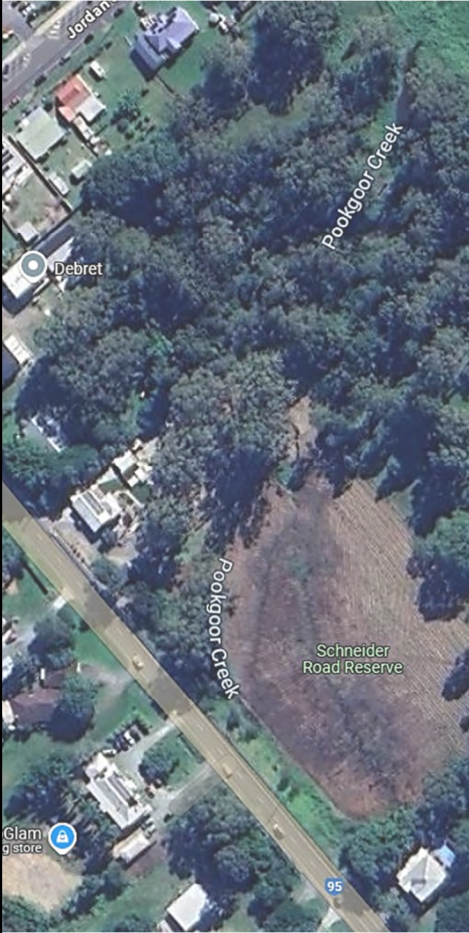


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Haider Shah

RPEQ: 26210

Date: 15/12/2025

Time: 11:11am

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Appendices

Appendix A – Detailed Site Survey Plan

Appendix B – Development Site Plan

Appendix C – Stormwater Drawings

Appendix D – DRAINS Model and Results

1 INTRODUCTION

The following technical memorandum provides a review of the hydrology and hydraulics contributing to the Portal Street roadway and drainage infrastructure and provides a capacity assessment of the drainage infrastructure to support the proposed development at 45 Portal Street, Oxley, QLD 4075. This assessment has been prepared generally in accordance with the Brisbane City Plan 2014, Queensland Urban Drainage Manual (QUDM) (current edition), Australian Rainfall and Runoff (ARR) and Healthy Waterways – Water by Design.

In particular the existing contributing catchments in conjunction with the post-development site parameters (unmitigated scenario) have been developed in a DRAINS hydrological computer model to assess the impacts of the Portal Street drainage infrastructure extension/upgrade and if the existing and proposed infrastructure has sufficient capacity in the minor (10% AEP) and major (1% AEP) design storm events.

2 HYDROLOGICAL MODEL DEVELOPMENT

The default hydrological model used for this assessment was the ILSAX Model. The following parameters were established in setting up the model:

- Paved (impervious) area depression storage (mm): 1
- Supplementary area depression storage (mm): 1
- Grassed (pervious) area depression storage (mm): 5
- Soil Type: Normal with antecedent rainfall depth for AMC 3 mm
- Rainfall Zone: Zone 3 – N.E. Coast
- AR&R 2016

The existing surface and contour mapping was derived from LiDAR data was obtained from *Queensland Spatial*, while the fraction impervious for the contributing catchments was estimated using aerial imagery from *Queensland Globe*. Existing stormwater infrastructure data was sourced from the Brisbane City Council Online Community Mapping System. The proposed residential development at 45 Portal Street is expected to have an overall fraction impervious of 60% ($f_i=0.60$), which has been adopted in the hydrological modelling.

Refer to **Appendix A** for the Detailed Site Survey Plan.

Refer to **Appendix B** for the Development Site Plan.

Refer to **Appendix C** for the contributing catchment delineation and parameters used in DRAINS Model.

The design rainfall Intensity Frequency Duration (IFD) data for all storm events up to an including 100-year ARI (or 1% AEP) has been obtained from the Bureau of Meteorology (BOM) for nominated ARI's and used in the DRAINS computer model. The design IFD data can be seen in Figure 1 below. Rainfall temporal patterns used in the DRAINS hydrological computer model (ILSAX Method) analysis were prepared in accordance with Australian Rainfall and Runoff (AR&R 2016). Rainfall is modelled for the catchment in equal time intervals under each storm event and the subsequent runoff routed through a drainage system. To establish the most likely rain event that would require the greatest volume of detention, design storm durations of 5, 10, 15, 20, 25, 30, 45, 60, 90, 120, 180 and 360 minutes were modelled.

