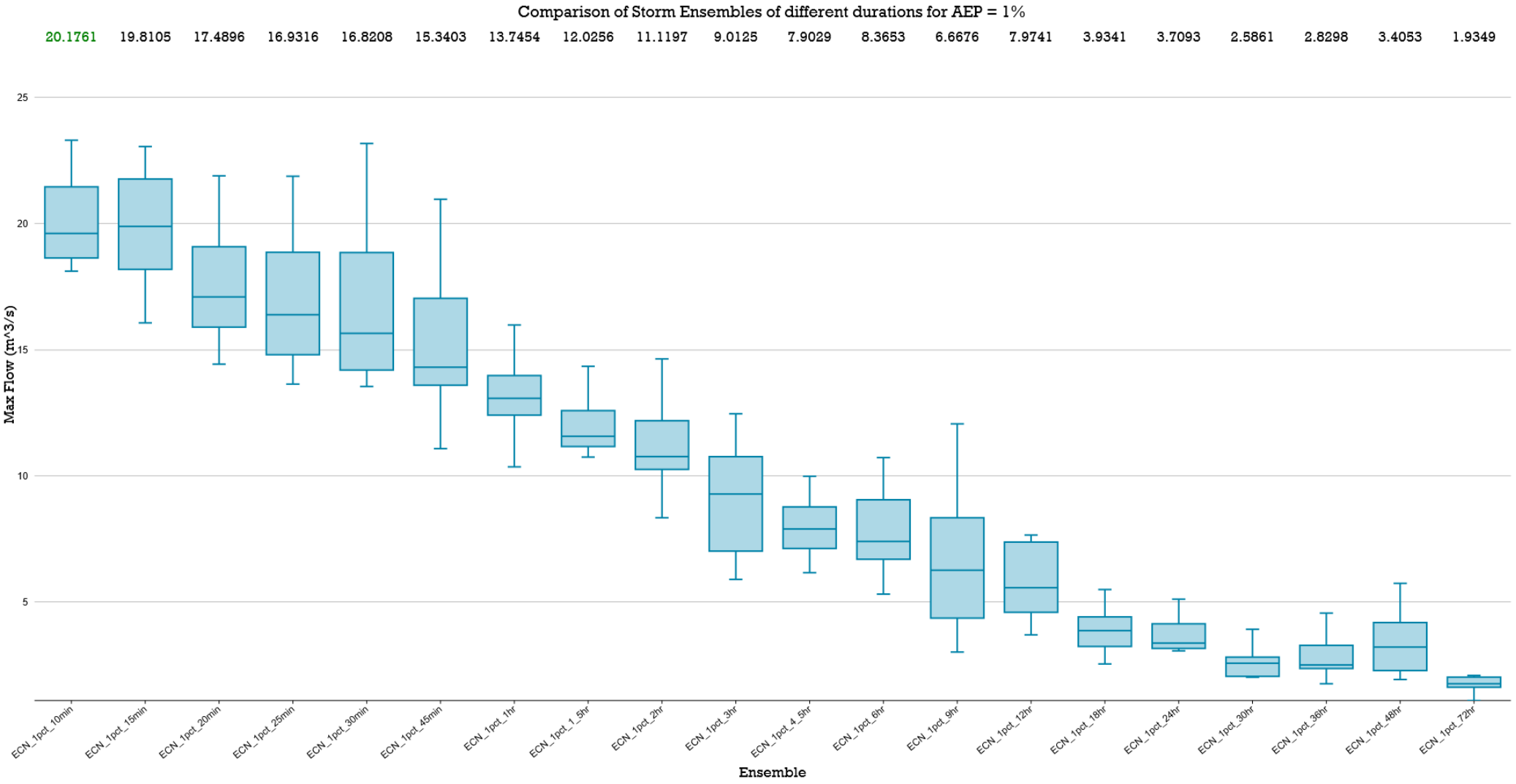

Comparison of Storm Ensembles of different durations for AEP = 10%
13.626
13.3372
11.7087
12.1673
11.4417
10.3819
10.0254
8.5381
8.4663
5.6949
5.1686
4.9956
3.6312
3.4402
2.4378
2.8268
2.1969
1.7172
2.2859
1.5868
20
16
12
8
4
Max Flow (m^3/s)
ECN_10pct_10min
ECN_10pct_15min
ECN_10pct_20min
ECN_10pct_25min
ECN_10pct_30min
ECN_10pct_45min
ECN_10pct_1hr
ECN_10pct_1_5hr
ECN_10pct_2hr
ECN_10pct_3hr
ECN_10pct_4_5hr
ECN_10pct_6hr
ECN_10pct_9hr
ECN_10pct_12hr
ECN_10pct_18hr
ECN_10pct_24hr
ECN_10pct_30hr
ECN_10pct_36hr
ECN_10pct_48hr
ECN_10pct_72hr
Ensemble

Comparison of Storm Ensembles of different durations for AEP = 5%

15.6748	15.3129	13.4465	14.0215	13.2084	12.1037	11.7508	10.0824	10.0345	6.8199	6.1953	6.0114	4.3687	4.1741	2.9546	3.4308	2.6576	2.0952	2.7783	1.9519




Comparison of Storm Ensembles of different durations for AEP = 2%
18.2499
17.9032
15.7804
15.2468
15.0796
13.6361
12.1537
10.5452
9.6475
7.8151
6.8519
7.198
5.7464
6.8705
3.3933
3.2074
2.2322
2.4468
2.9402
1.661
Max Flow (m^3/s)
25
20
15
10
5
ECN_2pct_10min
ECN_2pct_15min
ECN_2pct_20min
ECN_2pct_25min
ECN_2pct_30min
ECN_2pct_45min
ECN_2pct_1hr
ECN_2pct_1_5hr
ECN_2pct_2hr
ECN_2pct_3hr
ECN_2pct_4_5hr
ECN_2pct_6hr
ECN_2pct_9hr
ECN_2pct_12hr
ECN_2pct_18hr
ECN_2pct_24hr
ECN_2pct_30hr
ECN_2pct_36hr
ECN_2pct_48hr
ECN_2pct_72hr
Ensemble


Comparison of Storm Ensembles of different durations for AEP = 1%
20.1761 19.8105 17.4896 16.9316 16.8208 15.3403 13.7454 12.0256 11.1197 9.0125 7.9029 8.3653 6.6676 7.9741 3.9341 3.7093 2.5861 2.8298 3.4053 1.9349
Max Flow (m^3/s)
25
20
15
10
5
ECN_1pct_10min
ECN_1pct_15min
ECN_1pct_20min
ECN_1pct_25min
ECN_1pct_30min
ECN_1pct_45min
ECN_1pct_1hr
ECN_1pct_1_5hr
ECN_1pct_2hr
ECN_1pct_3hr
ECN_1pct_4_5hr
ECN_1pct_6hr
ECN_1pct_9hr
ECN_1pct_12hr
ECN_1pct_18hr
ECN_1pct_24hr
ECN_1pct_30hr
ECN_1pct_36hr
ECN_1pct_48hr
ECN_1pct_72hr
Ensemble

Appendix M – Mitigation Results

Worksheet for Combined Discharge Devices from Bio Retention Basin for LPoD-1 (STAGE 2)

EVENT	MEAN PEAK *UNMITIGATED* FLOW	MEAN PEAK MITIGATED FLOW m3/s	MEAN PEAK TARGET FLOW (PRE-DEV) m3/s	PRE-DEVELOPED MEAN PEAK STORM DURATION	PASS?	POST-DEVELOPED CRITICAL MEAN PEAK STORM DURATION
63pct	7.5160	3.0839	3.3644	ECN_63pct_1_5hr	Yes	ECN_63pct_30min
0.5EY	9.4428	4.3736	4.8920	ECN_0.50EY_1_5hr	Yes	ECN_0.50EY_30min
20pct	11.6273	6.7270	7.0227	ECN_20pct_1hr	Yes	ECN_20pct_30min
10pct	13.6260	8.8570	9.1878	ECN_10pct_45min	Yes	ECN_10pct_25min
5pct	15.6748	10.8044	11.5355	ECN_5pct_45min	Yes	ECN_5pct_25min
2pct	18.2499	13.0747	13.8167	ECN_2pct_45min	Yes	ECN_2pct_12hr
1pct	20.1761	14.8843	16.0856	ECN_1pct_30min	Yes	ECN_1pct_12hr

