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YUBA COMPANY LIMITED

PROPOSED AMENDMENT TO THE APPROVED WAN CHAI OUTLINE ZONING PLAN NO. S/H5/31 FROM "COMPREHENSIVE DEVELOPMENT AREA", "RESIDENTIAL (GROUP C)", "OPEN SPACE" AND "GOVERNMENT, INSTITUTION OR COMMUNITY" ZONES AND AREA SHOWN AS 'ROAD' TO "OTHER SPECIFIED USES (RESIDENTIAL DEVELOPMENT WITH HISTORICAL BUILDING CONSERVED)" AND "OTHER SPECIFIED USES (ELEVATED WALKWAY)" AT NOS. 1, 1A, 2 AND 3 HILL SIDE TERRACE, NO. 55 SHIP STREET (A.K.A. NAM KOO TERRACE), NOS. 1 - 5 SCHOONER STREET, NO. 53 SHIP STREET, NO. 18 SAU WA FONG, INLAND LOT NO. 9048 AND ADJOINING GOVERNMENT LAND, WAN CHAI

Drainage Impact Assessment

SEPTEMBER 2024

asia infrastructure solutions

PROPOSED AMENDMENT TO THE APPROVED WAN CHAI OUTLINE ZONING PLAN NO. S/H5/31 FROM "COMPREHENSIVE DEVELOPMENT AREA", "RESIDENTIAL (GROUP C)", "OPEN SPACE" AND "GOVERNMENT, INSTITUTION OR COMMUNITY" ZONES AND AREA SHOWN AS 'ROAD' TO "OTHER SPECIFIED USES (RESIDENTIAL DEVELOPMENT WITH HISTORICAL BUILDING CONSERVED)" AND "OTHER SPECIFIED USES (ELEVATED WALKWAY)" AT NOS. 1, 1A, 2 AND 3 HILL SIDE TERRACE, NO. 55 SHIP STREET (A.K.A. NAM KOO TERRACE), NOS. 1 - 5 SCHOONER STREET, NO. 53 SHIP STREET, NO. 18 SAU WA FONG, INLAND LOT NO. 9048 AND ADJOINING GOVERNMENT LAND, WAN CHAI

Drainage Impact Assessment

Author	Kevin Yu	
Reviewer	Arthur Ng	
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Report No EB000176/NKT2017/DIA/R05v1

Date September 2024

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1 INTRODUCTION

1.1 Background

1.1.1 Asia Infrastructure Solutions Limited was commissioned by Yuba Company Limited to prepare this Drainage Impact Assessment report ("DIA") in support of the Section 12A Planning Application ("S12A")/ Rezoning Request ("RR") to amend the Approved Wan Chai Outline Zoning Plan No. S/H5/31 (the "Approved OZP") at Nos. 1, 1A, 2 and 3 Hill Side Terrace ("HST"), No. 55 Ship Street [a.k.a Nam Koo Terrace ("NKT")], Nos. 1 - 5 Schooner Street, No. 53 Ship Street, No. 18 Sau Wa Fong, Inland Lot No. 9048 ("IL 9048") and adjoining Government Land, Wan Chai (the "Site"/ "Rezoning Site").

1.1.2 The Rezoning Site is currently zoned "Comprehensive Development Area" ("CDA") and "Residential (Group C)" ("R(C)") and minor encroachment into the "Open Space" ("O") and "Government, Institution or Community" ("G/IC") and falls into area shown as 'Road' on the Approved OZP. This RR seeks to rezone the Site to "Other Specified Uses (Residential Development with Historical Building Conserved)" ("OU(RDHBC)") and "Other Specified Uses (Elevated Walkway)" ("OU(EW)") zone to facilitate a Comprehensive Residential Development with supporting commercial uses and conservation of the NKT in-situ. The RR also seeks to relax the plot ratio ("PR") restriction to the level permitted under Building (Planning) Regulations ("B(P)R") and building height ("BH") restriction to 120mPD correspondingly. An Indicative Development Scheme ("IDS") which comprises of one 24-storey residential and commercial building over 3-storey podium with NKT preserved in-situ is put forth to demonstrate the development intention and the feasibility of the Proposed "OU(RDHBC)" zone.

1.1.3 Please refer to Appendix 1 of Supplementary Planning Statement for the Architectural plans.

1.1.4 This Drainage Impact Assessment (DIA) takes into account the public drainage works that will result from the construction of the Hopewell Centre II Development (HCII) located immediately east of the Site.

1.2 Objectives

1.2.1 The objectives of DIA are as follow:

- Identify any potential drainage impact arising from the Indicative Development Scheme;
- Assess the impact of the Indicative Development Scheme on the permanent diverted stormwater drainage system proposed as part of the construction of the Indicative Development Scheme; and
- Identify design requirements for the drainage system of the Indicative Development Scheme.

1.3 Information Available for the Study

1.3.1 The following information was reviewed for DIA:

a. DSD Drawings No. 11-SW-14B-3, 11-SW-14B-4 and 11-SW-14D-2 showing the as-constructed drainage and sewerage information;

b. DSD Stormwater Drainage Manual (SDM) (Fifth Edition, January 2018);

c. DSD Advice Note No. 1, Application of the Drainage Impact Assessment Process for Private Sector Projects (September 2010);

d. Hopewell Centre II Development DIA Report No. EB000176/HCII2017/R08 V3.

2 PROJECT OUTLINE

2.1 Project Title

2.1.1 The tentative project title is “Proposed Amendment To The Approved Wan Chai Outline Zoning Plan No. S/H5/31 From “Comprehensive Development Area”, “Residential (Group C)”, “Open Space” And “Government, Institution Or Community” Zones And Area Shown As ‘Road’ To “Other Specified Uses (Residential Development With Historical Building Conserved)” And “Other Specified Uses (Elevated Walkway)” At Nos. 1, 1a, 2 And 3 Hill Side Terrace, No. 55 Ship Street (A.K.A. Nam Koo Terrace), Nos. 1 - 5 Schooner Street, No. 53 Ship Street, No. 18 Sau Wa Fong, Inland Lot No. 9048 And Adjoining Government Land, Wan Chai.

2.2 Proponent

2.2.1 The proponent of the project is Yuba Company Limited.

2.3 Nature and Description of Project

2.3.1 The Indicative Development Scheme comprises of a 24-storey residential and commercial building with 3 podium levels. The G/F is mainly proposed for retail use whereas the 2/F and 3/F of the podium are reserved for E&M and residential recreational facilities.

2.3.2 The scope of this DIA comprises the drainage downstream of the Indicative Development Scheme at Sik On Street to the drainage system at Queen’s Road East, and all of the upstream sewers affected by the works.

2.4 Location

The Rezoning Site is located at southwestern part of Wan Chai. It is bounded by Schooner Street and Greenland House to the north, Ship Street to the east, St. Francis' Canossian College to the south and St. Francis' Canossian School to the west.

2.5 Area of Rezoning Site

2.5.1 The Rezoning Site has a site area of 3,157.6m^2, in which the Development Site Area is 3,140.7m^2 after excluding the elevated walkway above Ship Street staircase.

3 PLANNING AND IMPLEMENTATION OF PROGRAMME

3.1 Planning and Implementation

3.1.1 The Indicative Development Scheme will be constructed in one single phase.

3.2 Project Interface

3.2.1 This DIA takes into account the permanent stormwater drainage diversion works, the redefined catchments and the reconstruction works of Ship Street that will result from the construction of the HCII, located immediately East of the Rezoning Site.

3.2.2 The surface runoff from the site will be discharged to the 450 mm diameter drainage pipeline adjacent to the site at Schooner Street. This pipeline is part of the public drainage works proposed under the HCII.

3.2.3 For reference, proposed public drainage works under the HCII are shown in drawing no. D006-EA01425-HCII-06 extracted from HCII DIA report no. EB000176/HCII2017/R08 (Refer to Appendix E).

4 EXISTING DRAINAGE SYSTEM

4.1 Existing Drainage System

4.1.1 The existing 225mm diameter drainage pipeline along Schooner Street between existing manholes SMH7015208 and SMH7015211 is removed under HCII development and replaced by a new 450mm drainage pipe connecting existing stormwater manhole SMH7015208 to proposed manhole DM48.

4.1.2 Existing Manhole SMH7015208 is reconstructed under HCII development.

4.1.3 Existing drainage system in the vicinity of the Site is shown in drawing no. D005-EA01425-HCII-01 extracted from HCII DIA report no. EB000176/HCII2017/R08v3 (Refer to Appendix B).

5 DRAINAGE IMPACT ASSESSMENT

5.1 Assessment Criteria

5.1.1 The 1 in 50 year 120 minutes storm event is used to assess the hydraulic performance of the urban drainage branch systemThe 1 in 10 year 120 minutes storm event is used to assess the hydraulic performance of the urban drainage branch system during the dry season (case without the operation of Hong Kong West Drainage Tunnel).

5.1.2 Hydraulic modelling package InfoWorks ICM version 2023.2 developed by HR Wallingford/Innovyze is used to assess surface water runoff and hydraulic performance of existing and proposed drainage systems.

5.1.3 The runoff coefficients adopted for paved material, rock slope with underlying rock layer, steep grassland heavy soil, steep grassland heavy soil and flat grassland heavy soil are 1.0/0.9, 0.6, 0.35 and 0.2 respectively.

5.1.4 The boundary conditions applied at the outfalls adopted in this DIA are as follows. For outfall SMH7015271, it adopts the water level at nearby node SMH7015040 assumed to have similar flood level.

	SMH7015271 (mPD)
1 in 10 yrs	5.527
1 in 50 yrs	5.608

5.1.5 These water levels are provided by DSD. References are contained in Appendix N.

5.1.6 To account for the effect of climate change, an increase of 11.1% was applied to the design rainfall intensities in accordance with item (k) of the DSD SDM Corrigendum No. 1/2022.

5.2 Hydraulic Modelling Details

5.2.1 The model network extends from nodes SGJ7003427 and SMH7015571 on Kennedy Road to node SMH7015271 on Queen's Road East.

5.2.2 Node and conduit references, ground levels, invert levels and pipe diameters were taken from DSD drainage record drawings. Existing network data was inferred or interpolated where values were not present in the records. Proposed network data was taken from drawing E01425/HCII/DIA/006 and from Proposed External Steps Plans. Drawing E01425/HCII/DIA/006 is contained in Appendix D,

5.2.3 All manholes were modelled with a stored flood type.

5.2.4 A Colebrook White pipe roughness value of 3.0mm was applied to all concrete pipes.

5.2.5 Normal and Fixed headloss types were used in the model. A Fixed headloss type was applied for entry to and exit from chambers at backdrop manholes. Normal headloss types were modelled for all other locations. Fixed headloss entry and exit coefficients were modelled as 0.5 and 1.0 respectively. Normal headloss pipe coefficients were derived using the automated inference routine built into the InfoWorks ICM software.

5.2.6 The fixed runoff volume model was used for all catchments. The fixed runoff coefficients adopted are detailed in Table 1 & 2.

5.2.7 Wallingford routing model was used for all catchments apart from the hillside catchments where large catchment routing model was applied. A routing value of 1 was applied to paved and rock slope surfaces and a routing value of 4 was used for grassland. These are the default values for impervious and pervious surfaces respectively.

5.2.8 The unit hydrographs used to simulate the 200-year, 50-year and 10-year design rainstorm events were derived synthetically using the symmetrically distributed rainfall based on RO (1991) as recommended in Section 4.3.4 of the DSD SDM. The formulation is shown below:

$$F(t) = \begin{cases} \dfrac{a[b + 2(1-c)t]}{(2t+b)^{c+1}} & , \quad 0 \le t \le \dfrac{t_d}{2} \\ F(-t) & , \quad -\dfrac{t_d}{2} \le t \le 0 \end{cases}$$

where: F(t) = rate of rainfall or instantaneous intensity in mm/hr at time t (in minutes)
t_d = rainstorm duration (in minutes) (td≤240)
a,b,c = storm constants are given in Table 3 of DSD SDM, which are the same as those given of the algebraic equation of the IDF relationship

5.2.9 The 1 in 10-year design rainstorm profile is used to simulate the hydraulic performance of proposed drainage system for the case without the operation of Hong Kong West Drainage Tunnel (Dry Season Scenario).

5.2.10 Rainstorm events were input manually in the model using the formulation presented in Section 5.2.8. The Design Rainstorm Profiles adopted in the hydraulic models are contained in Appendix F.

5.2.11 The boundary conditions applied at the outfalls adopted in this DIA are as follows. For outfall SMH7015271, it adopts the water level at nearby node SMH7015040 assumed to have similar flood level.

	SMH7015271 (mPD)
1 in 10 yrs	5.527
1 in 50 yrs	5.608

5.2.12 These water levels are provided by DSD extracted from HCII DIA Report.

5.2.13 Model data and results outputs are included in Appendix F.

5.3 Review of the Drainage Catchments under HCII DIA

5.3.1 The Site falls within the storm water catchment of the proposed drainage pipeline along Ship Street under the HCII.

5.3.2 The storm water catchment of the Site was identified in HCII DIA Report No. EB000176/HCII2017/R08v3. Refer to catchment E1 in Drawing No. D004-EA01425-HCII-03 contained in Appendix C (extracted from HCII DIA report no. EB000176/HCII2017/R08v3).

5.3.3 With reference to Section 1.1.4 of the HCII DIA report no. EB000176/HCII2017/R08v3 (refer to Appendix D for extracts of the report), the HCII DIA report takes into account the future development of NKT, Hill Side Terrace (HST), Miu Kang Terrace (MKT), Inland Lot No. 9048 and Adjoining Government Land (the Site under this DIA).