Location

Label: Not provided

Latitude: -27.566 [Nearest grid cell: 27.5625 (S)]

Longitude: 152.9676 [Nearest grid cell: 152.9625 (E)]



IFD Design Rainfall Intensity (mm/h)

Issued: 24 May 2025

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

Table

Chart

Coefficients

Unit:

Duration	Annual Exceedance Probability (AEP)						
	63.2%	50%#	20%*	10%	5%	2%	1%
1 min	152	173	237	280	322	377	418
2 min	126	144	199	238	276	328	367
3 min	119	135	186	222	257	304	340
4 min	113	129	177	210	243	286	319
5 min	108	123	169	201	231	271	301
10 min	89.0	101	138	163	187	218	241
15 min	75.3	85.5	117	138	158	184	204
20 min	65.4	74.3	102	120	138	161	178
25 min	57.9	65.8	90.4	107	123	143	159
30 min	52.1	59.2	81.4	96.3	111	130	144
45 min	40.4	46.0	63.4	75.2	86.8	102	114
1 hour	33.4	38.0	52.4	62.4	72.2	85.3	95.4
1.5 hour	25.3	28.7	39.7	47.4	55.0	65.3	73.4
2 hour	20.6	23.4	32.4	38.8	45.1	53.8	60.6
3 hour	15.5	17.6	24.4	29.2	34.1	40.8	46.1
4.5 hour	11.7	13.2	18.4	22.1	25.8	31.0	35.1
6 hour	9.57	10.9	15.1	18.2	21.3	25.6	29.1
9 hour	7.28	8.27	11.5	13.9	16.3	19.7	22.4
12 hour	6.00	6.84	9.58	11.5	13.6	16.4	18.8
18 hour	4.59	5.24	7.40	8.95	10.6	12.8	14.7
24 hour	3.78	4.34	6.17	7.49	8.85	10.8	12.4
30 hour	3.25	3.74	5.35	6.52	7.73	9.47	10.9
36 hour	2.87	3.31	4.76	5.81	6.90	8.49	9.78
48 hour	2.34	2.71	3.93	4.83	5.75	7.11	8.22
72 hour	1.74	2.02	2.96	3.65	4.38	5.44	6.32
96 hour	1.39	1.61	2.37	2.94	3.53	4.41	5.14
120 hour	1.16	1.35	1.98	2.45	2.94	3.67	4.29
144 hour	1.000	1.16	1.68	2.08	2.50	3.12	3.64
168 hour	0.878	1.01	1.46	1.80	2.16	2.68	3.13

Figure 1. IFD Design Rainfall Intensity (mm/hr) for Oxley (BOM)

3 PROPOSED DRAINAGE WORKS

An extension of the Portal Street underground drainage infrastructure is proposed spanning from the development site and connecting to the existing gully pit (BCC Asset ID: S11191801) located approximately 35m south of the subject site. The proposed drainage system will be designed to capture and convey both existing and development generated flows from the site and provides a lawful point of discharge for future developments upstream of the subject site.

Refer to the Stormwater Drawings within **Appendix C** for details.

4 RESULTS

The hydraulic analysis of the existing and proposed Portal Street pit and pipe network, undertaken using the DRAINS model, indicates that the drainage infrastructure can sufficiently convey runoff flows generated during the minor (10% AEP) design storm event. All surface flows are contained within the Portal Street kerb and channel and do not overtop the crown of the road. Refer to Figure 2 and Figure 3 below for the Portal Street flow properties during the 10-year ARI (or 10% AEP) minor storm event.