BASIN OUTLET CONFIGURATION "CONDUIT" MEAN PEAK FLOWS								ASSOCIATED BASIN INUNDATION DEPTHS / RL's			Compliance
1	2	3	4	5	6	7	TOTAL	Depth	WSE R.L.	Nominal Basin IL	
0.0000	1.0542	0.4059	0.4059	0.4059	0.4059	0.4059	**3.0839**	1.014	11.484	10.470	-
0.6562	1.4923	0.4450	0.4450	0.4450	0.4450	0.4450	**4.3736**	1.157	11.627	10.470	-
2.5741	1.8069	0.4692	0.4692	0.4692	0.4692	0.4692	**6.7270**	1.252	11.722	10.470	-
4.4108	2.0188	0.4855	0.4855	0.4855	0.4855	0.4855	**8.8570**	1.319	11.789	10.470	-
6.1388	2.1751	0.4981	0.4981	0.4981	0.4981	0.4981	**10.8044**	1.374	11.844	10.470	**NO**
8.1825	2.3346	0.5115	0.5115	0.5115	0.5115	0.5115	**13.0747**	1.432	11.902	10.470	-
9.8328	2.4445	0.5214	0.5214	0.5214	0.5214	0.5214	**14.8843**	1.476	11.946	10.470	-

< 1.20m

DESCRIPTION OF OUTLETS:	WEIR @ RL11.570 1.100m ABOVE IL	HIGH FLOW OUTLET PIPE 3/450 @ 1.145% IL 0.5m ABOVE IL	600x600 - 1	600x600 - 2	600x600 - 3	600x600 - 4	600x600 - 5

EVENT	MEAN PEAK MITIGATED FLOW m3/s	MEAN PEAK TARGET FLOW (PRE-DEV) m3/s	MITIGATED BY m3/s	MITIGATED BY %
63pct	3.0839	3.3644	0.2805	8.3%
0.5EY	4.3736	4.8920	0.5184	10.6%
20pct	6.7270	7.0227	0.2957	4.2%
10pct	8.8570	9.1878	0.3308	3.6%
5pct	10.8044	11.5355	0.7311	6.3%
2pct	13.0747	13.8167	0.7420	5.4%
1pct	14.8843	16.0856	1.2013	7.5%

NOTE: low flow outlet pipe size shall be 450 ***mm dia laid at 1.111% grade*** *(Maximum contributng floor / filter area = 3904m*

NOTE: exclusion fencing shall be installed to the basin perimeter to mitigate risks of public safety regarding safe wading dep

AREA FOR DETENTION	**7,288 m2**	<-------- *Surface Area measured at Weir Crest Level of RL11.570m AHD*
AREA FOR TREATMENT	**3,852 m2**	<-------- *Refer MUSIC-Link Report*

BASIN FLOOR IL: 10.470

BASIN WEIR RL: 11.570 (1.1m above floor)

BASIN CROWN: 12.651 (at lowest point)

FREEBOARD to 1% AEP ACHIEVED: 0.705 m

NORMAL' REPORTING OUTLINED IN ORANGE

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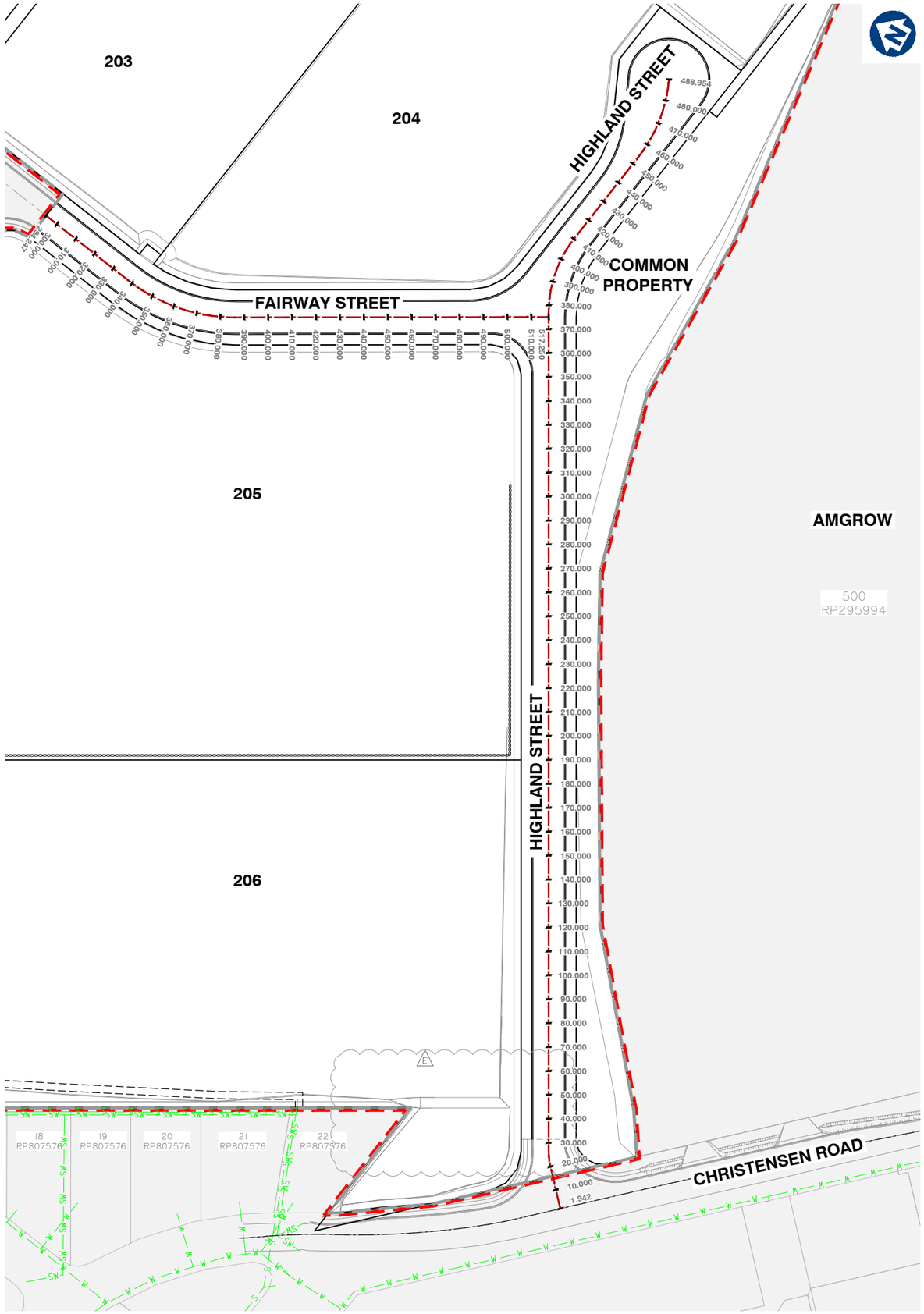
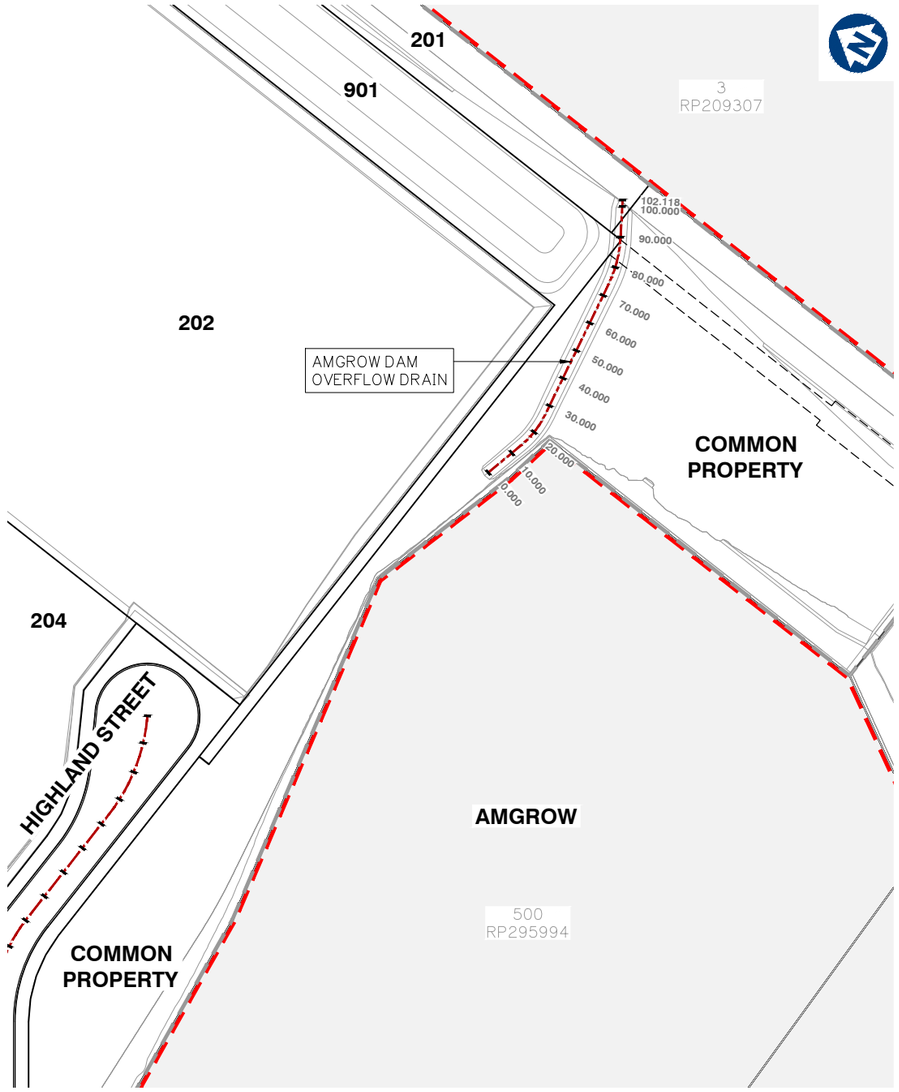
Appendix N – External Stormwater Catchment Conveyance Strategy