5.3.4 With reference to Table 4 in Section 6.3.1 of the HCII DIA report no. EB000176/HCII2017/R08v3, the area, surface characteristics and run-off coefficient of the Site adopted in the HCII DIA for the design of the proposed public drainage works under the HCII are as follows:

Catchment (HCII DIA report no. EB000176/HCII2017/R04)	**Area (m^2)**	**Surface Characteristics (percentage of area)**	**Runoff Coefficient (C)**
(E1) Indicative Development Scheme	2,987 m^2	Paved Material (80%)	1.0
		Flat Grassland – Heavy Soil (20%)	0.2

Table 1 – Area and surface characteristics of the Site adopted in the HCII DIA for the design of the proposed public drainage works under the HCII (report no. EB000176/HCII2017/R08v3)

5.4 Proposed Drainage Catchments

5.4.1 The area and surface characteristics of the Indicative Development Scheme catchments are as follows:

Catchment (this DIA report)	Area (m^2)	Surface Characteristics (percentage of area)	Runoff Coefficient (C)
Indicative Development Scheme	3,157.6m^2 (including 16.9 m^2 Elevated Walkway)	Paved Material (77%)	1.0
		Flat Grassland – Heavy Soil (23%)	0.2

Table 2 – Indicative Development Scheme Scenario Catchments Areas and Runoff Coefficients

5.4.2 It is also understood that the Site area is larger than that assumed in the HCII DIA report, and the surface characteristics has changed. Table 3 shows that the

5.4.3 The results of the hydraulic model show that the proposed 450mm diameter pipe connecting existing manhole SMH7015208 to proposed manhole DM48 has sufficient hydraulic capacity to cater for the peak design flows estimated from the upstream catchments.

5.4.4 The hydraulic model result of the proposed pipe connecting existing manhole SMH7015208 to proposed manhole DM48 and the downstream is shown in the InfoWorks' longitudinal section contained in Appendix F.

5.4.5 The surface runoff before the development is 0.280 m3/s while that after the development will become 0.205 m3/s.

5.4.6 Table 3 compares the freeboard of the drainage system downstream before and after the development.

Manhole	Ground Level (mPD)	HCII *		NKT *		HCII VS NKT**	
		(1in10 yr) - Freeboard (m)	(1in50 yr) - Freeboard (m)	(1in 0 yr) - Freeboard (m)	(1in50 yr) - Freeboard (m)	(1 in 10 yr) - Freeboard (m)	(1 in 50 yr) - Freeboard (m)
SMH7015208	19.39	-	-0.807	-	-0.804	-	0.003
DM48	19.58	-6.107	-6.127	-6.106	-6.117	0.001	0.010
DM49	13.6	-0.776	-0.819	-0.775	-0.797	0.001	0.022
DM50	13.55	-2.208	-2.25	-2.207	-2.229	0.001	0.021
DM51	13.6	-5.386	-5.422	-5.385	-5.404	0.001	0.018
DM53	9.2	-2.939	-2.953	-2.937	-2.906	0.002	0.047
DM54	7.39	-1.302	-1.268	-1.300	-1.220	0.002	0.048
DM55	6.57	-0.601	-0.553	-0.599	-0.516	0.002	0.037
DM56	6.38	-0.511	-0.456	-0.509	-0.431	0.002	0.025
SMH7015055	6.06	-0.266	-0.206	-0.265	-0.188	0.001	0.018
SMH7015040	5.26	0.303	0.379	0.303	0.382	0.000	0.003

* Negative freeboard implies the water level is below ground level

** Negative difference implies the water level of proposed manholes is lower than the water level of existing manhole.

5.4.7 It is concluded that the increment of site area and change in surface characteristics do not bring adverse impacts and fulfil the design criteria adopted in the hydraulic design of the public drainage works under HCII.

5.5 Proposed Drainage Connection from the Site to the Public Drainage System and Drainage Impact

5.5.1 With reference to the InfoWorks hydraulic model of the HCII DIA report (report no. EB000176/HCII2017/R08v3), in the design of the public drainage works under the HCII the stormwater runoff from the Site is assumed to be discharged to proposed drainage manhole SMH7015208 at Schooner Street.

5.5.2 Taking into account the Master Layout Plan of the Indicative Development Scheme the stormwater runoff from the Site is recommended to be discharged to proposed drainage manhole SMH7015208 in accordance with the design assumptions under the HCII.

5.5.3 Since the Site area is smaller than that assumed in the HCII DIA report and the surface characteristics for the Indicative Development Scheme tie in with the design criteria adopted in the hydraulic design of the public drainage works under the HCII, there should be no adverse drainage impact due to the Indicative Development Scheme.

6 CONCLUSIONS

6.1.1 The surface runoff from the Site will be discharged to the diverted public drainage pipeline adjacent to the Site at Schooner Street. This 450 mm diameter pipeline is part of the public drainage works under the Hopewell Centre II project.

6.1.2 With reference to Section 1.1.3 of the HCII DIA report no. EB000176/HCII2017/R08v3 (refer to Appendix D for extracts of the report), the HCII DIA report takes into account the future development of NKT, HST, MKT Inland Lot No. 9048, and Adjoining Government Land (the Site under this DIA).

6.1.3 Taking into account the Master Layout Plan of the Indicative Development Scheme, the stormwater runoff from the Site is recommended to be discharged to proposed drainage manhole SMH7015208 at Schooner Street in accordance with the design assumptions under the HCII.

6.1.4 Form the assessment carried out, the increment of site area and change in surface characteristics do not bring adverse impacts and fulfil the design criteria adopted in the hydraulic design of the public drainage works under HCII.

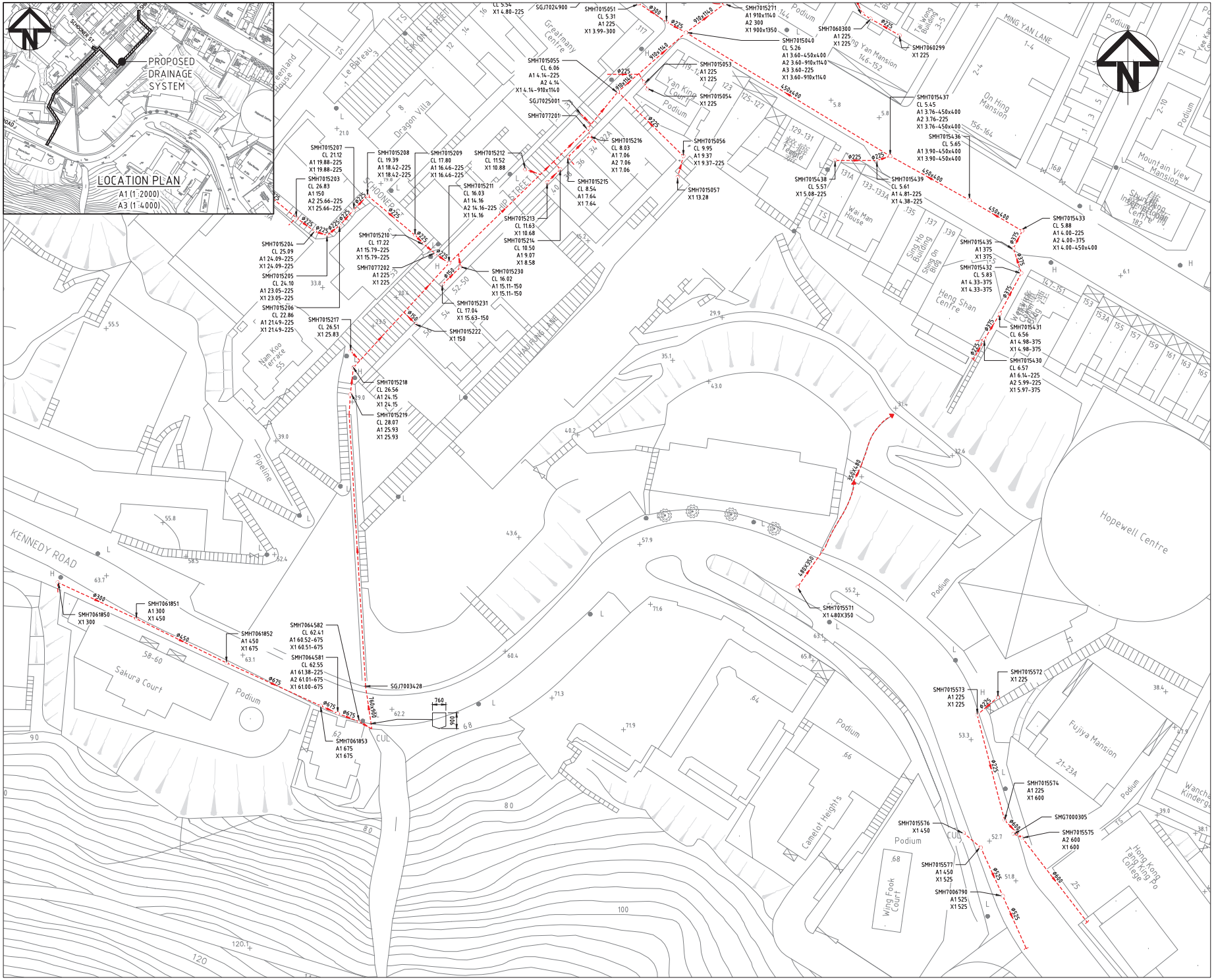
6.1.5 Hence, there should be no adverse drainage impact due to the Indicative Development Scheme

APPENDIX A

Architectural Drawings for the Indicative Development Scheme (Please refer to Appendix 1 of the Supplementary Planning Statement)

APPENDIX B

Existing Drainage System in the Vicinity of the Site (For Information, extracted from HCII DIA report no. EB000176/HCII2017/R08v3)



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Issue	Description	Date

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		Author	F. COUTINHO
Original Size	–	Checker	L. LEUNG
Height Datum	HKPD	Approver	B. IEONG
Grid	HK80	© Copyright reserved	

Filename: EA01425-HCII-DIA-005-01.DWG

Client
WETHERALL INVESTMENTS LIMITED

Project
HOPEWELL CENTRE II DEVELOPMENT

Title
EXISTING PUBLIC DRAINAGE SYSTEM

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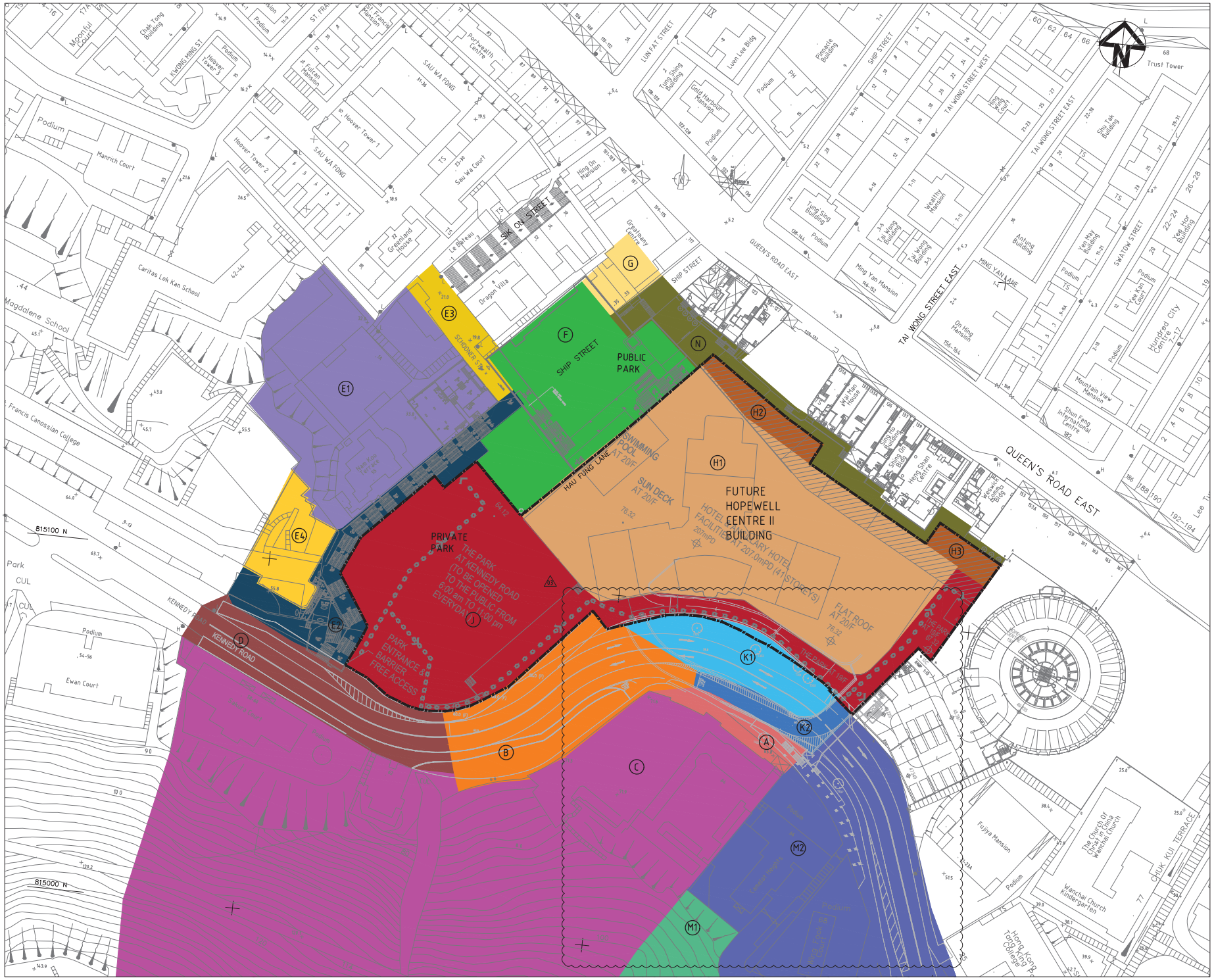
APPENDIX C

Stormwater catchments of the proposed drainage works under Hopewell Centre II Development (For Information, extracted from HCII DIA report no. EB000176/HCII2017/R08v3)



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02	ISSUE FOR DIA	19-07-19
01	ISSUE FOR DIA	16-10-17
Issue	Description	Date

Status

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

Scales	A1 (1:500) A3 (1:1000)	Current Issue Signatures	
		Author	F. COUTINHO
Original Size	–	Checker	L. LEUNG
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Filename: EA01425-HCII-DIA-004-03.DWG

Client

WETHERALL INVESTMENTS LIMITED

Project

HOPEWELL CENTRE II DEVELOPMENT

Title

PROPOSED CATCHMENTS AND SURFACE TYPE

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APPENDIX D

Excerpts of the Hopewell Centre II Development DIA Report No. EB000176/HCII2017/DIA/R08v3 (For information)