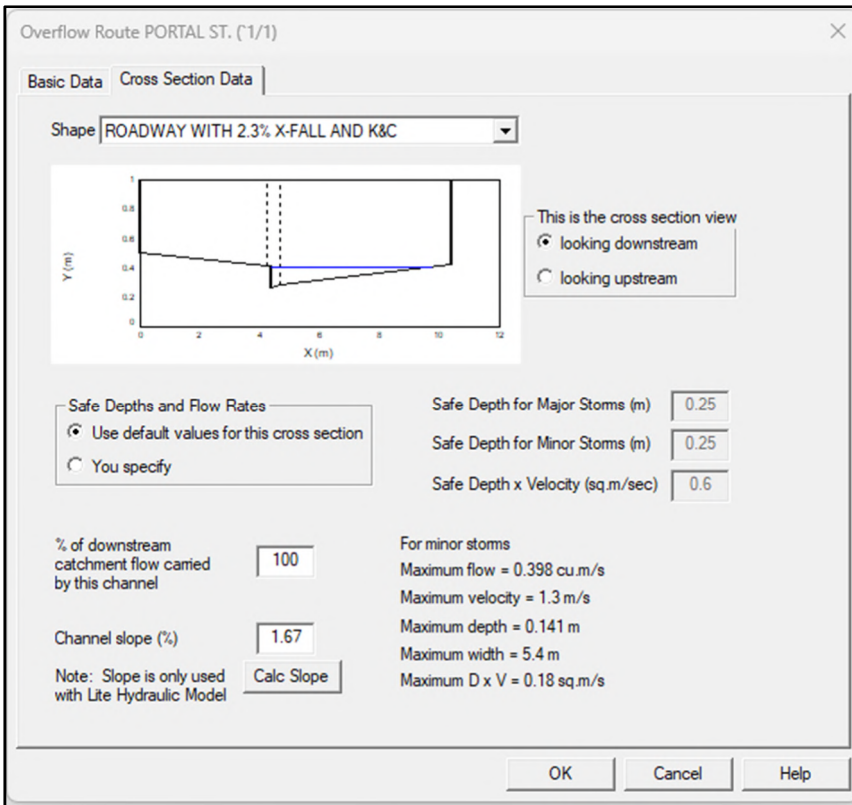


Figure 2. Portal Street Flow Results from DRAINS Model for the Minor (10% AEP) storm event - Upstream of Structure 1/1

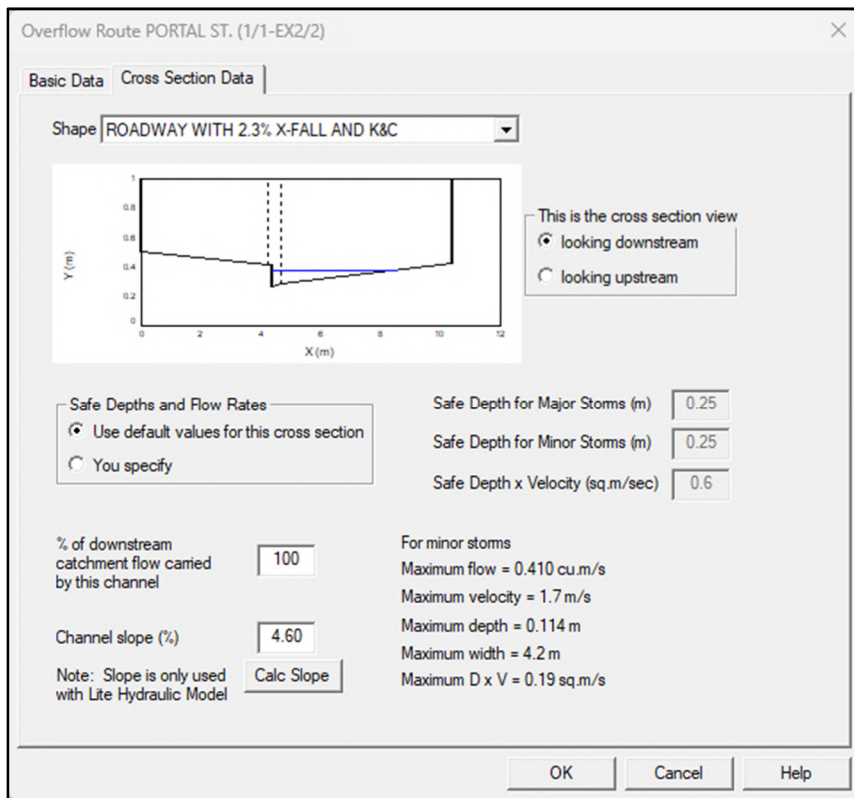


Figure 3. Portal Street Flow Results from DRAINS Model for the Minor (10% AEP) storm event - Upstream of Structure EX2/2

Refer to **Appendix C** for the hydraulic longitudinal sections of the drainage network during the minor (10% AEP) storm event.

During major storm events up to an including 100-year ARI (or 1% AEP), the Portal Street carriageway safely conveys surface flows within the road reserve with a maximum flow depth of 159mm in accordance with QUDM Table 7.4.4. Surface flows are directed to the existing SAG and Culvert crossing located approximately 126m downstream of the subject site which combines with the greater mapped overland flow path.

Refer to Figure 4 and Figure 5 below for the Portal Street flow properties during the 100-year ARI (or 1% AEP) major storm event. The results below allow for a 100% blockage factor applied to all gully pits.