CONTROL LINE LAYOUT PLAN

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RPD:

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Meridian:	-
Contour Interval:	-
PSM:	-
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CONTROL LINE LAYOUT PLAN

Issue	Date	Description	DRN	CHK
E	23-05-2022	LOT 207 BOUNDARY REMOVED	LAB	MG
D	10-02-2022	LOT 205 BOUNDARY AND EARTHWORKS	DV	MG
C	24-09-2021	EXTENT OF STAGE 2 EARTHWORKS REDUCED	IG	MG
B	15-02-2021	INFORMATION REQUEST RESPONSE	IG	MG
A	20-11-2020	ORIGINAL ISSUE	BA	MG

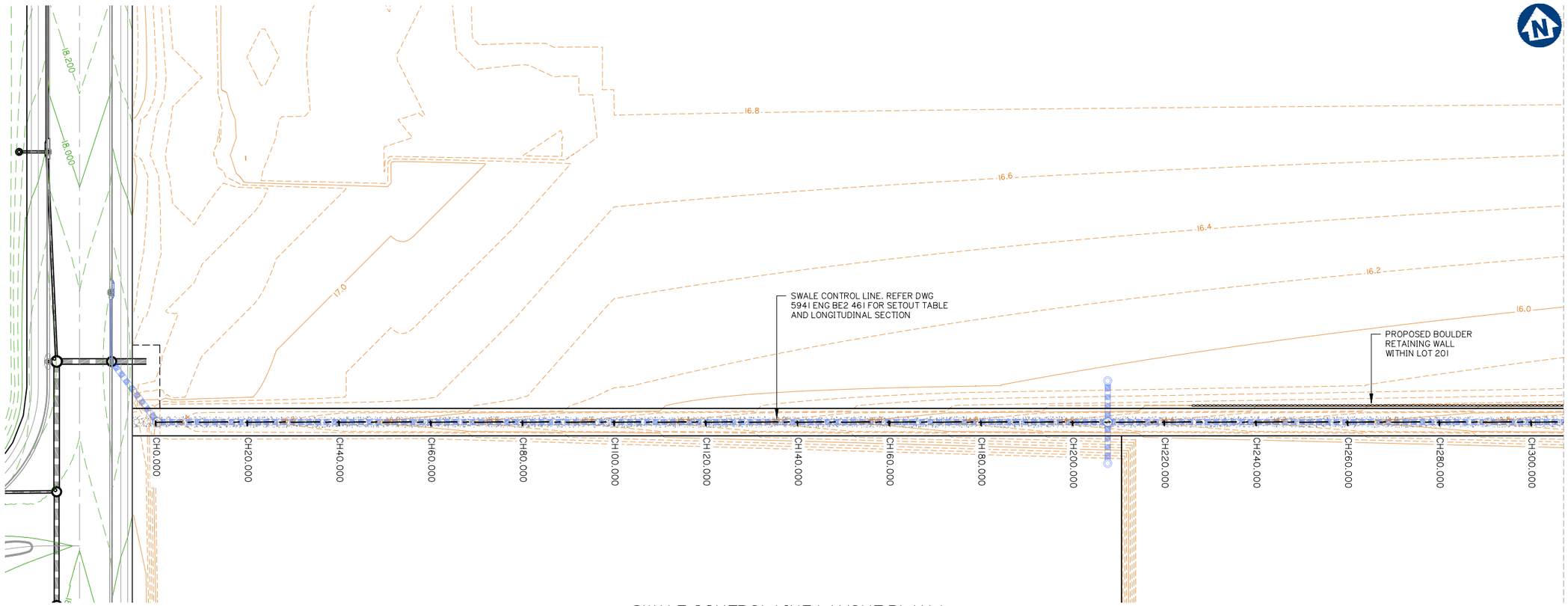
SCALE IN METRES

0 20 40 60 80 100

1:1000 (FULL SIZE A1)
1:2000 (HALF SIZE A3)

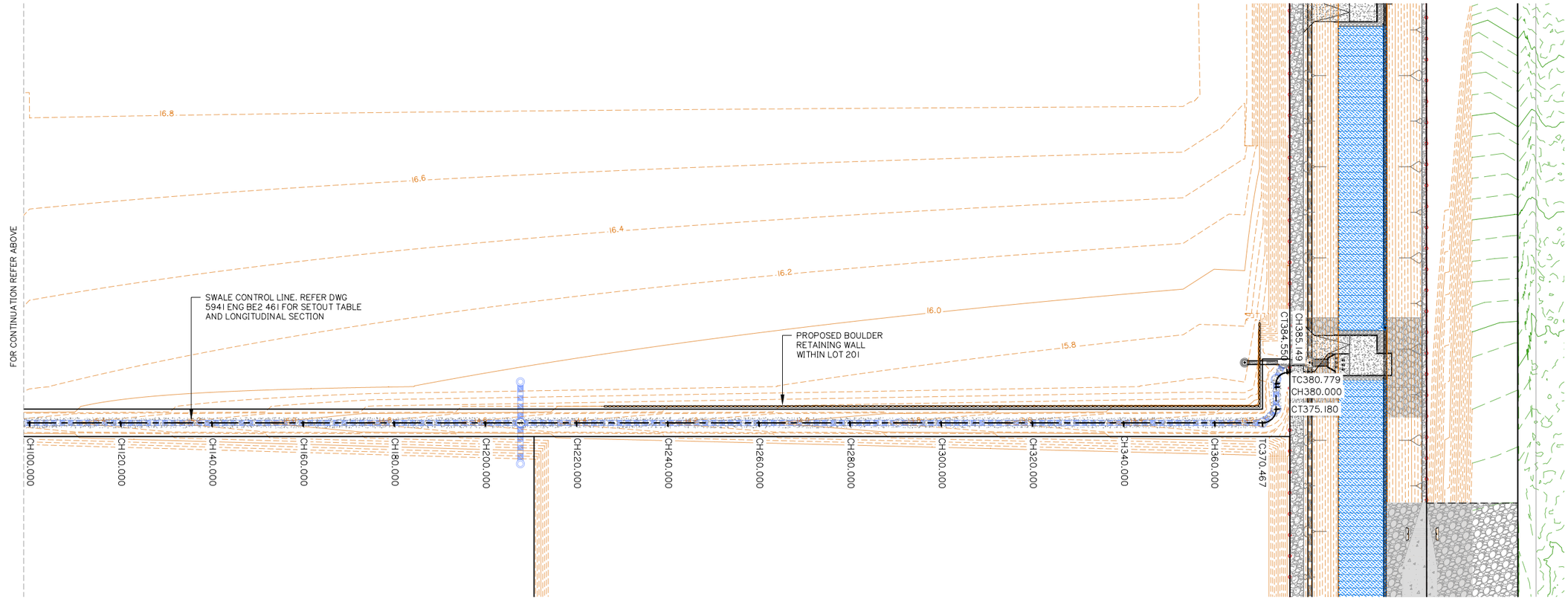
Scale at A1:	1:1000
Designed:	IG
Drafted:	IG / BA / LAB
Approved:	MG
RPEQ:	16939
Signed:	
Date:	23-05-2022