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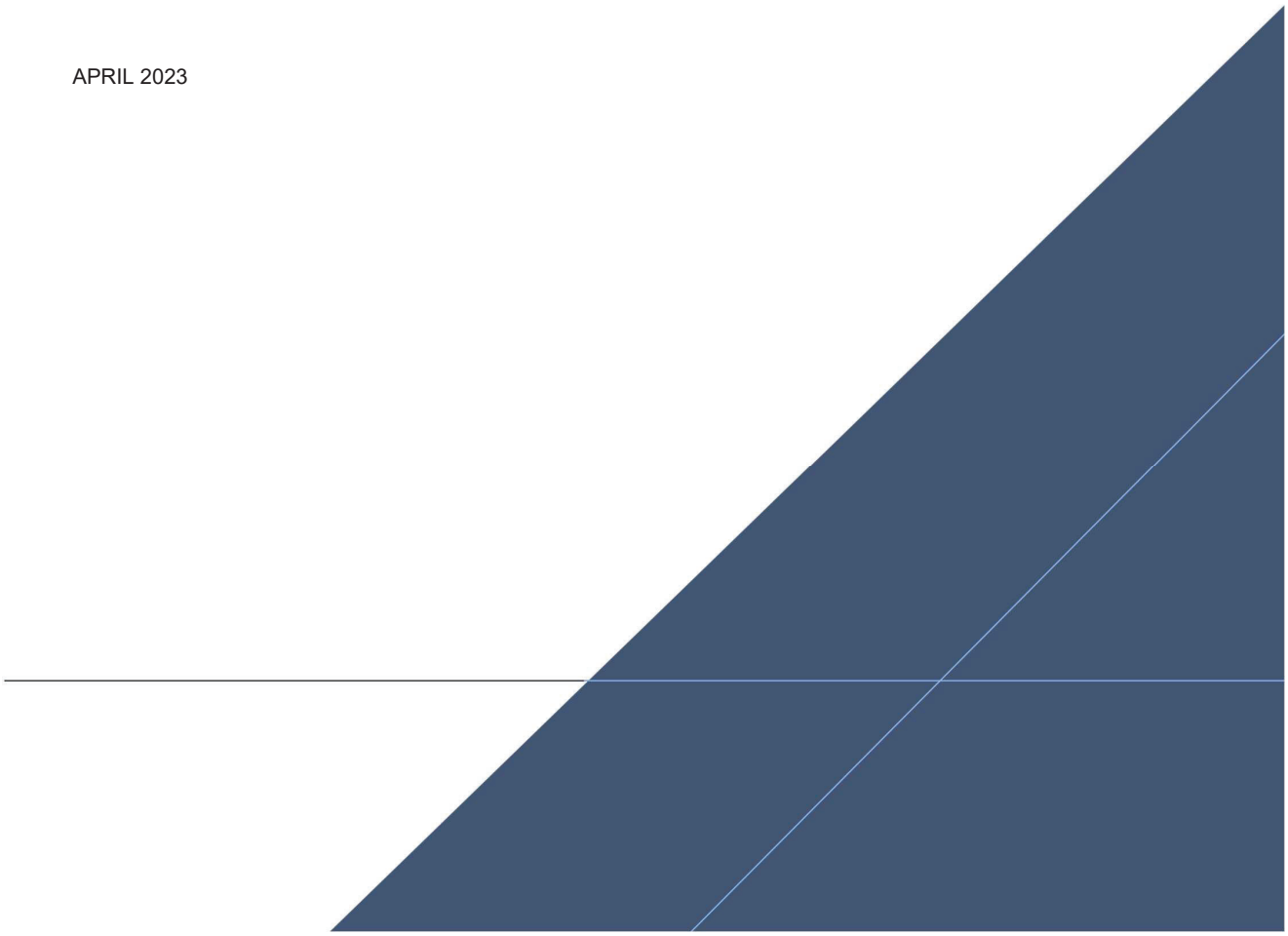
WETHERALL INVESTMENTS LIMITED
HOPEWELL CENTRE II DEVELOPMENT

Drainage Impact Assessment

APRIL 2023



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WETHERALL INVESTMENTS LIMITED
HOPEWELL CENTRE II DEVELOPMENT

Drainage Impact Assessment

Author	Claudius Tse	
Reviewer	Eric Tam	
Approver	Arthur Ng	

Report No	EB000176/HCII2017/R08/V3
Date	April 2023

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Surface Water Interception and Connection Details (For Information Only)

1 INTRODUCTION

1.1 Background

1.1.1 Asia Infrastructure Solutions Limited was commissioned by Wetherall Investments Limited to prepare this Drainage Impact Assessment (DIA) report for the proposed Hopewell Centre II Development in Wan Chai (HCII).

1.1.2 The proposed development is in Wan Chai and bounded by Queen's Road East to the north and Kennedy Road to the south – hereinafter referred to as "HCII Development" or "the Site".

1.1.3 In order to assess the technical feasibility of a proposed Comprehensive Development Area at Nam Koo Terrace, Hill Side Terrace, Miu Kang Terrace, Inland Lot No. 9048 and Adjoining Government Land, an "Indicative Development Scheme" was prepared. This proposed development falls within the catchment of the proposed drainage pipeline along Ship Street adjoining Hopewell Centre II Development. The Indicative Development Scheme has 21 storeys, including 17 storeys of residential use, 2 storeys of Ancillary Recreation, 1 storey of Shop & Services / Eating Place, and a Public Lavatory. The master layout plans of the Indicative Development Scheme are provided in Appendix A.

1.1.4 This version of the DIA report takes into account the following changes to the previously submitted HCII DIA Report (Ref. EB000176/HCII2017/DIA/R08V2):

- Updated drawings of the Proposed Comprehensive Development are added to Appendix A to show latest information.
- D006-EA01425-HCII in Appendix D is revised to show temporary connection from subsoil drains. It shall be noted that once the proposed drainage diversion is completed and in commission, flow from the subsoil drain shall be redirected to the proposed public drainage.
- Pipe information of DM29 in drawing D007-EA01425-HCII in Appendix D is rectified to be consistent with the layout plan.
- Water connection annotation is removed in drawing D008-EA01425-HCII in Appendix D to avoid confusion.
- Appendix G3 is added to show latest drainage plans of Public Open Space for additional reference.
- Connection details between surface channels, catchpits and modified manholes for the surface water interception of the staircase is contained in new Appendix R for information.

1.1.5 Amendments to the text are highlighted for easy reading.

2 OBJECTIVE

2.1.1 The objectives of this DIA are as follows:

- Identify any potential drainage impact arising from the Site;
- Assess the performance of the proposed permanent diverted stormwater drainage system;
- Identify design requirements for the drainage system of the proposed HCII development;

2.2 Information Available for the Study

2.2.1 The following information was reviewed for the Study:

a) DSD Drawings No. 11-SW-14B-3, 11-SW-14B-4 and 11-SW-14D-2 showing the as-constructed drainage and sewerage information;
b) DSD Stormwater Drainage Manual (SDM) (Fifth Edition, January 2018);
c) DSD Advice Note No. 1, Application of the Drainage Impact Assessment Process for Private Sector Projects (September 2010);
d) Highways Department, Guidance Notes on Road Pavement Drainage Design RD/GN/035 (May 2010);
e) District Lands Office Plan No. HK2808-DIb and Special Conditions;
f) DSD SDM Corrigendum No. 1/2022

3 PROJECT OUTLINE

3.1 Project Title

3.1.1 The tentative project title is “Hopewell Centre II Development at Wanchai, Hong Kong.”

3.2 Proponent

3.2.1 The proponent of the project is Wetherall Investments Limited.

3.3 Nature and Description of Project

3.3.1 The site is a Comprehensive Development Area according to the current Outline Zoning Plan. The Development consists of a hotel, amenities and commercial facilities up to 52 floors high, situated immediately west of the existing Hopewell Centre.

3.3.2 A section of the existing Kennedy Road in front of the Development will be widened, including construction of an overpass and an underpass across Kennedy Road, to accommodate the ingress-egress of the Development.

3.3.3 The existing stairway along Ship Street bounded by Kennedy Road and Schooner Street will have refinements and enhancements. Layout plans of the proposed stairways are contained in Appendix G1.

3.4 Location

3.4.1 The Site is located in Wanchai and bounded by Queen's Road East to the north, Kennedy Road to the south and Ship Street to the west. The existing Hopewell Centre is located to the east of the Site. The steps of Hau Fung Lane are within the Site boundary.

3.4.2 St. Francis Canossian College, Nam Koo Terrace, a public toilet and several private premises are situated to the west of the Site.

3.4.3 The Site is of predominantly demolished remnants of old houses and buildings constructed on a few terraces between which are some existing engineered slopes.

3.5 Areas of Project Site

3.5.1 The Site has an area of approximately 9,840m^2 (Private lot). The Public Open Space (aka LCSD Park) has an area of approximately 2,030m^2.

3.6 Change in Level

3.6.1 The existing levels of the Site vary between +5.2 mPD and +63.1 mPD. The levels within the Development will be designed to match the surrounding levels of the landscapes. The ingress / egress at Kennedy Road will be formed by local widening of the existing road between the existing retaining walls and the proposed Development. The proposed Development will incorporate a podium and a tower north of Kennedy Road.

4 PLANNING AND IMPLEMENTATION OF PROGRAMME

4.1 Planning and Implementation

4.1.1 The Hopewell Centre II development will be carried out in one single phase, for about 4 to 5 years.

4.2 Project Interface

4.2.1 This DIA has taken into account the future development of the site at Nam Koo Terrace, Hill Side Terrace, Miu Kang Terrace, Inland Lot No. 9048 and Adjoining Government Land and the proposed Hopewell Centre II.

5 EXISTING DRAINAGE

5.1 Existing Western Drain and Catchment

5.1.1 There is an existing drainage system situated between the stairway leading to Ship Street and the stairway leading to Hau Fung Lane, referred to here as the Existing Western Drain. This system consists of two sections: a) a 900 mm stepped u-channel, connecting upstream to a crossroad 760 mm x 900 mm box culvert across Kennedy Road, and then b) a pipe drain connecting to a 910 mm x 1140 mm box culvert downstream. Existing drainage systems are show in drawing D005-EA01425-HCII in Appendix C.

5.1.2 The Existing Western Drain collects a portion of surface runoff originated from Bowen Hill as well as part of the existing Kennedy Road. In addition, the runoff from the Site and some existing structures also drain into this system. Existing stormwater catchments are shown in drawings D001-EA01425-HCII and D002-EA01425-HCII in Appendix E.

5.2 Existing Eastern Drain and Catchment

5.2.1 There is another existing drainage system situated to the west of Hopewell Centre, referred to here as the Existing Eastern Drain. It takes a combined form of a 480 mm x 350 mm box culvert and a surface channel starting at Kennedy Road and going down the slope to Heng Shan Centre at 141-145 Queen's Road East. Existing drainage systems are shown in drawing D005-EA01425-HCII in Appendix C.

5.2.2 The Existing Eastern Drain collects only road surface runoff for part of the existing Kennedy Road and also the sloped area immediately west of Hopewell Centre. In order to confirm the function of the Existing Eastern Drain, where its starting manhole could not be identified on site, a separate CCTV survey was carried out. According the CCTV survey conducted by Kofrey Engineering in May 2009, the Existing Eastern Drain was investigated and confirmed that the drain collects a small amount of surface runoff from a small section of Kennedy Road. Existing stormwater catchments are shown in drawings D001-EA01425-HCII and D002-EA01425-HCII in Appendix E.

5.3 Other Existing Stormwater Drainage

5.3.1 There is also an existing stormwater drainage system at Kennedy Road south of Hopewell Centre that runs downhill and collects surface runoff before discharging into the Spring Garden Lane stepped U-channel. Its catchment area is also illustrated in drawings D001-EA01425-HCII and D002-EA01425-HCII in Appendix E (Existing Kennedy Road Catchment).

5.3.2 The areas, surface characteristics and runoff coefficients of Existing Catchments are summarized in the tables below:

Catchment	Area (m^2)	Surface Characteristics (percentage of area)	Runoff Coefficient (C)
(A) Existing Hillside Catchment	64,526 m2 Assumed area upstream of West Drainage Tunnel Intake Structure: 50,602 m2 Assumed area intercepted by West Drainage Tunnel Intake Structure: 40% of 50,602 m2 = 20,240 m2 Contributing area during wet seasons: 64,526m2 – 20,240m2 = 44,285 m2 Contributing area during dry seasons: 64,526 m2	Paved Material (10%)	1.0
		Steep Grassland – Heavy Soil (90%)	0.35
(B) Existing Kennedy Road	810 m2	Paved Material (100%)	1.0
(C1) Existing Nam Koo Terrace Catchment	3,887 m2	Paved Material (80%)	1.0
		Steep Grassland – Heavy Soil (20%)	0.35
(C2) Schooner Street Catchment	309 m2	Paved Material (100%)	1.0
(C3) St Francis C College	536 m2	Paved Material (100%)	0.9
	3,407 m2	Paved Material (15%)	1.0

(D) Existing Tung Chi College Catchment		Rock slope/underlying impervious rock layer (30%)	0.6
		Steep Grassland – Heavy Soil (15%)	0.35
		Flat Grassland – Heavy Soil (40%)	0.2
(E) Existing Tung Chi College Catchment	894 m2	Rock slope/underlying impervious rock layer (100%)	0.6
(F) Existing Tung Chi College Catchment	5,344 m2	Paved Material (15%)	1.0
		Rock slope/underlying impervious rock layer (35%)	0.6
		Flat Grassland – Heavy Soil (50%)	0.2
(G) Existing QRE Back lane	589 m2	Paved Material (100%)	1.0
(H) Existing Ship St/Hau Fung Ln Catchment	2,421 m2	Paved Material (100%)	1.0

Table 1 - Existing Catchments Areas and Runoff Coefficients – Western Drain

Catchment	**Area (m2)**	**Surface Characteristics (percentage of area)**	**Runoff Coefficient (C)**
(J) Existing Kennedy Road	2,007 m2	Paved Material (100%)	1.0
(K) Existing Tung Chi College Catchment	1,543 m2	Rock slope/underlying impervious rock layer (100%)	0.6

Table 2 - Existing Catchments Areas and Runoff Coefficients – Eastern Drain

Catchment	Area (m2)	Surface Characteristics (area percentage)	Runoff Coefficient (C)
(L1) Existing Hillside KR	857 m2	Paved Material (4.6%)	1.0
	17,788 m2	Steep Grassland – Heavy Soil (95.4%)	0.35
(L2) Existing Developments and Kennedy Road	5,549 m2	Paved Material (100%)	0.9

Table 3 - Existing Kennedy Road Catchment Area and Runoff Coefficient

5.3.3 In order to take into consideration the completion of the West Drainage Tunnel in 2012, in the wet season scenario, 40% of the surface runoff in the area of Existing Hillside Catchment upstream the intake structure at Bowen Road is sensibly assumed to be intercepted and conveyed to the sea via the tunnel. To take into consideration that the West Drainage Tunnel may be out of service during the dry season for maintenance, a dry season simulation adopting 100% of the area of this catchment is included in the report.