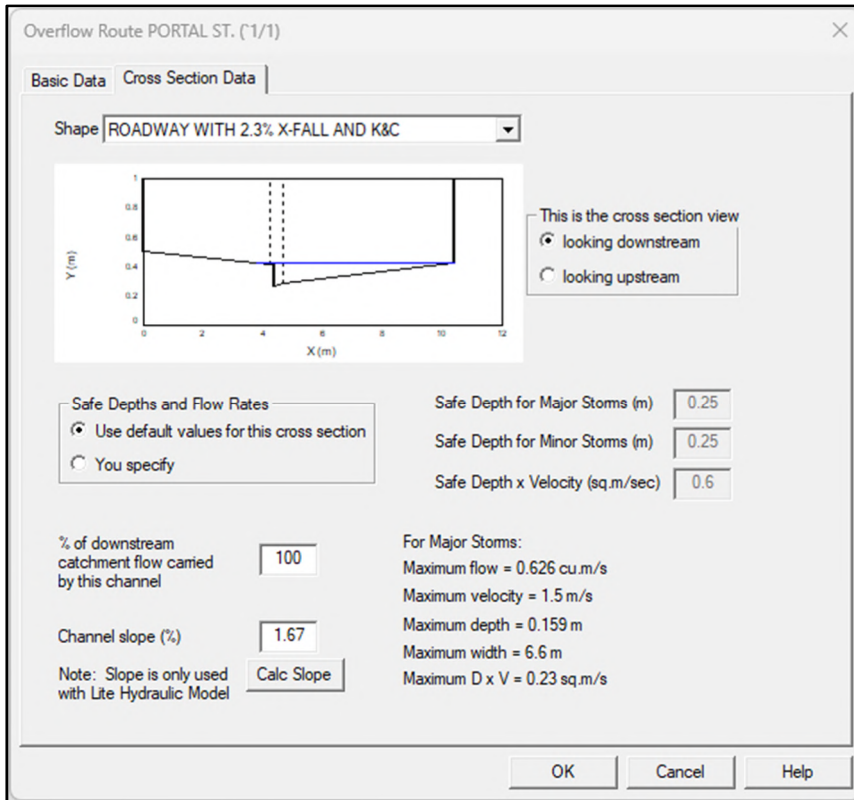


Figure 4. Portal Street Flow Results from DRAINS Model for the Major (1% AEP) storm event - Upstream of Structure 1/1

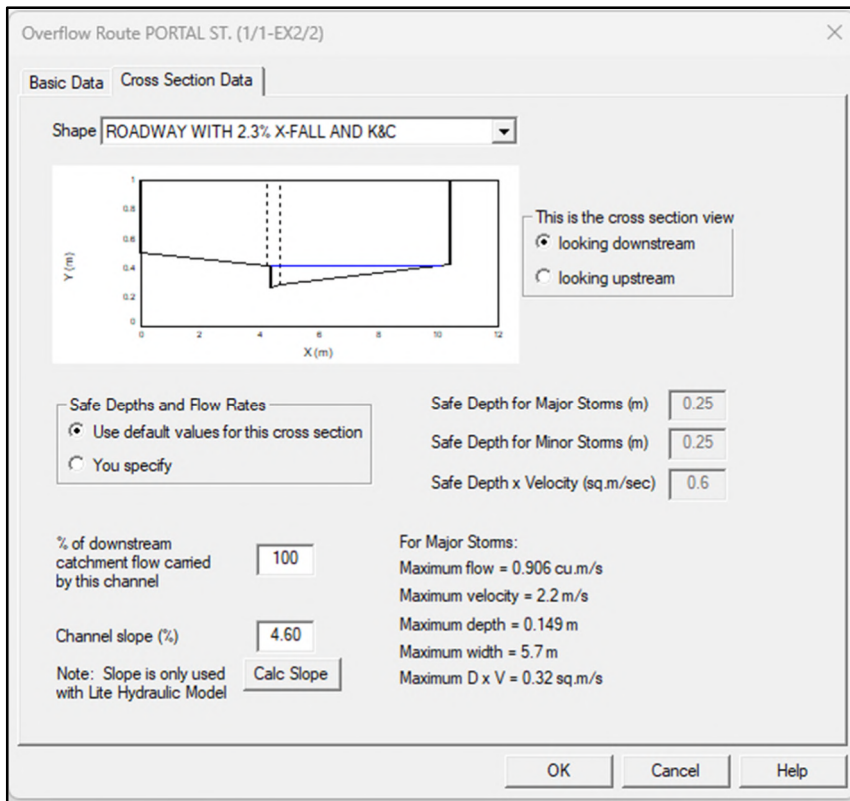


Figure 5. Portal Street Flow Results from DRAINS Model for the Major (1% AEP) storm event - Upstream of Structure EX2/2

Refer to **Appendix D** for snippets of the DRAINS Model and corresponding results.