Drawing No: 5941 ENG BE2 400
Rev. No: E



SWALE CONTROL LINE LAYOUT PLAN 1

SCALE 1:500 (A1)



SWALE CONTROL LINE LAYOUT PLAN

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Issue	Date	Description	DRN	CHK
A	23-05-2022	ORIGINAL ISSUE	LAB	MG

SCALE IN METRES

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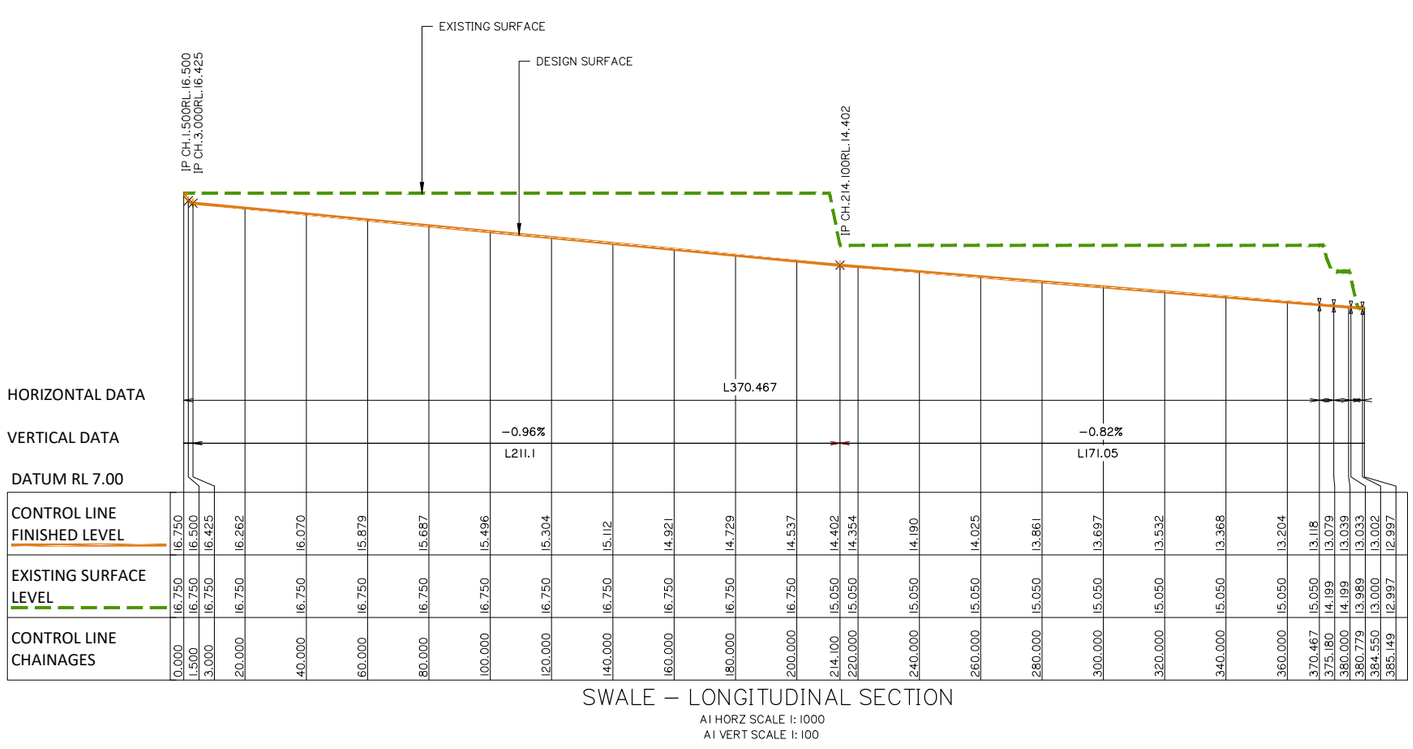
1:500 (FULL SIZE A1)
1:1000 (HALF SIZE A3)

Scale at A1:	1:500
Designed:	IG
Drafted:	IG BA / LAB
Approved:	MG
RPEQ:	16939
Signed:	
Date:	23-05-2022

Drawing No: 5941 ENG BE2 460
Rev. No: A

SWALE – CONTROL LINE								
PT	CHAINAGE	EASTING	NORTHING	HEIGHT	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
IP 1	0.000	2698.826	6808.023	16.750	99°13'15.50"			
	20.000	2718.567	6804.818	16.262	99°13'15.50"			
	40.000	2738.309	6801.613	16.070	99°13'15.50"			
	60.000	2758.050	6798.409	15.879	99°13'15.50"			
	80.000	2777.792	6795.204	15.687	99°13'15.50"			
	100.000	2797.533	6791.999	15.496	99°13'15.50"			
	120.000	2817.275	6788.794	15.304	99°13'15.50"			
	140.000	2837.017	6785.589	15.112	99°13'15.50"			
	160.000	2856.758	6782.384	14.921	99°13'15.50"			
	180.000	2876.500	6779.179	14.729	99°13'15.50"			
	200.000	2896.241	6775.975	14.537	99°13'15.50"			
	220.000	2915.983	6772.770	14.354	99°13'15.50"			
	240.000	2935.724	6769.565	14.190	99°13'15.50"			
	260.000	2955.466	6766.360	14.025	99°13'15.50"			
	280.000	2975.207	6763.155	13.861	99°13'15.50"			
	300.000	2994.949	6759.950	13.697	99°13'15.50"			
	320.000	3014.691	6756.746	13.532	99°13'15.50"			
	340.000	3034.432	6753.541	13.368	99°13'15.50"			
	360.000	3054.174	6750.336	13.204	99°13'15.50"			
TC	370.467	3064.506	6748.659	13.118	99°13'15.50"			
IP 2	372.824	3067.467	6748.178	13.098		R = –3.000	4.713	90°00'28.56"
CT	375.180	3067.948	6751.139	13.079	9°12'46.95"			
	380.000	3068.719	6755.897	13.039	9°12'46.95"			
TC	380.779	3068.844	6756.666	13.033	9°12'46.95"			
IP 3	382.664	3069.229	6759.036	13.018		R = 2.400	3.770	90°00'26.57"
CT	384.550	3071.598	6758.651	13.002	99°13'13.51"			
IP 4	385.149	3072.189	6758.555	12.997	99°13'13.51"			