6 PROPOSED DRAINAGE

6.1 Proposed Western Drain

6.1.1 The Existing Western Drain will be abandoned and diverted along an alternative route referred to here as the Proposed Western Drain, shown in drawing D006-EA01425-HCII. The proposed western drain starts at the widened Kennedy Road near the proposed flyover and runs to the west to the proposed Ship Street stairway, then passes through the proposed Public Open Space, and ultimately connects to the existing 910 mm x 1140 mm box culvert downstream at Ship Street.

6.2 Proposed Eastern Drain

6.2.1 The Existing Eastern Drain will be abandoned and diverted with another routing referred to as the Proposed Eastern Drain here. Due to the significant differences in road levels, and proposed ingress tunnel, diversion of the Existing Eastern Drain westwards to the Proposed Western Drain, is technically not feasible. Therefore, the Proposed Eastern Drain will be diverted eastwards, which takes the form of 375 mm diameter pipes at the widened Kennedy Road running to southeast. This pipeline to the existing DN525 drainage system on Kennedy Road running to the east.

6.3 Proposed Catchments

6.3.1 The areas, surface characteristics and runoff coefficients of Proposed Catchments are summarized in the tables below:

Catchment	Area (m^2)	Surface Characteristics (percentage of area)	Runoff Coefficient (C)
(A) Existing footpath & elevated road	301 m2	Paved Material (100%)	1.0
(B) + (D) Proposed Kennedy Road	1,684 +1,290 m2	Paved Material (100%)	1.0
(C) Existing Hillside Catchment	64,526 m2	Paved Material (10%)	1.0
	Assumed area upstream of West Drainage Tunnel Intake Structure: 50,602 m2 Assumed area intercepted by West Drainage Tunnel Intake Structure: 40% of 50,602 m2 = 20,240 m2 Contributing area during wet seasons: 64,526m2 – 20,240m2 = 44,285 m2 Contributing area during dry seasons: 64,526 m2	Steep Grassland – Heavy Soil (90%)	0.35

(E1) Indicative Development Scheme	2,987 m2	Paved Material (80%)	1.0
		Flat Grassland – Heavy Soil (20%)	0.2
(E2) Stairway catchment	1,042 m2	Paved Material (100%)	1.0
(E3) Schooner Street Catchment	359 m2	Paved Material (100%)	1.0
(E4) St Francis C College	531 m2	Paved Material (100%)	0.9
(F) Proposed HCII Public Park	2,030 m2	Paved Material (70%)	1.0
		Flat Grassland – Heavy Soil (30%)	0.2
(H1) Proposed HCII Building	5,240 m2	Paved Material (90%)	1.0
		Flat Grassland Heavy Soil (10%)	0.9
(H2) +(H3) HCII Building Pedestrian Passage	417 m2	Paved Material (100%)	1.0
(N) QRE Backlane	847 m2	Paved Material	1.0
(G) Greatmany Centre	266 m2	Paved Material	1.0
(J) Proposed HCII Private Park	4,126 m2	Paved Material (60%)	1.0
		Flat Grassland – Heavy Soil (40%)	0.2
(K2) Flyover	319 m2	Paved Material (100%)	1.0

Table 4- Proposed Catchments Areas and Runoff Coefficients- Western Drain

Catchment	Area (m^2)	Surface Characteristics (percentage of area)	Runoff Coefficient (C)
(K1) Kennedy Road East Drain	779 m2	Paved Material	1.0
(M1) Existing Hillside East Drain	857 m2	Paved Material (4.6%)	1.0
	17,788 m2	Steep Grassland – Heavy Soil (95.4%)	0.35
(M2) Existing Developments and Kennedy Road + footbridge	5,231 m2	Paved Material (100%)	0.9

Table 5- Proposed Catchments Areas and Runoff Coefficients- Eastern Drain

6.3.2 In order to take into consideration the completion of the West Drainage Tunnel in 2012, in the wet season scenario, 40% of the surface runoff in the area of Existing Hillside Catchment upstream the intake structure at Bowen Road is sensibly assumed to be intercepted and conveyed to the sea via the tunnel. To take into consideration that the West Drainage Tunnel may be out of service during the dry season for maintenance, a dry season simulation adopting 100% of the area of this catchment is included in the report.

6.4 DRAINAGE IMPACT ASSESSMENT

6.5 Assessment Criteria

6.5.1 The 1 in 50 year 120 minutes storm event is used to assess the hydraulic performance of the urban drainage branch system. The 1 in 200 year 120 minutes storm event is used to assess the size of the stormwater detention tank. The 1 in 10 year 120 minutes storm event is used to assess the hydraulic performance of the urban drainage branch system during the dry season (case without the operation of Hong Kong West Drainage Tunnel).

6.5.2 Hydraulic modelling package InfoWorks ICM version 7.5 developed by HR Wallingford/Innovyze is used to assess surface water runoff and hydraulic performance of existing and proposed drainage systems.

6.5.3 The runoff coefficients adopted for paved material, rock slope with underlying rock layer, steep grassland heavy soil, steep grassland heavy soil and flat grassland heavy soil are 1.0/0.9, 0.6, 0.35 and 0.2 respectively.

6.5.4 The boundary conditions applied at the outfalls adopted in this DIA are as follows. For outfall SMH7015271, it adopts the water level at nearby node SMH7015040 assumed to have similar flood level.

	SMH7015271 (mPD)	SMH7057342 (mPD)
1 in 10 yrs	5.527	46.935
1 in 50 yrs	5.608	46.949
1 in 200 yrs	5.630	46.955

6.5.5 These water levels are provided by DSD. References are contained in Appendix N.

6.5.6 To account for the effect of climate change, an increase of 11.1% was applied to the design rainfall intensities in accordance with item (k) of the DSD SDM Corrigendum No. 1/2022.

6.6 Hydraulic Modelling Details

6.6.1 The model network extends from nodes SGJ7003427 and SMH7015571 on Kennedy Road to node SMH7015271 on Queen's Road East.

6.6.2 Node and conduit references, ground levels, invert levels and pipe diameters were taken from DSD drainage record drawings. Existing network data was inferred or interpolated where values were not present in the records. Proposed network data was taken from drawing E01425/HCII/DIA/006 and from Proposed External Steps Plans. Drawing E01425/HCII/DIA/006 is contained in Appendix D, Approved External Steps Plans are contained in Appendix G1.

6.6.3 All manholes were modelled with a stored flood type.

6.6.4 A Colebrook White pipe roughness value of 3.0mm was applied to all concrete pipes.

6.6.5 Normal and Fixed headloss types were used in the model. A Fixed headloss type was applied for entry to and exit from chambers at backdrop manholes. Normal headloss types were modelled for all other locations. Fixed headloss entry and exit coefficients were modelled as 0.5 and 1.0 respectively. Normal headloss pipe coefficients were derived using the automated inference routine built into the InfoWorks ICM software.

6.6.6 The fixed runoff volume model was used for all catchments. The fixed runoff coefficients adopted are detailed in Table 1 to Table 5.

6.6.7 Wallingford routing model was used for all catchments apart from the hillside catchments where large catchment routing model was applied. A routing value

of 1 was applied to paved and rock slope surfaces and a routing value of 4 was used for grassland. These are the default values for impervious and pervious surfaces respectively.

6.6.8 The unit hydrographs used to simulate the 200-year, 50-year and 10-year design rainstorm events were derived synthetically using the symmetrically distributed rainfall based on RO (1991) as recommended in Section 4.3.4 of the DSD SDM. The formulation is shown below:

$$F(t) = \begin{cases} \dfrac{a[b + 2(1-c)t]}{(2t+b)^{c+1}} & , \quad 0 \le t \le \dfrac{t_d}{2} \\ F(-t) & , \quad -\dfrac{t_d}{2} \le t \le 0 \end{cases}$$

where: F(t) = rate of rainfall or instantaneous intensity in mm/hr at time t (in minutes)
t_d = rainstorm duration (in minutes) (td≤240)
a,b,c = storm constants are given in Table 3 of DSD SDM, which are the same as those given of the algebraic equation of the IDF relationship

6.6.9 The 1 in 10 year design rainstorm profile is used to simulate the hydraulic performance of proposed drainage system for the case without the operation of Hong Kong West Drainage Tunnel (Dry Season Scenario).

6.6.10 Rainstorm events were input manually in the model using the formulation presented in Section 6.6.8. The Design Rainstorm Profiles adopted in the hydraulic models are contained in Appendix L.

6.6.11 The boundary conditions applied at the outfalls adopted in this DIA are as follows. For outfall SMH7015271, it adopts the water level at nearby node SMH7015040 assumed to have similar flood level.

	SMH7015271 (mPD)	**SMH7057342 (mPD)**
1 in 10 yrs	5.527	46.935
1 in 50 yrs	5.608	46.949
1 in 200 yrs	5.630	46.955

6.6.12 These water levels are provided by DSD. References are contained in Appendix N.

6.6.13 The 1D overland flow modelling is adopted at the junction of Ship Street and Queen's Road East to reflect its actual hydraulic performance.

6.6.14 Model data and results outputs are included in Appendix H.

6.7 Drainage Capacity Assessment for the Proposed Western Drain

6.7.1 The capacity of the Proposed Western Drain and the corresponding design flows and InfoWorks results in the form of longitudinal sections are contained in Appendix H. The results of the model show that the pipes have sufficient flow capacity to cater for the peak design flows estimated from the upstream catchments.

6.7.2 The Proposed Western Drain ultimately connects to the existing 910 mm x 1140 mm box culvert at Ship Street. The capacity of the box culvert was also appraised to ensure that it could cater for the surface runoff due to the development.

6.7.3 The design flow through the Proposed Western Drain is 1.798 m3/s (1 in 50 year design return period). The flow capacity of Box Culvert is 3.647 m3/s. Hence, it is concluded that the existing box culvert has sufficient capacity to cater the flow.

6.7.4 The drainage system downstream of the 910mm x 1140mm box culvert is known to have a lower capacity than the Proposed Western Drain. This is confirmed by the model provided by DSD wherein water level at node SMH7015040 is already above ground (Appendix N refers). The impacts of the boundary condition adopted at the Proposed Wester Drain outfall are described in Section 6.10.

6.8 Drainage Capacity Assessment for the Proposed Drain along Schooner Street

6.8.1 It is proposed that existing 225mm diameter drainage pipeline along Schooner Street between existing manholes SMH7015208 and SMH7015211 is removed and replaced by a new 450mm drainage pipe connecting existing stormwater manhole SMH7015208 to proposed manhole DM48.

6.8.2 Existing Manhole SMH7015208 is to be reconstructed.

6.8.3 The results of the hydraulic model show that the proposed 450mm diameter pipe connecting existing manhole SMH7015208 to proposed manhole DM48 has sufficient hydraulic capacity to cater for the peak design flows estimated from the upstream catchments.

6.8.4 The hydraulic model result of the proposed pipe connecting existing manhole SMH7015208 to proposed manhole DM48 (1 in 50 year rainfall event) is shown in the InfoWorks' longitudinal section contained in Appendix H3.

6.9 Drainage Capacity Assessment for the Proposed Eastern Drain

6.9.1 As mentioned in Section 6.2.1, a portion of surface runoff from Kennedy Road carriageway is not possible to divert westwards to the Proposed Western Drain and therefore the stormwater catchment of the existing eastern drain will increase by 779 m2:

Catchment	Area (m^2)	Surface Characteristics (percentage of area)	Runoff Coefficient (C)
(K1) Kennedy Road East Drain	779 m2	Paved Material	1.0

6.9.2 On the other hand, the proposed flyover will reduce the size of existing eastern drain catchment as follows:

Catchment	Area (m2)	Surface Characteristics (area percentage)	Runoff Coefficient (C)
Baseline scenario			
(L2) Existing Developments and Kennedy Road	5,549 m2	Paved Material (100%)	0.9
Proposed Development Scenario			
(M2) Existing Developments and Kennedy Road	5,231m2	Paved Material (100%)	0.9

6.9.3 Therefore, there will be a net increase of 461 m2 of paved areas draining to the existing 750 mm x 750 mm crossroad box culvert opposite Hong Kong Tan Kang Po College via the Proposed Eastern Drain.

6.9.4 The design flows and the capacity of the existing 750 mm x 750 mm crossroad box culvert were analysed and found to have adequate hydraulic capacity to cater for the change in stormwater flow:

1 in 50 years peak flow (baseline scenario) = 0.813 m3/s

1 in 50 years peak flow (proposed development scenario) = 0.861 m3/s

Capacity of the 750 mm x 750 mm box Culvert = 3.868 m3/s

6.10 Drainage Impact on the Existing Drainage Systems Downstream

6.10.1 It is demonstrated in Section 6.7 of this Report that the capacities of the Proposed Western Drain and 910mm x 1140mm box are adequate for conveyance of the estimated design flows. However, the existing drain capacity downstream of the junction of Ship Street and Queen's Road East has a lower capacity than the estimated peak flow through the Proposed Western Drain resulting in surcharge and flooding at the junction of Ship Street and Queen's Road East (1 in 50 year design return period).

6.10.2 A stormwater detention tank with the discharge flow rate limited by a 200mm diameter pipe is proposed as a means to attenuate the runoff from the Hopewell Centre II Development which increases due to the changes in land use and diversion of existing pipelines.

6.10.3 The hydrograph contained in Appendix H1 shows that the maximum discharge flow rate from the proposed stormwater attenuation tank is 0.152m3/s.