The above results demonstrate the proposed Portal Street stormwater extension and the existing downstream infrastructure has sufficiently capacity to capture and convey increased discharge flows generated from the subject site as a result of increased impervious area from the development at 45 Portal Street. Therefore no detention system is proposed for the development.

5 CONCLUSIONS AND RECOMMENDATIONS

Based on the above hydraulics assessment, the following conclusions have been drawn:

- It is proposed to provide an extension of the Portal Street underground drainage infrastructure spanning from the development site and connecting to the existing gully pit (BCC Asset ID: S11191801) located approximately 35m south of the subject site.
- The new gully pit proposed in the Portal Street kerb and channel adjacent to the south-eastern corner of the subject, constructed as part of the drainage infrastructure extension will serve as the lawful point of discharge (LPoD) for the subject site and future developments on the upstream side of the subject site.
- A fraction impervious of 60% ($f_i=0.60$) for the post-development scenario for the proposed residential development at 45 Portal Street has been adopted as part of the DRAINS Model assessment.
- Based on the above fraction impervious parameters, the DRAINS Model determines the proposed Portal Street stormwater extension and the existing downstream infrastructure has sufficiently capacity to safely convey the increased discharge flows generated from the subject site in the post-development (unmitigated) scenario.
- Since no adverse impact to the existing downstream infrastructure or downstream neighbouring properties is anticipated as a result of the proposed development, no stormwater detention system is proposed for the proposed residential development at 45 Portal Street.