SWALE – LONGITUDINAL SECTION

A1 HORZ SCALE 1: 1000
A1 VERT SCALE 1: 100

SWALE LONGITUDINAL SECTION AND SETOUT TABLE

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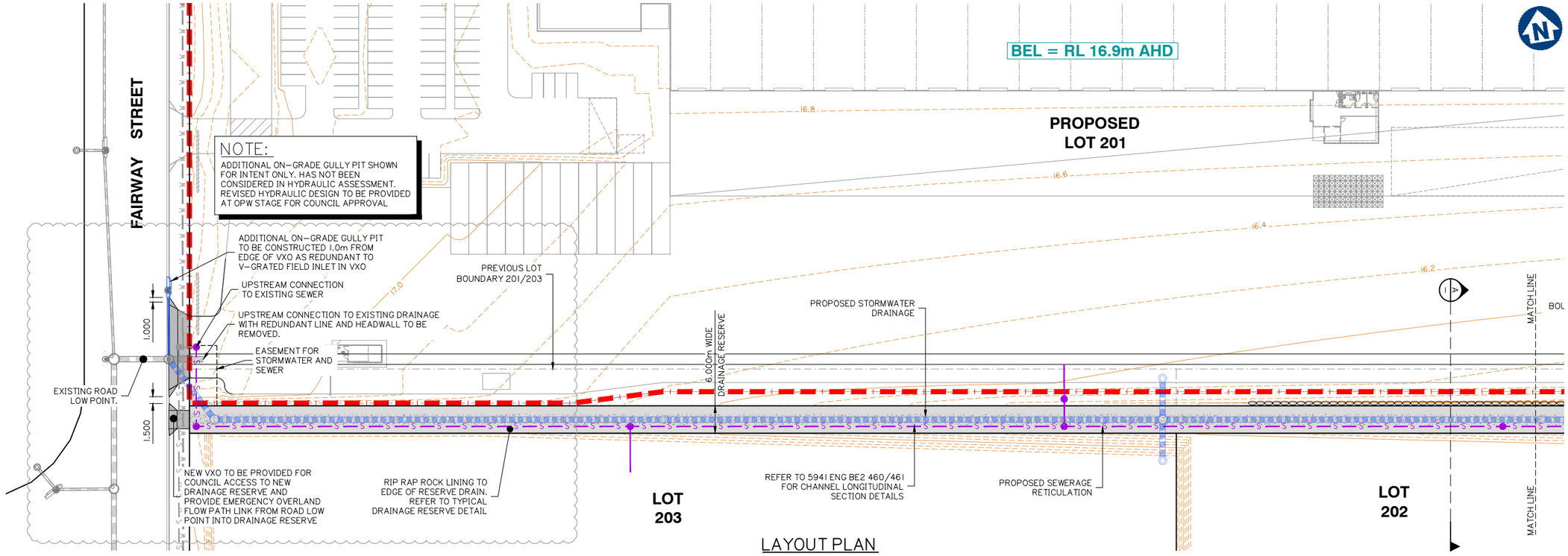
Issue	Date	Description	DRN	CHK
A	23-05-2022	ORIGINAL ISSUE	LAB	MG

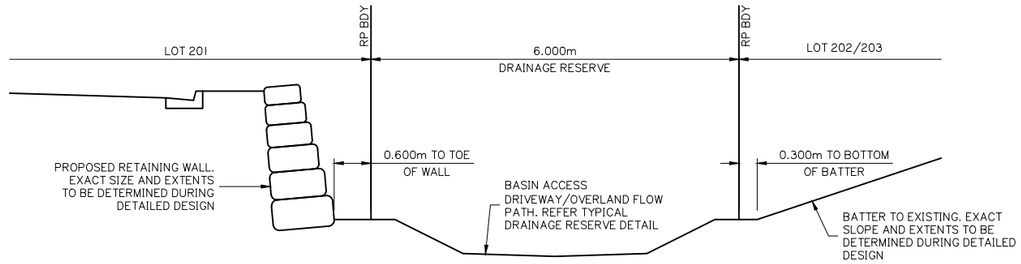
N/A

Scale at A1:	N/A
Designed:	IG
Drafted:	IG BA / LAB
Approved:	MG
RPEQ:	16939
Signed:	
Date:	23-05-2022

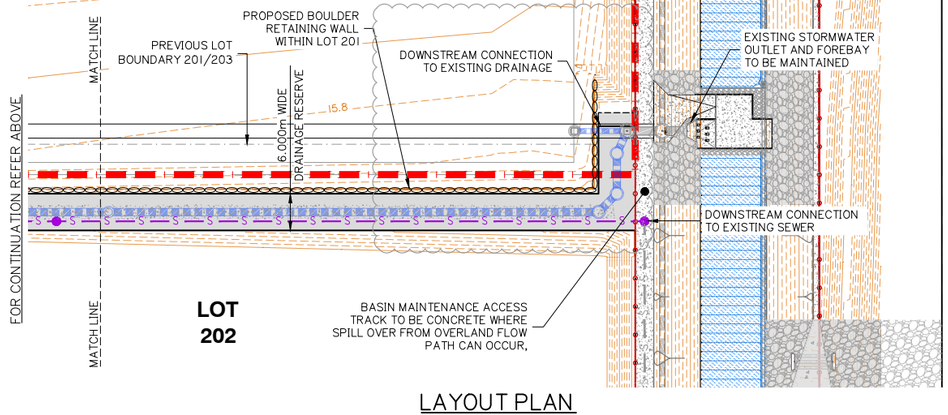
Drawing No: 5941 ENG BE2 461
Rev. No: A



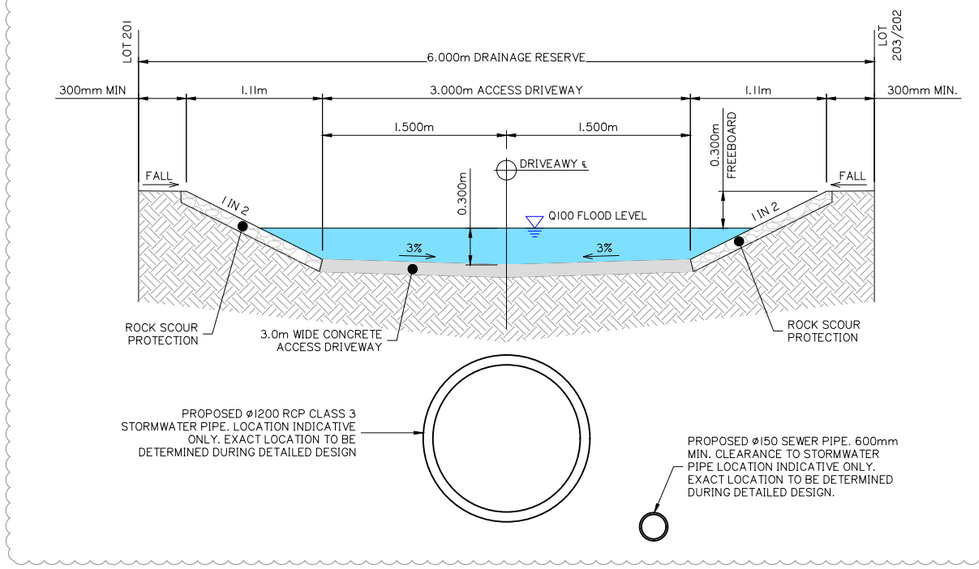
LAYOUT PLAN
SCALE 1:500



SECTION A
SCALE 1:50



LAYOUT PLAN
SCALE 1:500



TYPICAL DRAINAGE RESERVE DETAIL
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Project:
VANTAGE YATALA
LOT 201

Site Address:
FAIRWAY STREET,
STAPYLTON QLD 4207

THIS DRAWING IS INTENDED TO BE PRINTED IN COLOUR

RPD:

Lot:	502
Plan:	SP316137
Local Authority:	CITY OF GOLD COAST COUNCIL
Level Datum:	AHD
Meridian:	-
Contour Interval:	-
PSM:	-
RL:	-

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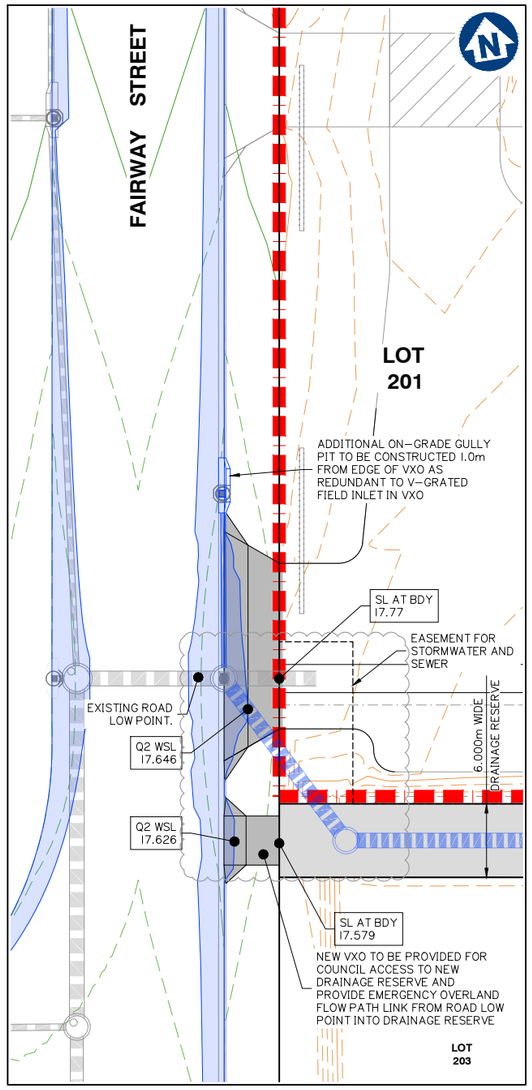
DRAWING TITLE
CONCEPTUAL STORMWATER AND SEWER RELOCATION PLAN & DETAILS