6.10.4 The results of the model show that for a 1,150m3 detention tank with a 200mm discharge outlet pipe, the values of the flood volume and water level at manholes at the junction of Ship Street with Queen's Road East for the Proposed Development Scenario are below those verified for the Existing Scenario.

6.10.5 The hydrographs of the revised hydraulic model built to assess the Drainage Impact of the Proposed Hopewell Centre II Development and the Indicative Development Scheme, which takes into consideration the current design of the proposed stormwater attenuation tank, are presented in Appendix H. These compare the water level, flood volume and flow rate at the connection of Ship Street with Queen's Road East of the Existing Scenario to the Proposed Development Scenario.

6.10.6 The results of the model, resumed graphically in the hydrographs, show that the water level, flow rate and flooding volume at the junction of Ship Street and Queen's Road East are less than those verified in the Existing Scenario.

6.11 Existing Pipes to be Abandoned

6.11.1 There are abandoned pipes as a result of the proposed development, the pipes shall be removed or filled up at the developer's cost and to the satisfaction of DSD. DSD Technical Circular No. 2/2008 – Handling of Abandoned Pipes under DSD's Purview. The schedule of abandoned pipes is contained in Appendix M.

6.12 Node Comparison

6.12.1 Tables showing the summary of water levels and freeboard of existing manholes and all proposed manholes under this DIA are shown in Appendix O. Summary tables include both existing and proposed scenarios with wet and dry season under each scenario. A separate summary table was created wherein water levels are compared for manholes present in both existing and proposed scenarios.

7 CONCLUSIONS

7.1.1 According to the analyses in this report, the proposed diversion scheme of the existing stormwater drains is technically feasible.

7.1.2 The results of the InfoWorks hydraulic model simulations demonstrated that the Proposed Western Drain will have adequate pipe full flow capacity down to and including the existing 910mm x 1140mm box culvert at the Ship Street and Queen's Road East junction.

7.1.3 The analysis also illustrated that the Proposed Eastern Drain will lead to a net increase of 461 m2 catchment areas contributing to the existing 750 mm x 750 mm crossroad box culvert opposite Hong Kong Tan Kang Po College. The design flows and the capacity of this existing crossroad box culvert were analysed and found to have adequate hydraulic capacity to cater for the increase in stormwater flow.

7.1.4 The calculations demonstrated that the proposed Hopewell Centre II development would increase the stormwater runoff from the Site. This occurs primarily from the change in the surface runoff coefficients of the proposed development from the existing grassed slope to the impervious concreted and tiled surfaces.

7.1.5 It is proposed that a 1,150m3 stormwater attenuation tank, with its discharge flow rate limited by a 200mm diameter pipe, is constructed as a means to attenuate the increased stormwater flow generated by the Proposed Hopewell Centre II Development. This option will mitigate adverse hydraulic impacts on the existing drainage system and reduce total predicted flood volumes for a 1 in 50 Year 120 Minute duration storm event (refer to Appendix H for comparative hydrographs).

7.1.6 With the implementation of the proposed stormwater attenuation tank, the project will lead to an overall reduction in peak runoffs as summarized below:

Scenario	1 in 50 years peak runoff at SMH7015271 (m3/s)	1 in 50 years peak runoff at SMH7057342 (m3/s)	Total 1 in 50 years peak runoff (m3/s)
Baseline	1.080 + 0.995= 2.075	0.813	2.888
Proposed Development	0.929 + 0.849 = 1.778	0.861	2.639

7.1.7 In light of the findings from the analyses, it is recommended to implement the proposed drainage diversion scheme presented in this assessment and to construct a 1,150m^3 stormwater attenuation tank to mitigate the increase in surface water runoff entering the Proposed Western Drain.

APPENDIX H

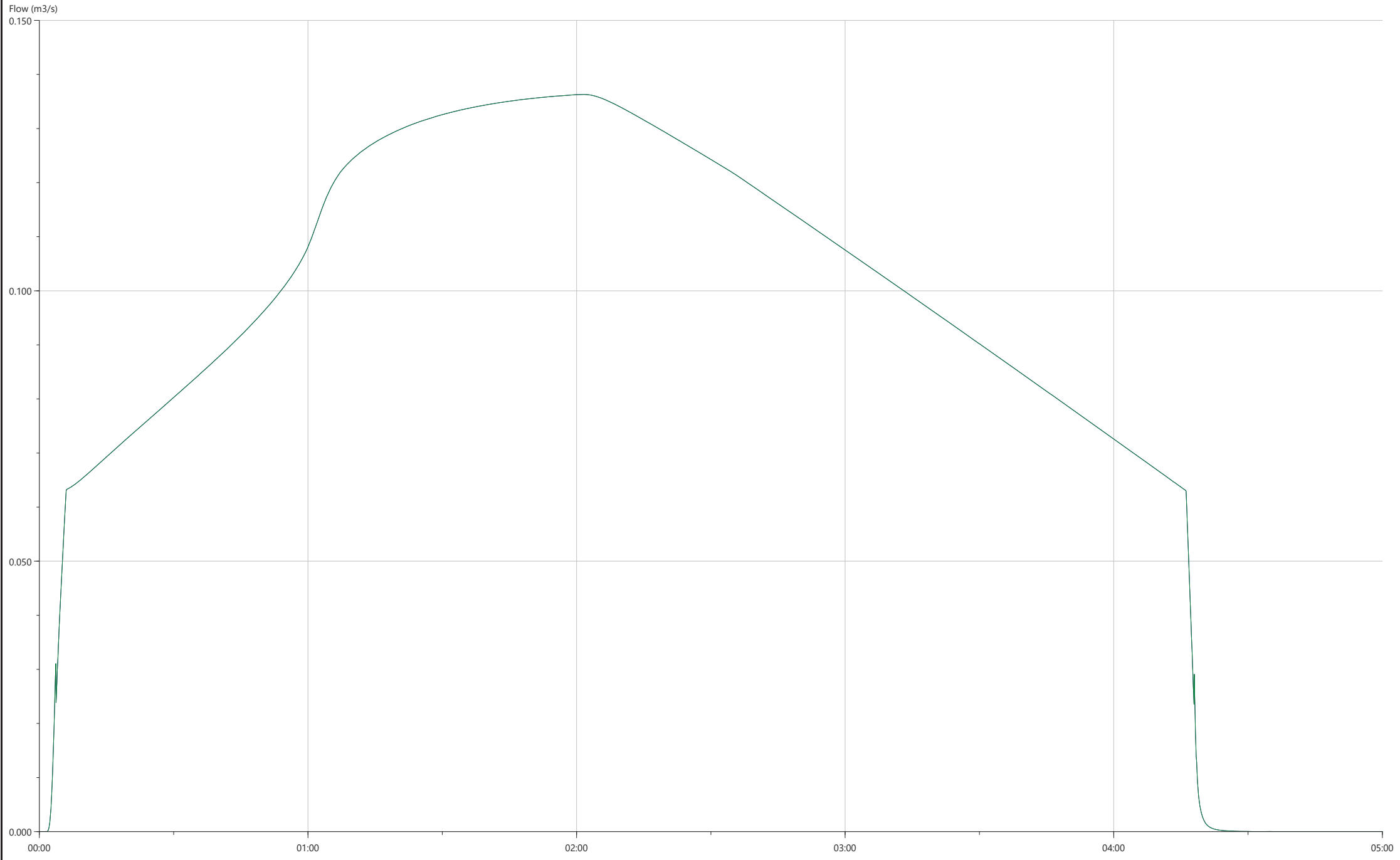
InfoWorks Model Outputs

APPENDIX H1

Hydrographs

Single Simulation Plot Produced by famn2449 (16/12/2022 2:49:33 pm) Page 1 of 1
Sim: >HCII DIA R08 V2>Proposed Development>Proposed Network Simulations>Proposed Network Wet Season R08v2 50yr>11.1_50y 120min (14/12/2022 11:42:43 am)
Selection list: Custom Selection

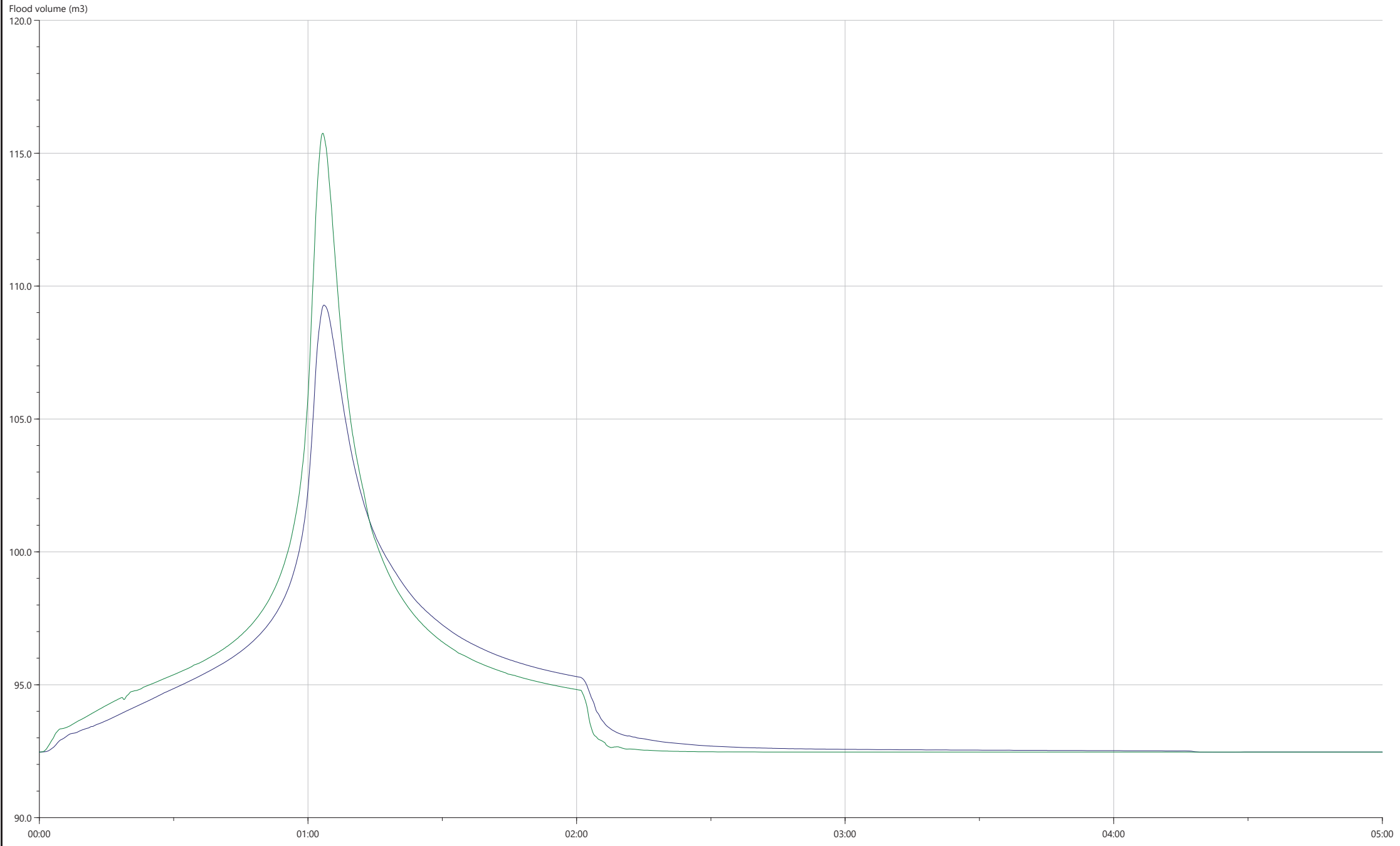
Link : PROPOSED DETENTION TANK.1



	Flow (m3/s)		
	Min	Max	Volume (m3)
U/stream	0.000	0.136	1586.645
D/stream	0.000	0.136	1586.645

Simulation Plot Produced by famn2449 (16/12/2022 2:50:35 pm) Page 1 of 1
Sim: >HCII DIA R08 V2>Proposed Development>Proposed Network Simulations>Proposed Network Wet Season R08v2 50yr>11.1_50y 120min (14/12/2022 11:42:43 am)
Sim: >HCII DIA R08 V2>Baseline>Existing System Simulations>Existing Network Wet Season R08v2 50yr>11.1_50y 120min (14/12/2022 2:18:27 pm)
Selection list: Custom Selection