Appendix - A
DETAILED SITE
SURVEY PLAN

Appendix - B

DEVELOPMENT SITE PLAN

Appendix - C
STORMWATER DRAWINGS

LEGEND

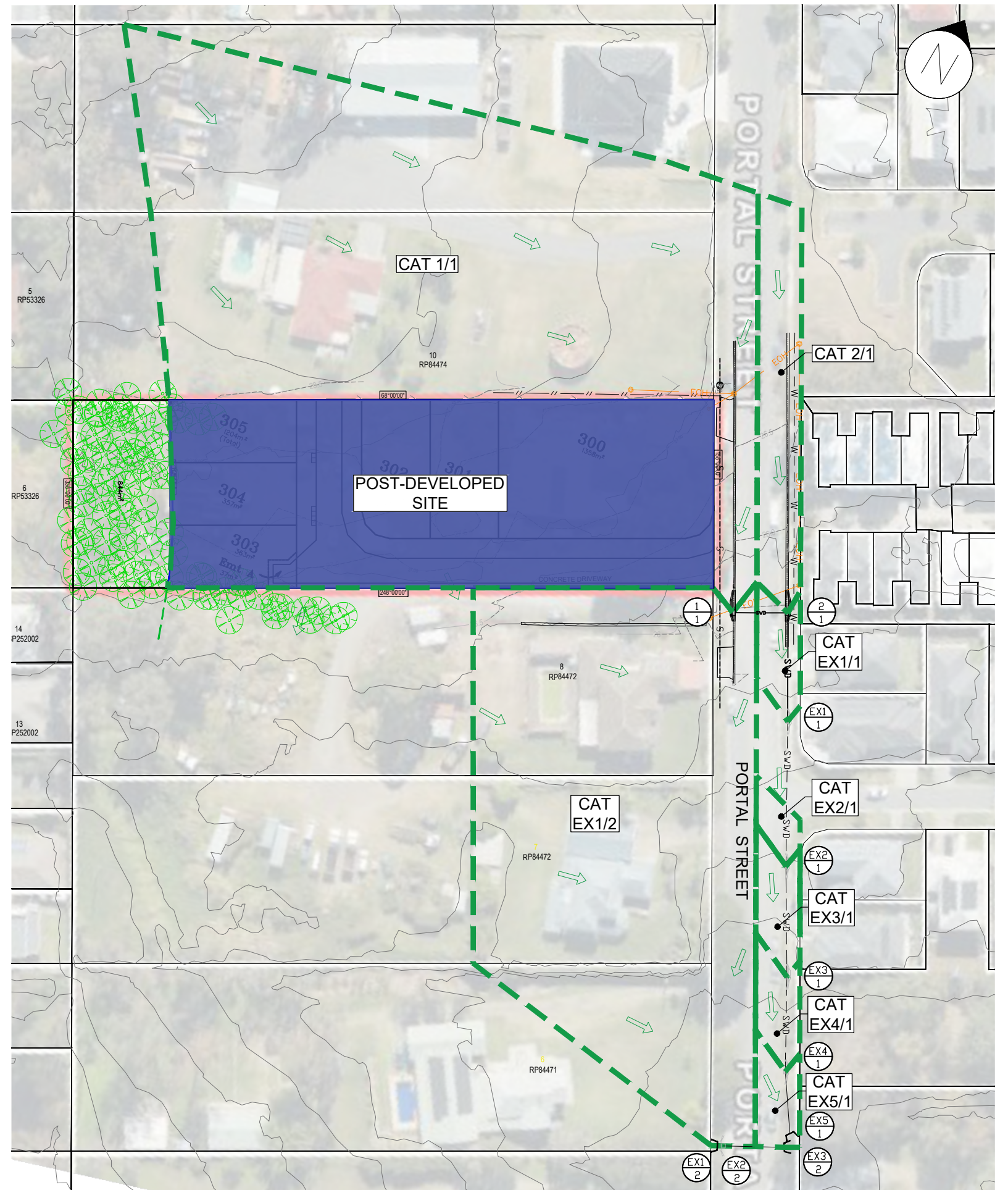
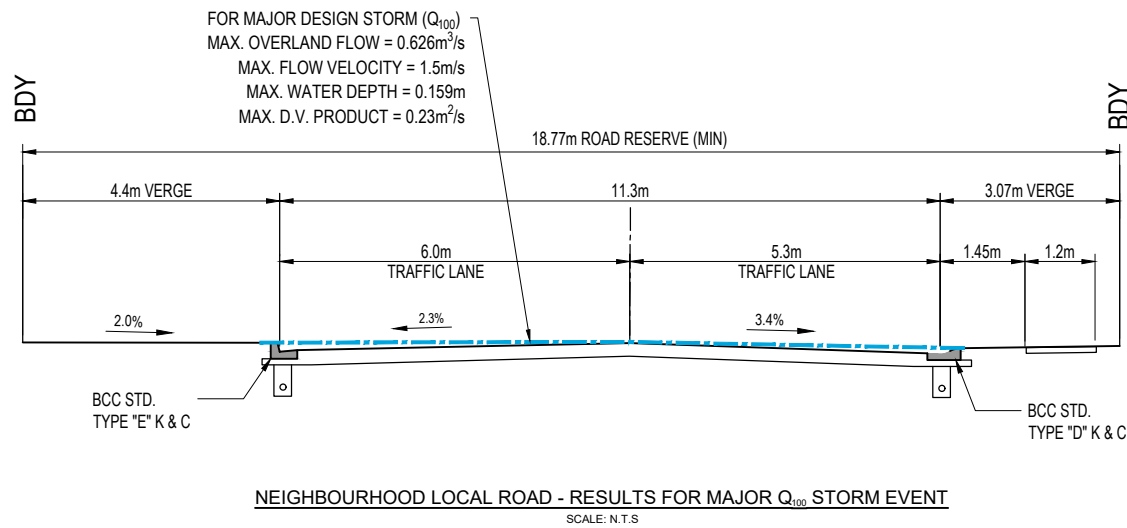
- EXISTING LIDAR CONTOURS
- EXISTING FENCE
- EXISTING WATER MAIN
- EXISTING SEWER MAIN
- EXISTING KERB & CHANNEL
- EXISTING OVERHEAD ELECTRICAL LINES
- EXISTING TELSTRA PIT
- PROPOSED SWALE
- PROPOSED KERB ADAPTOR
- PROPOSED STORMWATER
- PROPOSED DRAINAGE EASEMENT
- CATCHMENT BOUNDARY
- CATCHMENT FLOW DIRECTION

CATCHMENT TABLE

CATCHMENT LABEL	TOTAL CATCHMENT AREA	FRACTION IMPERVIOUS	TIME OF CONCENTRATION
CAT 1/1	1.323	0.51 (Site fi=0.60)	16.3
CAT EX1/2	0.622	0.50	14.4
CAT 2/1	0.080	0.76	5.0
CAT EX1/1	0.021	0.80	5.0
CAT EX2/1	0.010	0.84	5.0
CAT EX3/1	0.022	0.75	5.0
CAT EX4/1	0.020	0.76	5.0
CAT EX5/1	0.019	0.76	5.0

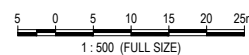
STORMWATER STRUCTURE DETAILS

STRUCTURE NUMBER	STRUCTURE DETAILS
1/1 - 2/1	PROPOSED GULLY PIT ON GRADE WITH 2.4m LINTEL
EX1/1 - EX4/1	EXISTING GULLY PIT ON GRADE
EX1/2, EX3/2, EX5/1	EXISTING HEADWALL
EX2/2	EXISTING GULLY PIT IN SAG