Issue	Date	Description	DRN	CHK
B	16/05/22	INFORMATION REQUEST	LAB	MG
A	01/02/22	ORIGINAL ISSUE	JH	MG

0 10 20 30 40 50
1:500 (FULL SIZE A1)
1:1000 (HALF SIZE A3)

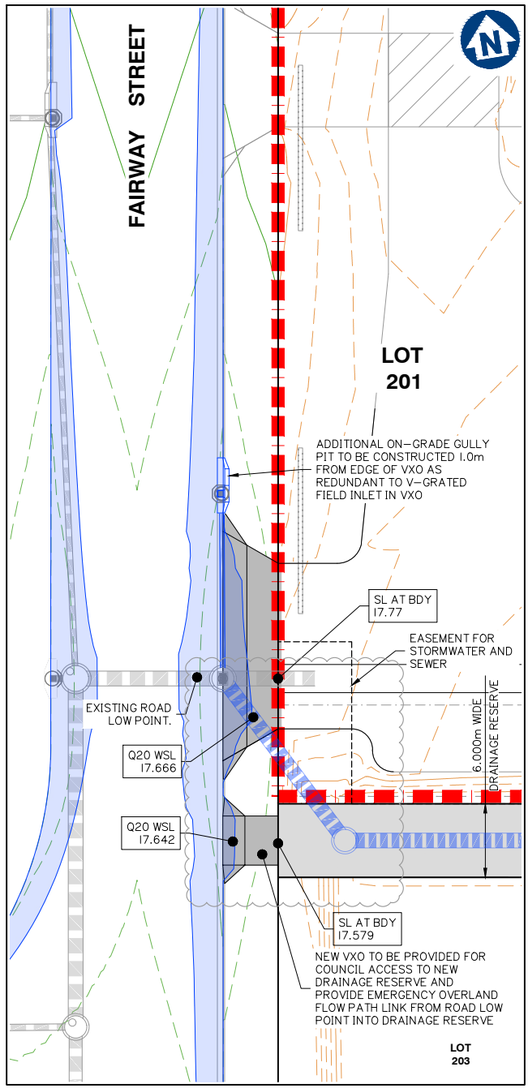
Scale at A1:	1:500
Designed:	JH
Drafted:	JH
Approved:	MG
RPEQ:	16939
Signed:	
Date:	16-05-2021

Drawing No: 6111 ENG SK 001
Rev. No: B



FLOODED WIDTH LAYOUT PLAN – Q2

SCALE 1:250



FLOODED WIDTH LAYOUT PLAN – Q20

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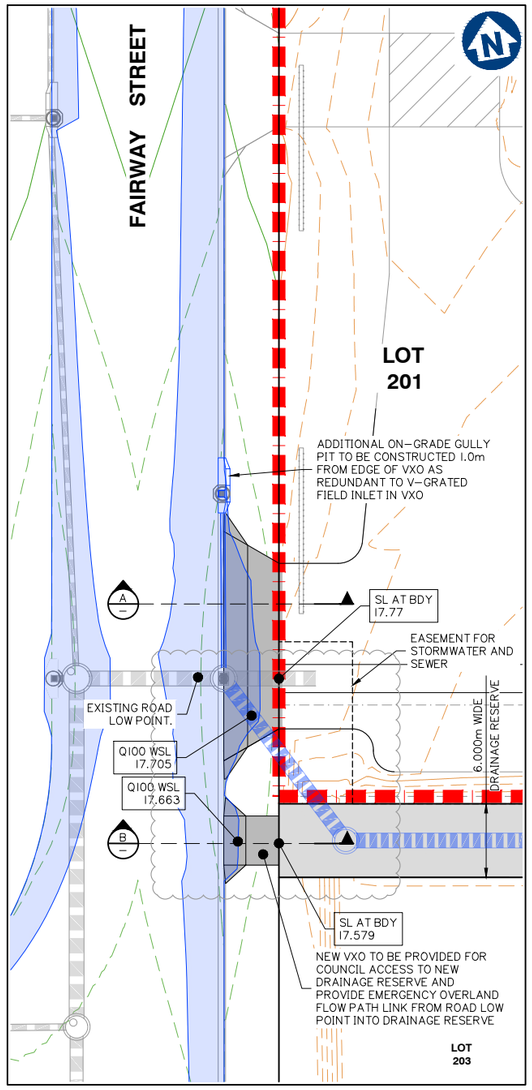
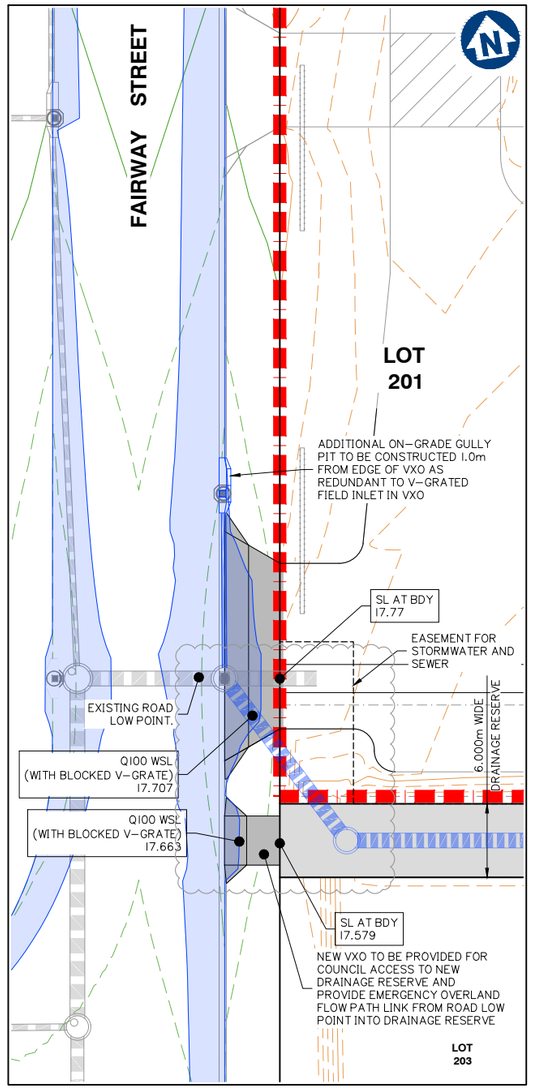


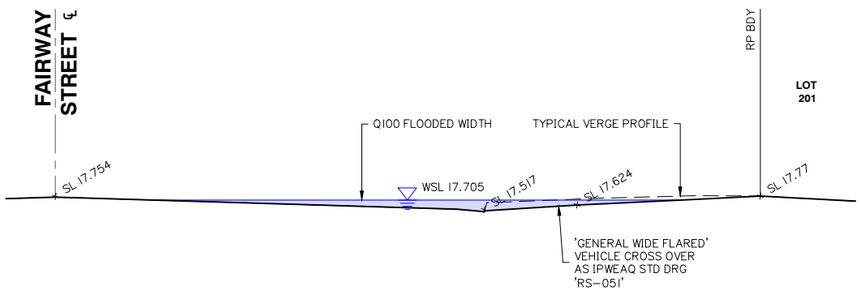
FLOODED WIDTH LAYOUT PLAN – Q100

SCALE 1:250



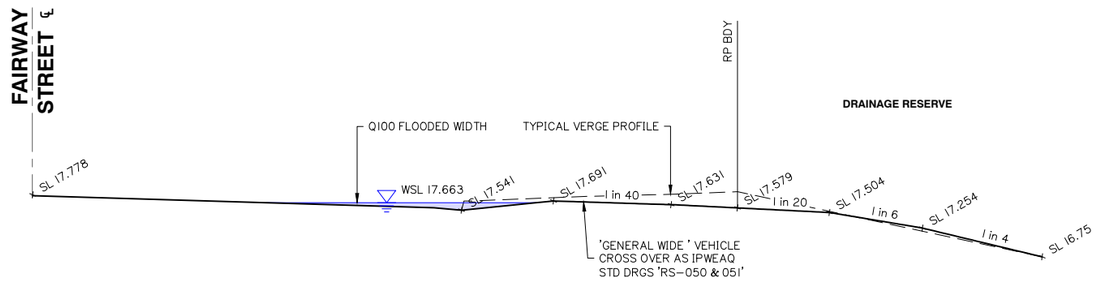
FLOODED WIDTH LAYOUT PLAN – Q100 WITH 100% BLOCKED INLET