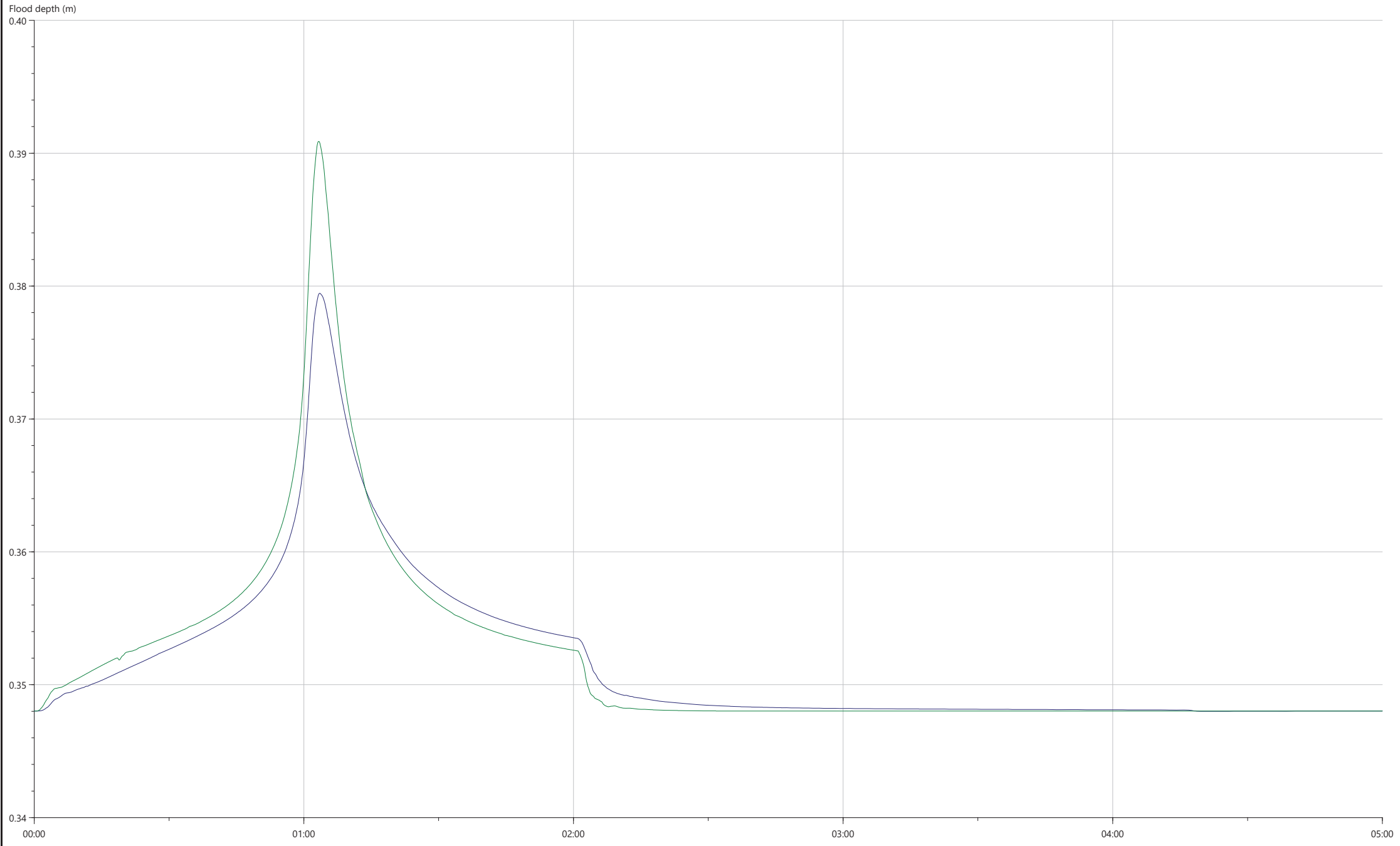
Node : SMH7015040



	Flood volume	
	Min	Max
... Development>Proposed Network Simulations>Proposed Network Wet Season R08v2 50yr>11.1_50y 120min	92.460	109.284
...IA R08 V2>Baseline>Existing System Simulations>Existing Network Wet Season R08v2 50yr>11.1_50y 120min	92.469	115.750

Simulation Plot Produced by famn2449 (26/01/2023 7:50:18 am) Page 1 of 1
Sim: >HCII DIA R08 V2>Proposed Development>Proposed Network Simulations>Proposed Network Wet Season R08v2 50yr>11.1_50y 120min (14/12/2022 11:42:43 am)
Sim: >HCII DIA R08 V2>Baseline>Existing System Simulations>Existing Network Wet Season R08v2 50yr>11.1_50y 120min (14/12/2022 2:18:27 pm)
Selection list: Custom Selection

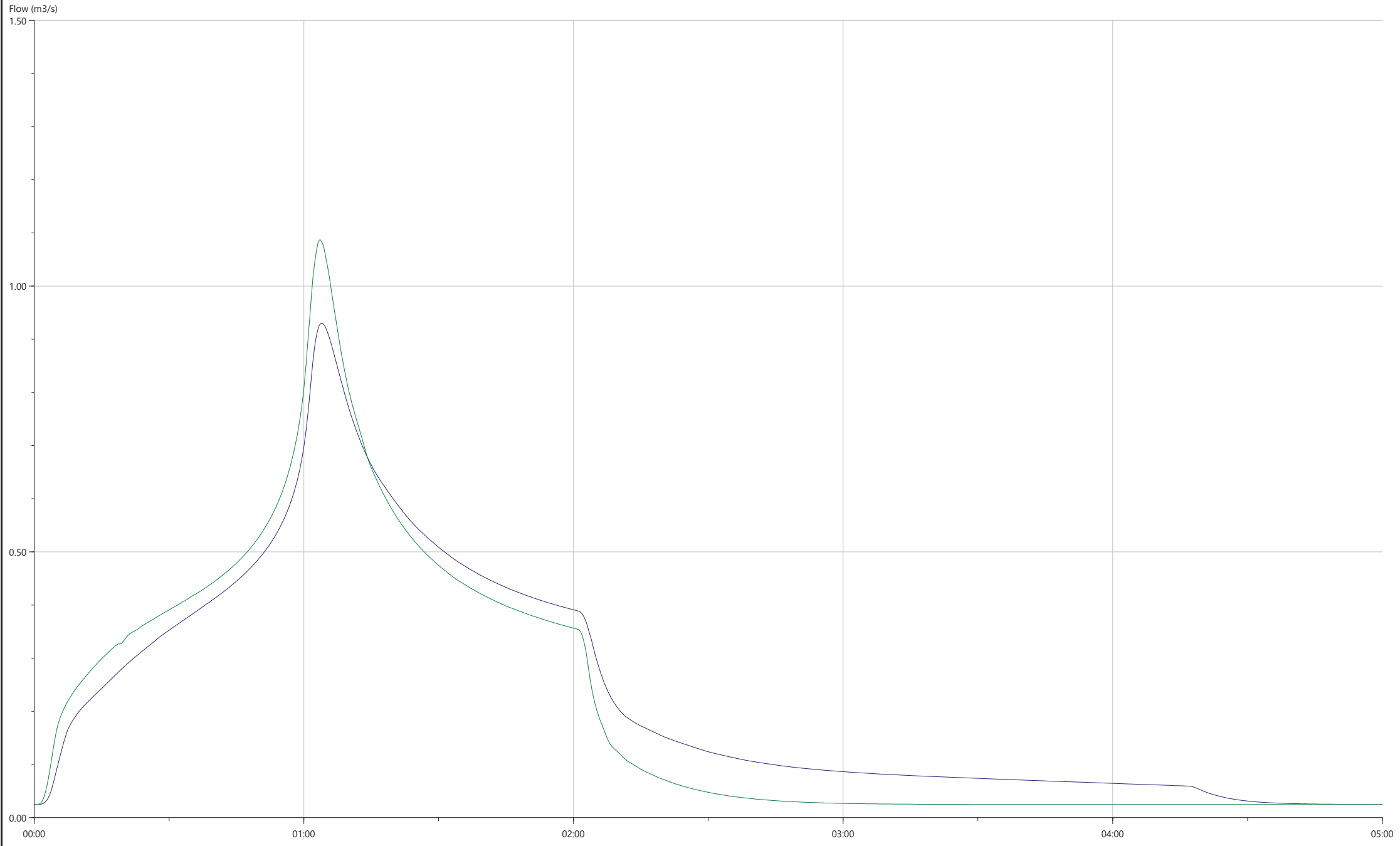
Node : SMH7015040



	Flood depth	
	Min	Max
... Development>Proposed Network Simulations>Proposed Network Wet Season R08v2 50yr>11.1_50y 120min	0.348	0.379
...IA R08 V2>Baseline>Existing System Simulations>Existing Network Wet Season R08v2 50yr>11.1_50y 120min	0.348	0.391

Sim: >HCII DIA R08 V2>Proposed Development>Proposed Network Simulations>Proposed Network Wet Season R08v2 50yr>11.1_50y 120min (14/12/2022 11:42:43 am)
Sim: >HCII DIA R08 V2>Baseline>Existing System Simulations>Existing Network Wet Season R08v2 50yr>11.1_50y 120min (14/12/2022 2:18:27 pm)
Selection list: Custom Selection

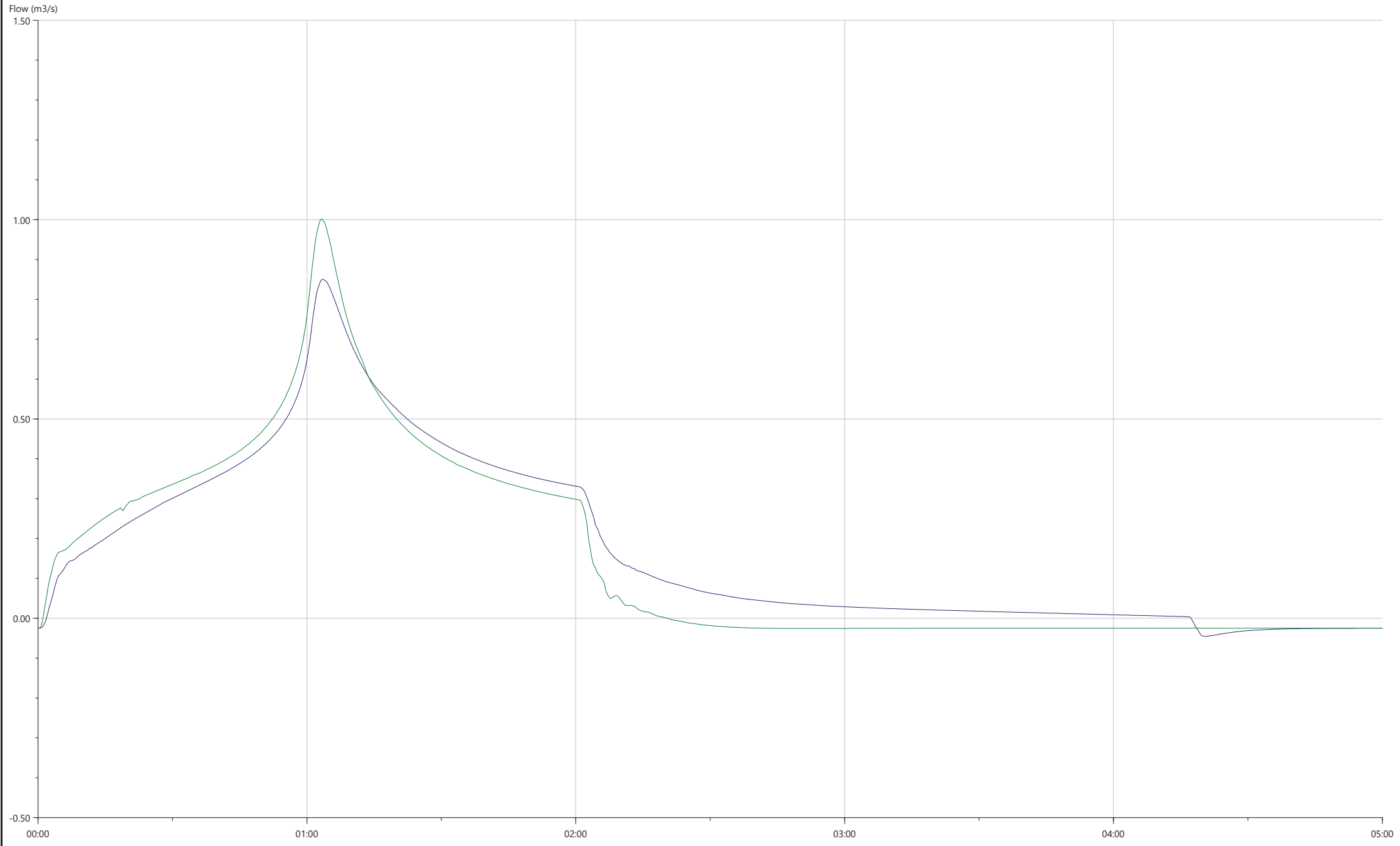
Link : SMH7015040.1



	Flow	
	Min	Max
... Development>Proposed Network Simulations>Proposed Network Wet Season R08v2 50yr>11.1_50y 120min	0.025	0.930
...IA R08 V2>Baseline>Existing System Simulations>Existing Network Wet Season R08v2 50yr>11.1_50y 120min	0.025	1.087

Sim: >HCII DIA R08 V2>Proposed Development>Proposed Network Simulations>Proposed Network Wet Season R08v2 50yr>11.1_50y 120min (14/12/2022 11:42:43 am)
Sim: >HCII DIA R08 V2>Baseline>Existing System Simulations>Existing Network Wet Season R08v2 50yr>11.1_50y 120min (14/12/2022 2:18:27 pm)
Selection list: Custom Selection

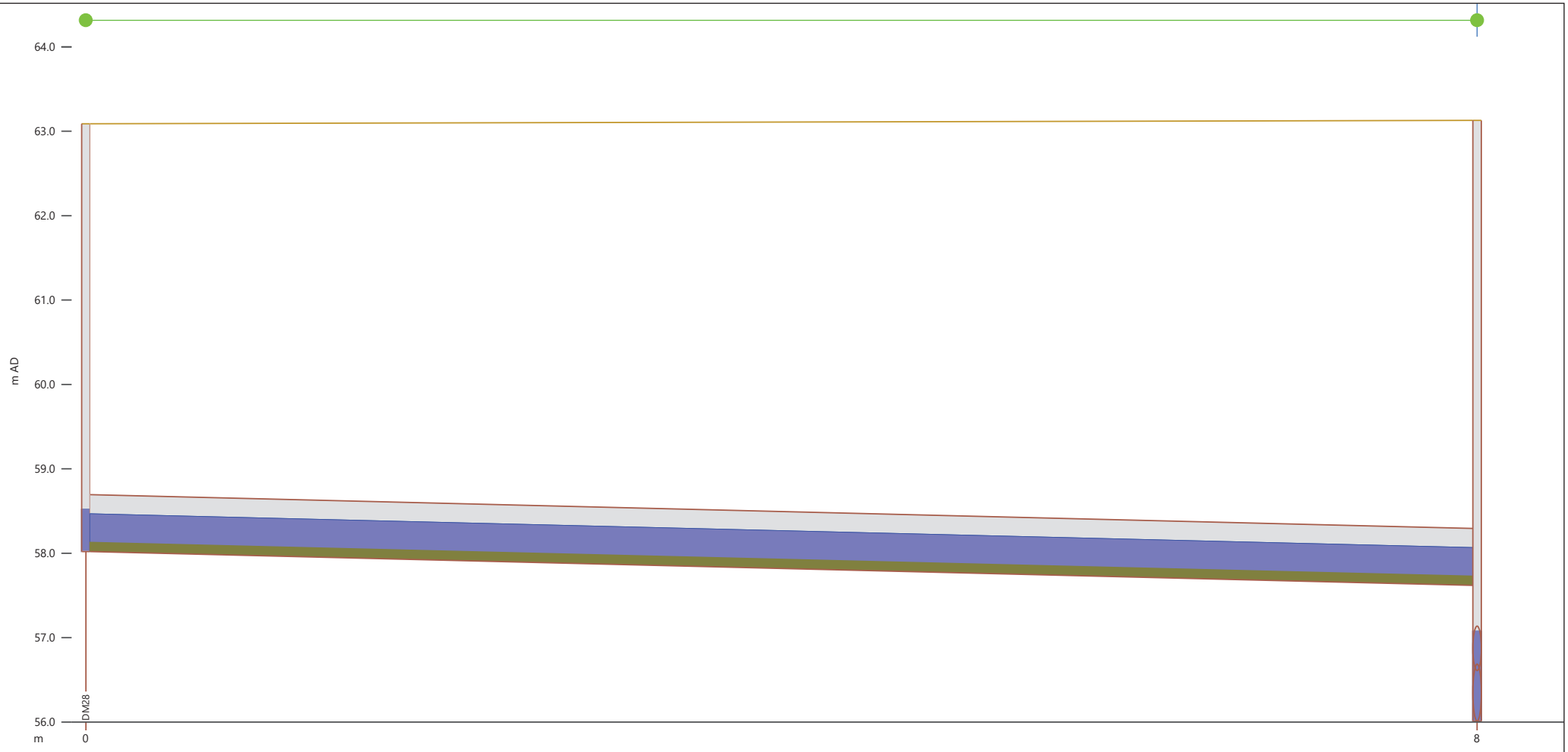
Link : SMH7015040.2



	Flow	
	Min	Max
... Development>Proposed Network Simulations>Proposed Network Wet Season R08v2 50yr>11.1_50y 120min	-0.045	0.850
...IA R08 V2>Baseline>Existing System Simulations>Existing Network Wet Season R08v2 50yr>11.1_50y 120min	-0.026	1.001