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ASSOCIATED CONSULTANTS
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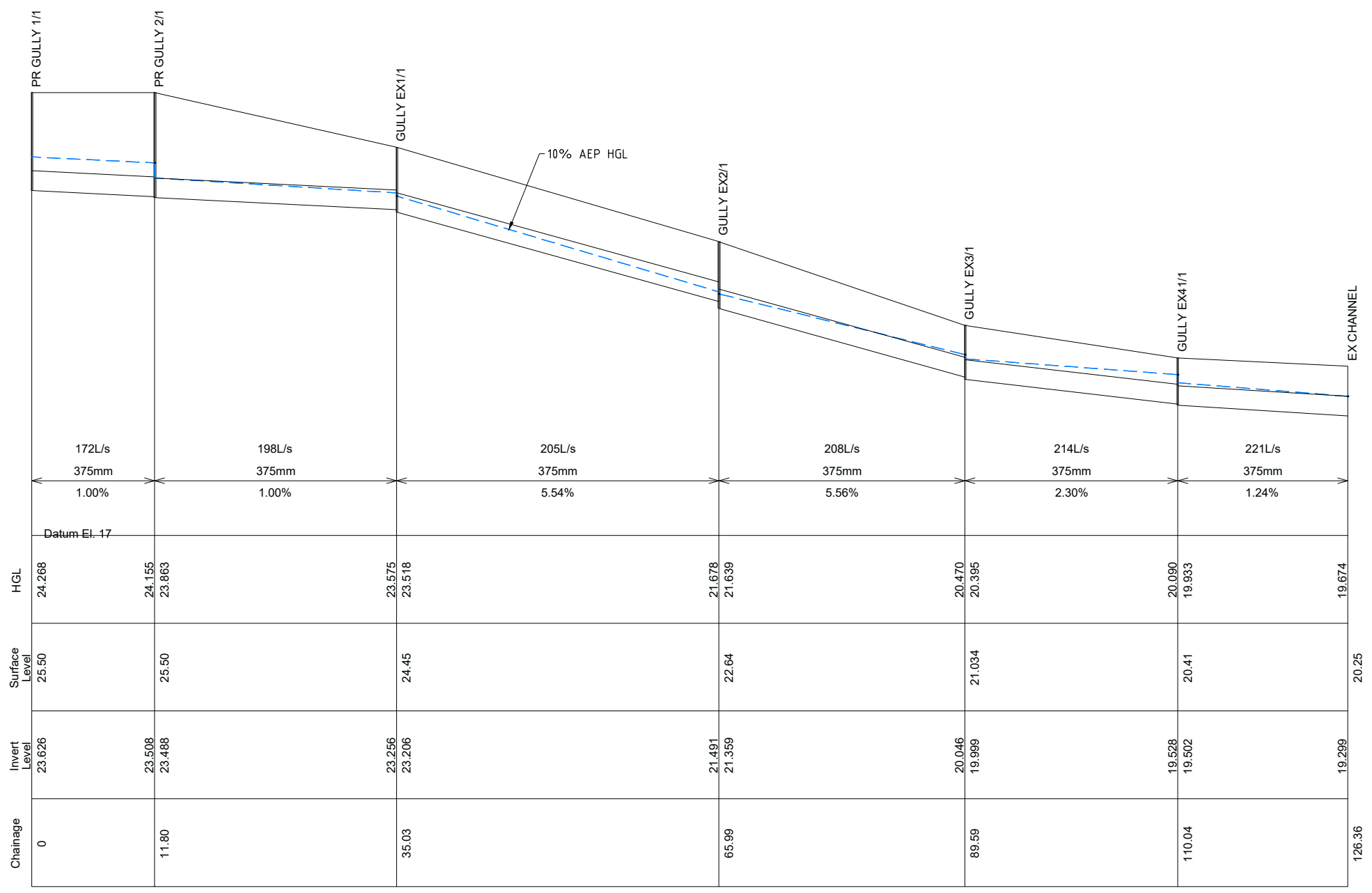
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 haider.shah@72civil.com



CLIENT: **AZIZ DEEN**
 PROJECT: **45 PORTAL STREET, OXLEY BRISBANE CITY COUNCIL**
 TITLE: **STORMWATER CATCHMENT PLAN AND DETAILS**
 STATUS: **FOR DA APPROVAL**