SCALE 1:250



SECTION A

SCALE 1:50



SECTION B

SCALE 1:50

NOTE:

ADDITIONAL ON-GRADE GULLY PIT SHOWN FOR INTENT ONLY. HAS NOT BEEN CONSIDERED IN HYDRAULIC ASSESSMENT. REVISED HYDRAULIC DESIGN TO BE PROVIDED AT OPW STAGE FOR COUNCIL APPROVAL

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DRAWING TITLE

FLOODED WIDTH LAYOUT PLAN

Issue	Date	Description	DRN	CHK
B	16/05/21	INFORMATION REQUEST	LAB	MG
A	07/02/22	ORIGINAL ISSUE	JH	MG

0 5 10 15 20 25

1:250 (FULL SIZE A1)
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Appendix O – WSUD Design Checklists

TABLE D.1 GENERAL APPLICATION INFORMATION

(GDP Ref. 5941)

APPLICATION INFORMATION			
Site or Project Name	VANTAGE STG.2	DA No.	
Lot and Plan No.	LOT 501 ON SP295994		
Location	60 STAPYLTON JACOBS WELL ROAD, STAPYLTON		

TABLE D.2 CLIMATE AND TIME STEP ASSESSMENT CHECKLIST (REFER TO SECTION 3 & APPENDIX A)

CLIMATE & TIME-STEP (CHECK REPORTING TABLE C1)	Y	N	COMMENTS/ISSUES TO FOLLOW UP
Has the correct rainfall station been used?	✓		CoGC MUSIC LINK NORTH
Has a 6-minute time-step been used for assessment against stormwater quality management objectives?	✓		
Has the correct modelling period been selected?	✓		
Has the correct potential evapotranspiration been selected?	✓		

TABLE D.3 CATCHMENT AND SOURCE NODE ASSESSMENT CHECKLIST (REFER TO SECTION 3.3)

CLIMATE & TIME-STEP (CHECK REPORTING TABLE C1)	Y	N	COMMENTS/ISSUES TO FOLLOW UP
Are the source node areas reported appropriate with respect to catchment areas shown on the plan?	✓		
Does the total area reported reflect the total catchment relative to the development application?	✓		
Does the land use reported reflect the proposed land use?	✓		
Is the total imperviousness percentage for each land type appropriate (for development applications this must be measured direct from plans)?	✓		

CATCHMENT SPLIT (CHECK REPORTING TABLE C3)	Y	N	COMMENTS/ISSUES TO FOLLOW UP
Has a 'split catchment' approach been used?	✓		
Does the area of each land use/surface type reported reflect the areas shown on the plan?	✓		
Does the total area reported reflect the total catchment?	✓		
Do the land uses or surface types reported reflect the proposed development i.e. have correct source nodes been used?	✓		
Is the fraction imperviousness for each land uses or surface type appropriate? Nb: for development applications this must be measured direct from plan, otherwise refer Section 3.3.3.	✓		
For split catchment modelling where rainwater tanks are proposed as treatment nodes, is the percentage of connected roof area appropriate (Section 4.2)?	N/A		

TABLE D.4 RAINFALL AND RUNOFF ASSESSMENT CHECKLIST (REFER TO SECTION 3.3 AND APPENDIX A)

RAINFALL RUN-OFF AND POLLUTANT EXPORT PARAMETER (CHECK REPORTING TABLE B4 AND TABLE)	Y	N	COMMENTS/ISSUES TO FOLLOW UP
Have the correct rainfall runoff parameters been used?	✓		
Are appropriate pollutant export parameters used?	✓		
Has stochastic generation been used for all pollutants?	✓		

TABLE D.5 ALL TREATMENT NODES ASSESSMENT CHECKLIST

ALL TREATMENT NODES	Y	N	COMMENTS/ISSUES TO FOLLOW UP
Will treatment nodes modelled be free draining? Compare the total depth of the treatment measures modelled against development plan levels.	✓		
Have any receiving environments been modelled as treatment systems? These include natural waterways, natural wetlands, naturalised channel systems, environmental buffers, freshwater and brackish lake and pond systems (existing or constructed). Stormwater must be treated before it discharges to these systems.	✓		20m ECOLOGICAL BUFFER WAS MODELLED

TABLE D.6 RAINWATER TANK NODES ASSESSMENT CHECKLIST (REFER TO SECTION 4.2)

RAINWATER TANKS (CHECK REPORTING TABLE B6)	Y	N	COMMENTS/ISSUES TO FOLLOW UP
Has the volume below overflow pipe (kL) been calculated appropriately?			
Has the depth above the overflow been calculated appropriately?			
If tanks are lumped, is depth below overflow the same as a single tank and overflow pipe scaled accordingly. (Section 4.2.5?)			
Has the total tank surface area been calculated appropriately? For lumped tanks refer to Section 4.2.5.			
Has the overflow pipe diameter been calculated appropriately? For lumped tanks this must be equivalent to the diameter of the overflow pipe of a single tank multiplied by the square root of the number of tanks (Section 4.2.5).		N/A	
Has stormwater reuse been calculated appropriately? PET PET – Rain			
Have appropriate indoor connections been selected?			
Has the indoor demand been calculated appropriately?			
Has the outdoor demand been calculated appropriately?			
Has the daily demand been calculated appropriately?			
Has the monthly distribution of annual demand been calculated appropriately?			
Have K and C* been retained as default values? (Y/N)			

TABLE D.7 WETLAND NODE ASSESSMENT CHECKLIST (REFER TO SECTION 4.3)

RAINWATER TANKS (CHECK REPORTING TABLE B6)	Y	N	COMMENTS/ISSUES TO FOLLOW UP
Has the inlet pond volume sized appropriately to capture coarse sediment?			
Has the macrophyte zone surface area been calculated appropriately?			
Is the extended detention depth less than, or equal to, 0.5 m?			
Has the permanent pool volume been calculated appropriately?			
Is the exfiltration rate set to 0 mm/hr?			
If an exfiltration rate has been used, has the secondary drainage link been used to return the exfiltrated flows to the model? (Section 4.1)		N/A	
Has the evaporative loss as % of PET been set to 125% or less?			
Has the equivalent pipe diameter been set so that the notional detention time is about 48 hours?			
Has the overflow weir width been calculated appropriately?			
Is the notional detention time (hrs) approximately 48 hours?			
Are the number of CSTRs appropriate for the shape of the system?			
Have K and C* been retained as default values for all parameters except nitrogen which has been adjusted to reflect Section 4.3.4? (Y/N)			

TABLE D.8 SWALE NODE ASSESSMENT CHECKLIST (REFER TO SECTION 4.4)

SWALES (CHECK REPORTING TABLE C8)	Y	N	COMMENTS/ISSUES TO FOLLOW UP
Is the length equivalent to the length shown on the development plans and does it account for conveyance capacity and safety limitations selected in accordance with the WSUD Technical Design Guidelines for SEQ?			
Is the bed slope less than or equal to 4%?			
Are the base width, top width and depth equivalent to the length shown on the development plans?			
Is the set vegetation height appropriate for the selected species (Section 4.4)?			
Is the exfiltration rate set to 0 mm/hr?			
If an exfiltration rate has been used, has the secondary drainage link been used to return the exfiltrated flows to the model? (Section 4.1)			
If the swale accepts point source discharges at given locations, is it split into separate lengths?			
Have K and C* been retained as default values?			
BIORETENTION SWALE CHECKS			
Is the swale node located in the model downstream of bioretention swale surface component? (Y/N)			
Is the low-flow bypass of the swale node set to the infiltration rate of the filter? (Y/N)			