APPENDIX H2

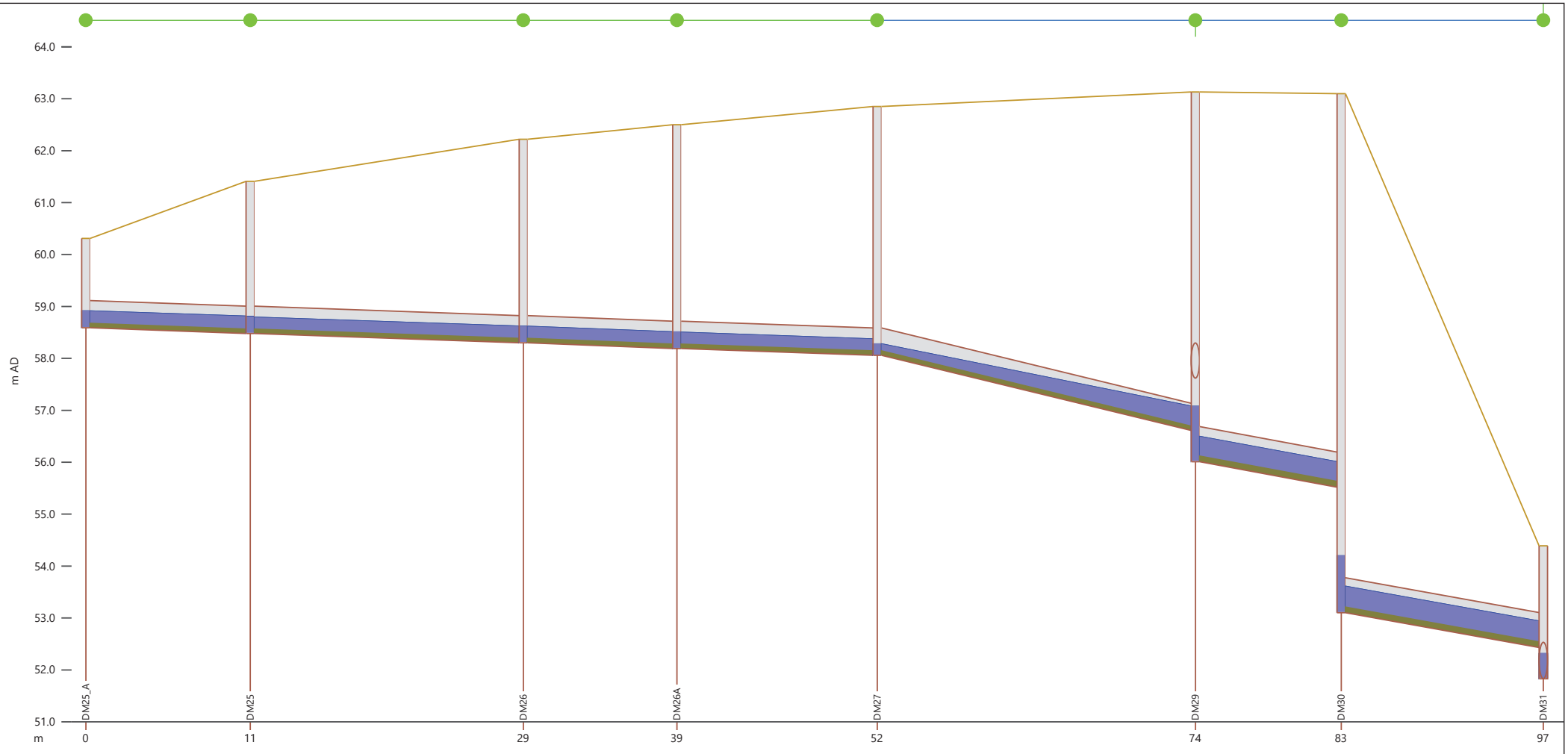
Longitudinal Section of the Proposed Western Drain



Link		DM28.1
US node ID		DM28
ds node		DM29
length (m)		7.6
width (mm)		675
us inv (m AD)		58.020
ds inv (m AD)		57.620
grad (m/m)		0.05260
surc		0.66
US flow (m3/s)		0.99866
US velocity (m/s)		4.685
r.pfc (m3/s)		1.485
DS flow (m3/s)		0.99847
DS velocity (m/s)		4.684

Node	DM28	DM29
Node ID	DM28	DM29
ground (m AD)	63.090	63.130
flood dep (m)	-4.572	-6.055

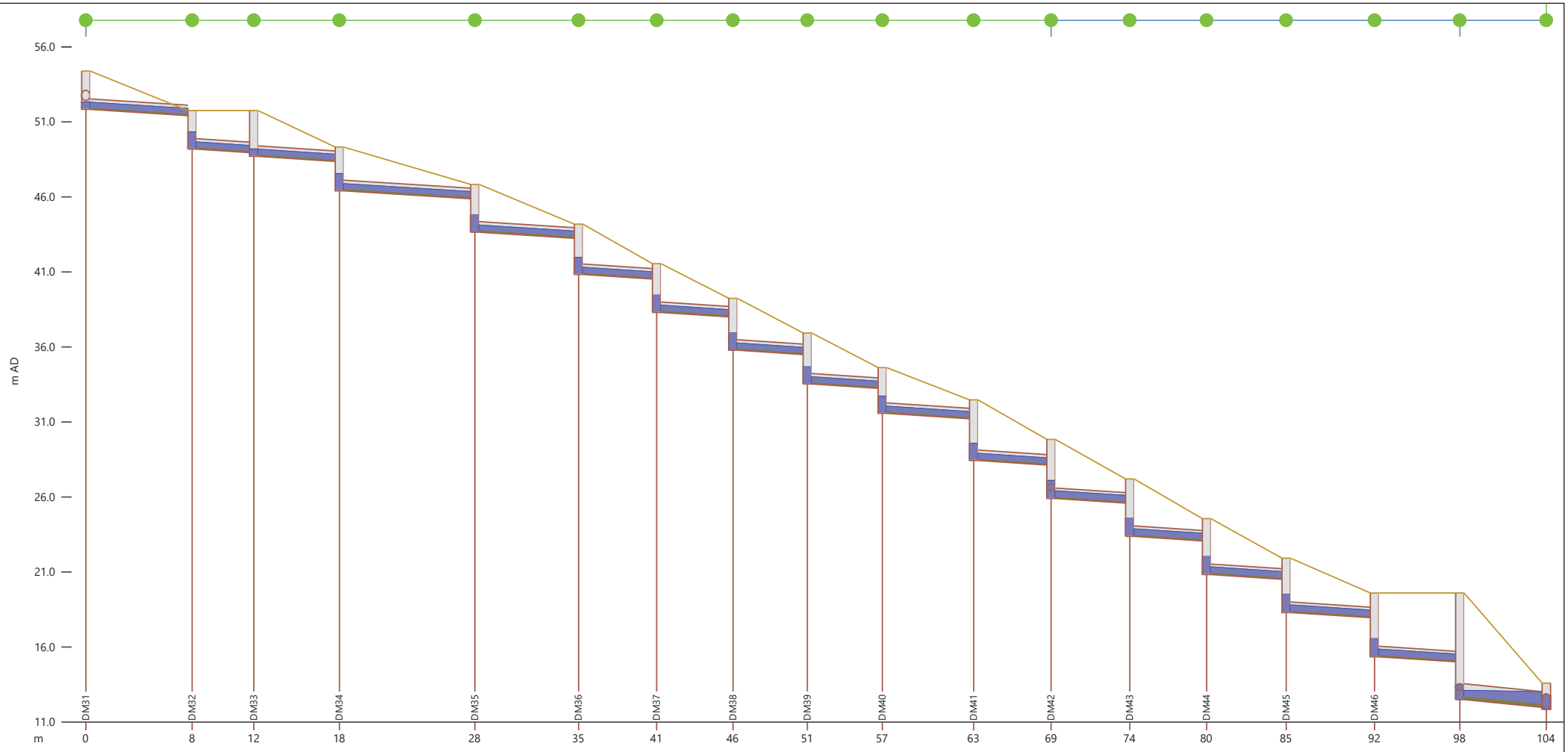
Proposed Development Scenario 50yr rain - DM28 to DM29



Link	DM25_A.1	DM25.1	DM26.1	DM26A.2	DM27.1	DM29.1	DM30.1
US node ID	DM25_A	DM25	DM26	DM26A	DM27	DM29	DM30
ds node	DM25	DM26	DM26A	DM27	DM29	DM30	DM31
length (m)	10.9	18.1	10.2	13.3	21.1	9.7	13.4
width (mm)	525	525	525	525	525	675	675
us inv (m AD)	58.590	58.480	58.300	58.190	58.060	56.010	53.100
ds inv (m AD)	58.480	58.300	58.190	58.060	56.610	55.520	52.430
grad (m/m)	0.01009	0.00995	0.01081	0.00979	0.06876	0.05071	0.05005
surc	0.63	0.61	0.61	0.59	0.89	0.72	0.75
US flow (m3/s)	0.19311	0.19220	0.19129	0.19088	0.19069	1.13752	1.21080
US velocity (m/s)	1.660	1.721	1.697	1.712	3.084	4.769	4.805
r.pfc (m3/s)	0.333	0.331	0.345	0.328	0.871	1.458	1.448
DS flow (m3/s)	0.19235	0.19139	0.19095	0.19070	0.18931	1.13707	1.21060
DS velocity (m/s)	1.607	1.666	1.665	1.708	2.124	4.768	4.805

Node	DM25_A	DM25	DM26	DM26A	DM27	DM29	DM30	DM31
Node ID	DM25_A	DM25	DM26	DM26A	DM27	DM29	DM30	DM31
ground (m AD)	60.310	61.410	62.220	62.500	62.850	63.130	63.100	54.390
flood dep (m)	-1.394	-2.601	-3.601	-3.992	-4.572	-6.055	-8.903	-2.075

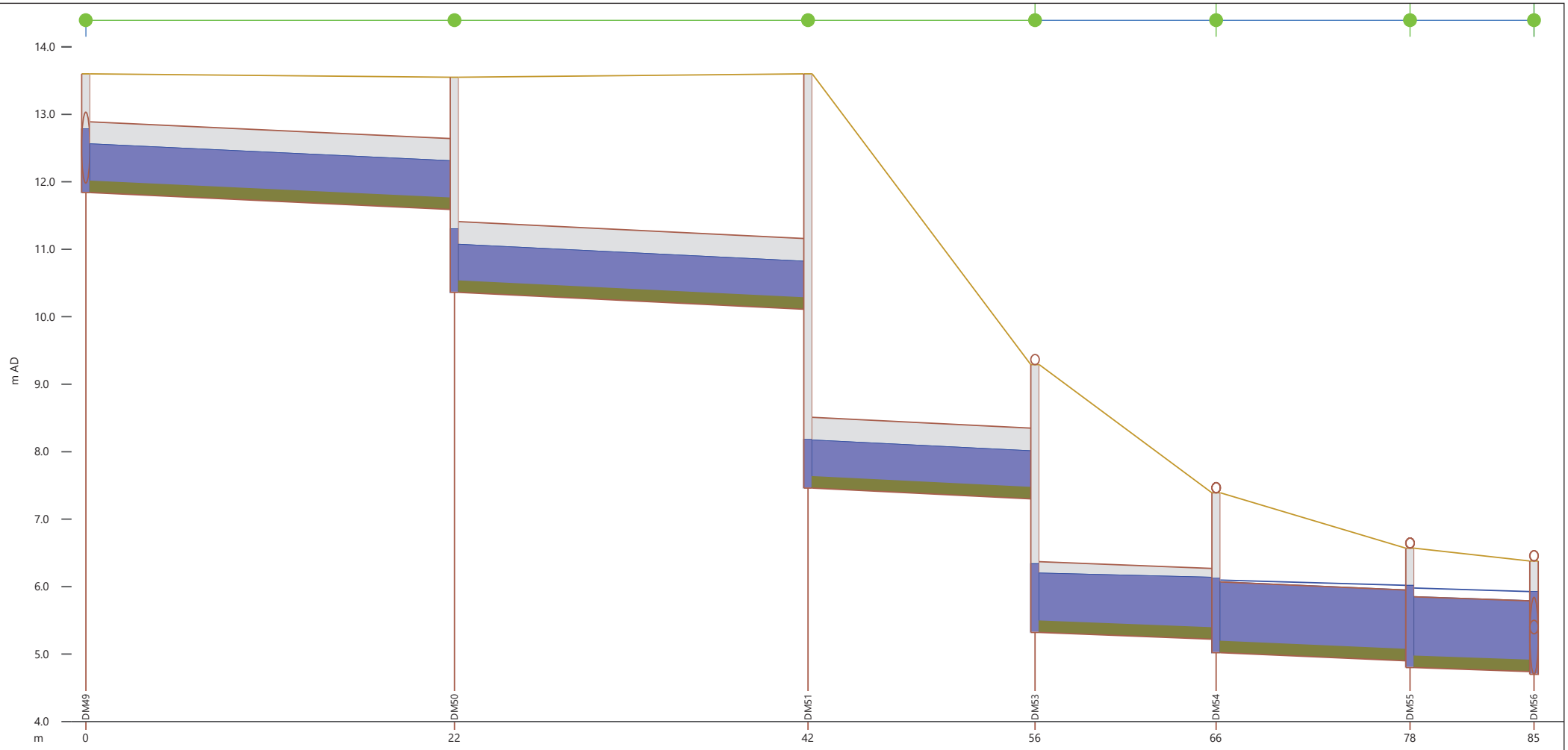
Proposed Development Scenario 50yr rain - DM25_A to DM31