DESIGNED	DRAWN	APPROVED	DATE
AN	HS	HS	15.12.25
PROJECT No	DRAWING No	REV	
25-006	SK-001	-	



STORMWATER DRAINAGE LONGITUDINAL SECTIONS - Q₁₀ (10% AEP)
N.T.S

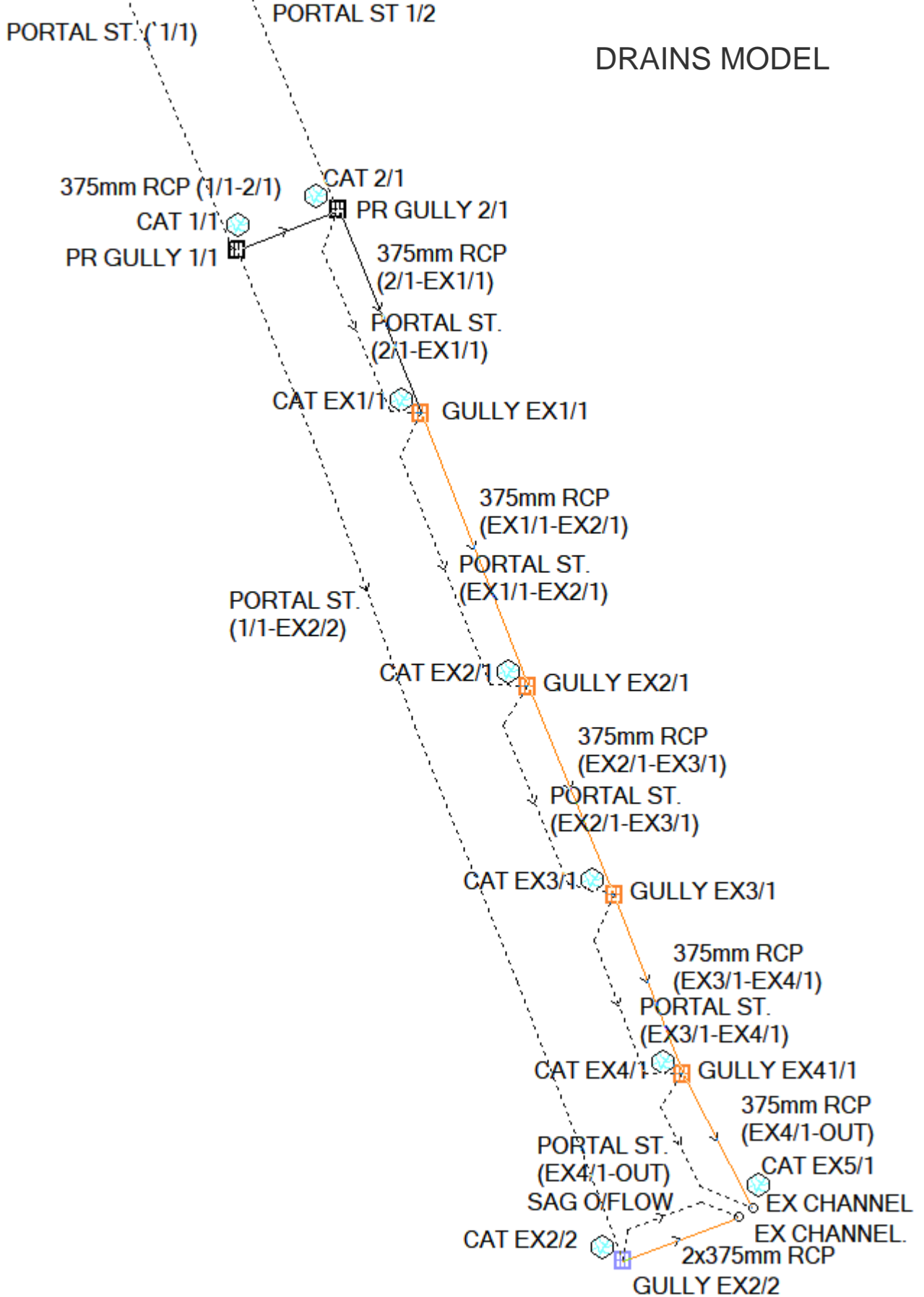
NOTE:
TAILWATER LEVEL ASSUMED AT
OBVERT OF OUTLET PIPE "EX CHANNEL"

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								Approved for and on behalf of 72 CIVIL DESIGN & DRAFTING			72 CIVIL DESIGN & DRAFTING A.B.N. 73 789 722 441 Pebble Beach, Windaroo QLD 4207 T: +61 7 3804 1399 M: +61 422 598 075 haider.shah@72civil.com		72 CIVIL DESIGN & DRAFTING		PROJECT No: 25-006 DRAWING No: SK-002	
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											DATE: 15.12.25		REV: -			

Appendix - D
**DRAINS MODEL AND
RESULTS**

DRAINS MODEL



Q100 DESIGN STORM RESULTS
100% BLOCKAGE SENSITIVITY ANALYSIS