N/A

TABLE D.9 BIORETENTION AND BIORETENTION SWALE NODES ASSESSMENT CHECKLIST (REFER TO SECTION 4.5)

BIORETENTION AND BIORETENTION SWALE FILTER COMPONENTS (CHECK REPORTING TABLE C8 AND TABLE C9)	Y	N	COMMENTS/ISSUES TO FOLLOW UP
Has the filter surface area been calculated appropriately?	✓		
Is the extended detention depth consistent with the depth shown on the development plans and between 0-0.4 m?	✓		0·3m
Is the filter media area consistent with the area shown on the development plans?	✓		
Has an appropriate unlined filter media perimeter been set?	✓		
Has an appropriate saturated hydraulic conductivity been set? This should be modelled once at 50 mm/hr, once at 200 mm/hr and both scenarios reported.	✓		200mm/hr
Is the filter media depth modelled equivalent to the depth of media shown on the plans? This depth should not include the intermediate layer, drainage layers, or submerged zone.	✓		
Is the TN content in the filter media set to either 400 mg/kg or another suitably justified value?	✓		
Is the orthophosphate content in the filter media set to 30 mg/kg or another suitably justified value?	✓		
Is the base lined?	✓		
Has the system been modelled to reflect the nutrient removal properties of the plants to be used on site?	✓		
Is the overflow weir width appropriate?	✓		25m
Is the exfiltration rate set to zero?	✓		
If an exfiltration rate has been used, has the secondary drainage link been used to return the exfiltrated flows to the model? (Section 4.1)	N/A		
If exfiltration rate has been used, is the exfiltration rate justified?	N/A		
Has the system been modelled with underdrains present?	✓		
Is a submerged zone with carbon present?		✓	
Is the depth of submerged zone consistent with plans?		N/A	
If bioretention systems are modelled in series, is there a low-flow bypass modelled in the downstream bioretention system/s? (Note: separate drainage systems are required if a low-flow bypass is modelled)	N/A		
Have K and C* been retained as default values? (Y/N)			
BIORETENTION SWALE COMPONENT ONLY (CHECK TABLE C8)			
Has an extended detention depth of 0 m been used? (Y/N)			
Has the low flow bypass ~~been calculated? The calculation should be provided~~ by the applicant separately.		N/A	

TABLE D.10 BUFFER NODE ASSESSMENT CHECKLIST (REFER TO SECTION 4.7)

BUFFERS (CHECK REPORTING TABLE C10)	Y	N	COMMENTS/ISSUES TO FOLLOW UP
Does the treatment node reflect the vegetated area receiving sheet flow only?			
Is the percentage of upstream area buffered consistent with catchment plans?			
Does the buffer area accurately reflect the percentage impervious area as shown on the development plans?		N/A	
Is the exfiltration rate set to zero?			
If an exfiltration rate has been used, has the secondary drainage link been used to return the exfiltrated flows to the model? (Section 4.1)			

TABLE D.11 PROPRIETARY & CUSTOM PRODUCTS (INC GROSS POLLUTANT TRAPS) NODE ASSESSMENT CHECKLIST (REFER TO SECTION 4.8)

PROPRIETARY & CUSTOM PRODUCTS (CHECK REPORTING TABLE C11)	Y	N	COMMENTS/ISSUES TO FOLLOW UP
Are the proposed pollutant reduction efficiencies independently verified using a method suited to local conditions (Section 4.8)?			
Does the data provided include performance results under dry weather flows (to account for potential pollutant leeching)? (Y/N).			
Is the assumed high-flow bypass rate consistent with manufacturer specifications? (Y/N)		N/A	
UNLESS "YES" HAS BEEN ANSWERED TO ALL THREE QUESTIONS ABOVE THE PROPOSED POLLUTANT REDUCTION RATES CANNOT BE RELIED UPON AS BEING REASONABLE ASSUMPTIONS OF THE UNIT'S PERFORMANCE.			
Is the storage volume modelled consistent with the proposed unit?			
Is the expected maintenance frequency a reasonable assumption?			
Is the storage volume large enough to contain all sediments and gross pollutants received by unit during inter-maintenance periods?			

TABLE D.12 SEDIMENT BASIN NODE ASSESSMENT CHECKLIST (SECTION 4.9)

SEDIMENT BASTINS (CHECK REPORTING TABLE C12)	Y	N	COMMENTS/ISSUES TO FOLLOW UP
Has the surface area been calculated appropriately (Section 4.3.2)?			
Is the extended detention depth consistent with the development plans?			
Is the permanent pool volume consistent with the development plans?			
Is the exfiltration rate set to 0 mm/hr?			
If an exfiltration rate has been used, has the secondary drainage link been used to return the exfiltrated flows to the model? (Section 4.1)	N/A		
Is the evaporative loss as % of PET reasonable?			
Has the equivalent pipe diameter been set appropriately? (Where appropriate refer to Section 4.3.3 for advice on accounting for user-defined stage–discharge relationship)?			
Is the overflow weir width consistent with the development plans?			
Is the notional detention time set to account for potential flow restriction?			
Are the number of CSTRs appropriate for the shape of the system?			
Have the K and C* values been retained as default values? (Y/N)			

TABLE D.13 INFILTRATION NODE ASSESSMENT CHECKLIST (REFER TO SECTION 4.10)

INFILTRATION (CHECK REPORTING TABLE C13)	Y	N	COMMENTS/ISSUES TO FOLLOW UP
Is the exfiltration rate justified?			
Has the secondary drainage link been used to return the exfiltrated flows to the model? (Section 4.1). If the secondary drainage link is not used, WQO's must be achieved prior to stormwater entering an infiltration system.			
Can the hydraulic conductivity of the in-situ soils be guaranteed even during earthworks?			
IF "NO" WAS ANSWERED TO ANY OF THE ABOVE QUESTIONS THIS NODE CANNOT BE USED.			
Is the pond surface area consistent with the plans?	N/A		
Is the extended detention depth consistent with the plans?			
Is the filter area consistent with the plans?			
Is the unlined filter media perimeter appropriate?			
Is the depth of infiltration media consistent with the plans?			
Is the exfiltration rate justified?			
Is the overflow weir width consistent with the plans?			
Is the evaporative loss as % of PET reasonable?			
Have the K and C* values been retained as default values?			

TABLE D.14 POROUS PAVEMENT NODE ASSESSMENT CHECKLIST (REFER TO SECTION 4.11)

POROUS PAVEMENTS (CHECK REPORTING TABLE C14)	Y	N	COMMENTS/ISSUES TO FOLLOW UP
Has the applicant answered "Y" to all questions in the reporting table?	N/A		

NB: Check all other parameters for the porous pavement using Table C9.

TABLE D.15 MEDIA FILTRATION NODE ASSESSMENT CHECKLIST (REFER TO SECTION 4.8.3)

MEDIA FILTRATION SYSTEM (CHECK REPORTING TABLE C15)	Y	N	COMMENTS/ISSUES TO FOLLOW UP
Is the extended detention depth consistent with plans?			
Is the surface area consistent with plans?			
Is the exfiltration rate set to zero?			
If an exfiltration rate has been used, has the secondary drainage link been used to return the exfiltrated flows to the model? (Section 4.1)	N/A		
Is the filter area consistent with plans?			
Is the filter depth consistent with plans?			
Is the filter media particle diameter consistent with manufacturer information?			
Is the saturated hydraulic conductivity consistent with manufacturer information?			
Is the depth below underdrain consistent with plans?			
Have the K and C* values been retained as default values or otherwise justified?			

TABLE D.16 OVERALL APPROVAL ASSESSMENT CHECKLIST

DESIGN OBJECTIVES (CHECK REPORTING TABLE C16)	Y	N	COMMENTS/ISSUES TO FOLLOW UP
Have all water quality objectives been met?	✓		
Is the MUSIC model approved?			