Link	DM31.1	DM32.1	DM33.1	DM34.1	DM35.1	DM36.1	DM37.1	DM38.1	DM39.1	DM40.1	DM41.1	DM42.1	DM43.1	DM44.1	DM45.1	DM46.1	DM48.1
US node ID	DM31	DM32	DM33	DM34	DM35	DM36	DM37	DM38	DM39	DM40	DM41	DM42	DM43	DM44	DM45	DM46	DM48
ds node	DM32	DM33	DM34	DM35	DM36	DM37	DM38	DM39	DM40	DM41	DM42	DM43	DM44	DM45	DM46	DM48	DM49
length (m)	7.6	4.4	6.1	9.6	7.4	5.5	5.4	5.3	5.3	6.5	5.5	5.6	5.5	5.7	6.3	6.1	6.1
width (mm)	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	1050
us inv (m AD)	51.830	49.190	48.700	46.410	43.650	40.830	38.300	35.780	33.530	31.570	28.430	25.900	23.370	20.830	18.300	15.350	12.500
ds inv (m AD)	51.414	48.949	48.366	45.880	43.245	40.525	38.002	35.490	33.237	31.213	28.127	25.593	23.069	20.520	17.954	15.017	11.980
grad (m/m)	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.08464
surc	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.70	0.70	0.70	0.70	0.70	0.97
US flow (m3/s)	1.27038	1.27036	1.27035	1.27034	1.27032	1.27031	1.29788	1.29787	1.29786	1.29786	1.29785	1.41434	1.41434	1.41434	1.41434	1.41433	1.60267
US velocity (m/s)	5.130	5.130	5.130	5.130	5.130	5.130	5.157	5.157	5.157	5.157	5.157	5.258	5.258	5.258	5.258	5.258	4.217
r.pfc (m3/s)	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	6.062
DS flow (m3/s)	1.27037	1.27035	1.27034	1.27032	1.27031	1.27030	1.29787	1.29787	1.29786	1.29785	1.29784	1.41434	1.41434	1.41434	1.41433	1.41433	1.60245
DS velocity (m/s)	5.130	5.130	5.130	5.130	5.130	5.130	5.157	5.157	5.157	5.157	5.157	5.258	5.258	5.258	5.258	5.258	2.977

Node	DM31	DM32	DM33	DM34	DM35	DM36	DM37	DM38	DM39	DM40	DM41	DM42	DM43	DM44	DM45	DM46	DM48	DM49
Node ID	DM31	DM32	DM33	DM34	DM35	DM36	DM37	DM38	DM39	DM40	DM41	DM42	DM43	DM44	DM45	DM46	DM48	DM49
ground (m AD)	54.390	51.750	51.750	49.320	46.830	44.190	41.550	39.240	36.930	34.620	32.480	29.840	27.200	24.560	21.920	19.598	19.598	-
flood dep (m)	-2.075	-1.430	-2.565	-1.780	-2.050	-2.230	-2.107	-2.317	-2.257	-1.907	-2.907	-2.743	-2.633	-2.533	-2.423	-3.051	-6.127	-

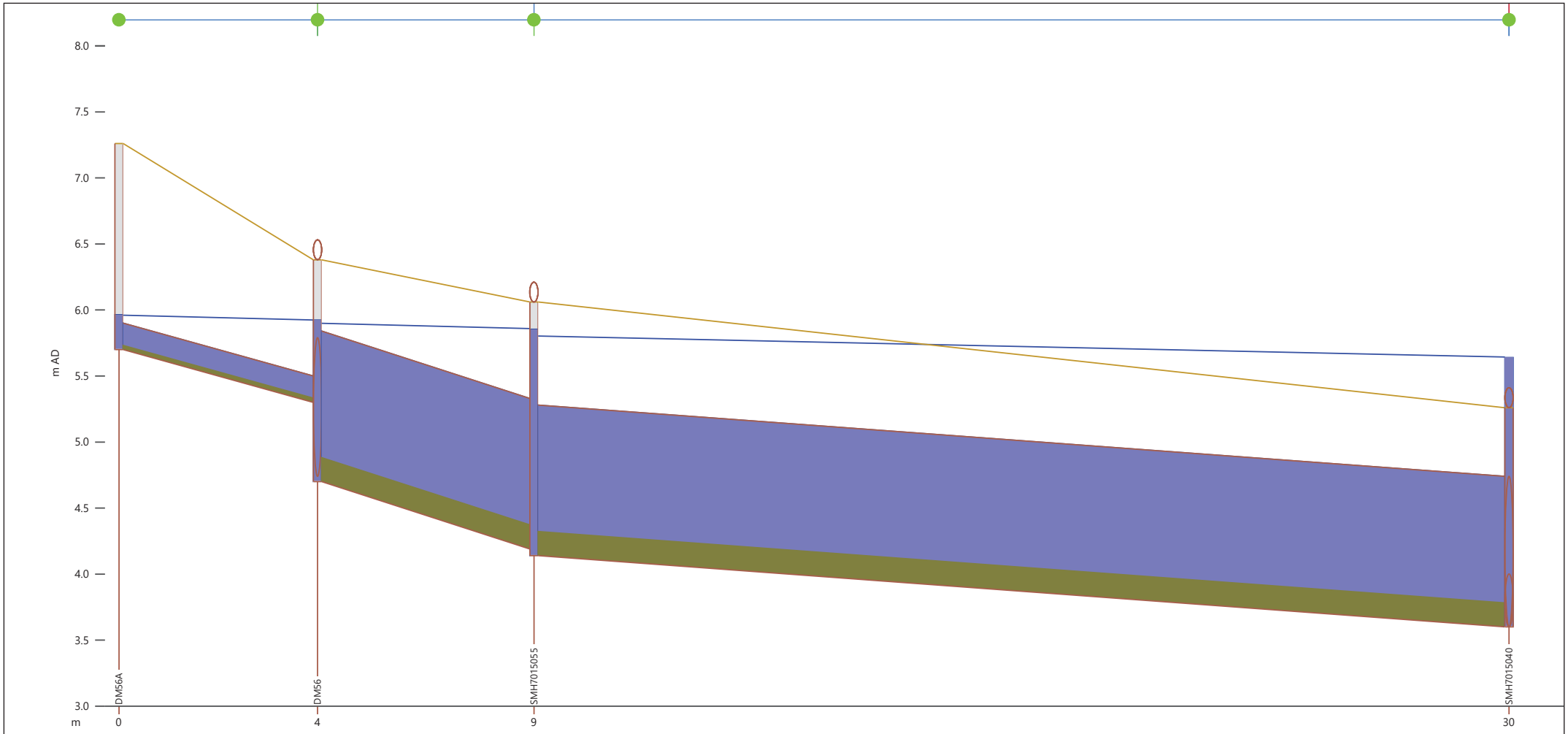
Proposed Development Scenario 50yr rain - DM31 to DM49



Link	DM49.1	DM50.1	DM51.1	DM53.1	DM54.3	DM55.1
US node ID	DM49	DM50	DM51	DM53	DM54	DM55
ds node	DM50	DM51	DM53	DM54	DM55	DM56
length (m)	21.7	20.8	13.3	10.6	11.4	7.3
width (mm)	1050	1050	1050	1050	1050	1050
us inv (m AD)	11.840	10.360	7.460	5.320	5.020	4.800
ds inv (m AD)	11.590	10.110	7.300	5.220	4.900	4.740
grad (m/m)	0.01154	0.01204	0.01200	0.00940	0.01053	0.00824
surc	0.68	0.68	0.68	0.87	1.00	1.00
US flow (m3/s)	1.60241	1.60193	1.60155	1.60152	1.61995	1.72671
US velocity (m/s)	2.963	3.008	3.004	2.533	2.048	2.134
r.pfc (m3/s)	2.237	2.284	2.281	2.019	2.137	1.890
DS flow (m3/s)	1.60196	1.60160	1.60141	1.60314	1.62065	1.72671
DS velocity (m/s)	2.960	3.007	3.003	2.478	2.022	2.133

Node	DM49	DM50	DM51	DM53	DM54	DM55	DM56
Node ID	DM49	DM50	DM51	DM53	DM54	DM55	DM56
ground (m AD)	13.600	13.550	13.600	9.290	7.390	6.570	6.380
flood dep (m)	-0.819	-2.250	-5.422	-2.953	-1.268	-0.553	-0.456

Proposed Development Scenario 50yr rain - DM49 to DM56



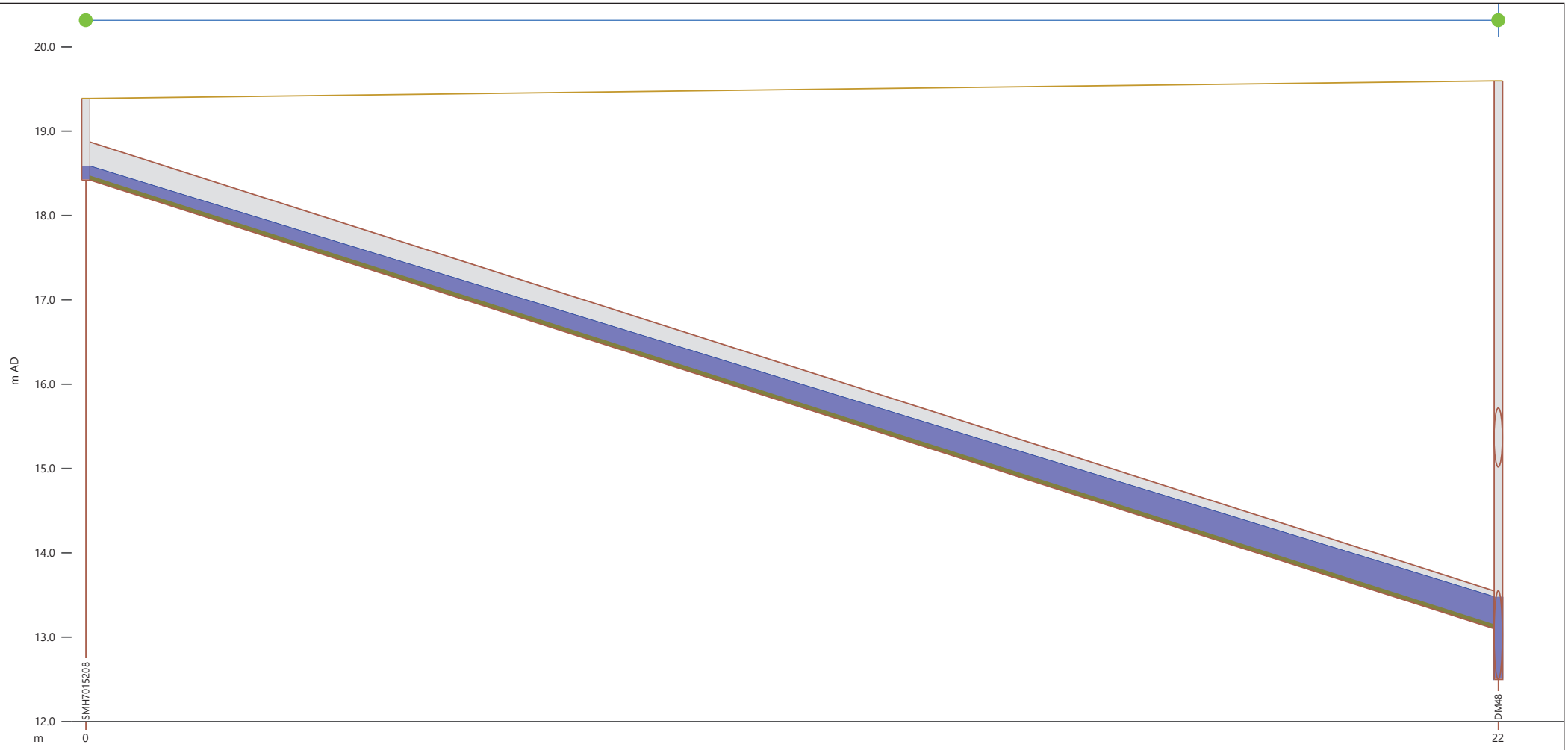
Link	DM56A.3	DM56.3	SMH7015055.1
US node ID	DM56A	DM56	SMH7015055
ds node	DM56	SMH7015055	SMH7015040
length (m)	4.3	4.7	21.1
width (mm)	200	910	910
us inv (m AD)	5.700	4.700	4.140
ds inv (m AD)	5.300	4.190	3.600
grad (m/m)	0.09298	0.10877	0.02556
surc	1.00	1.00	1.00
US flow (m3/s)	0.02008	1.74516	1.80071
US velocity (m/s)	1.095	1.957	1.960
r.pfc (m3/s)	0.077	7.526	3.647
DS flow (m3/s)	0.02006	1.74516	1.80070
DS velocity (m/s)	0.651	1.899	1.942

Node	DM56A	DM56	SMH7015055	SMH7015040
Node ID	DM56A	DM56	SMH7015055	SMH7015040
ground (m AD)	7.260	6.380	6.060	5.260
flood dep (m)	-1.296	-0.456	-0.206	0.379

Proposed Development Scenario 50yr rain - DM56A to SMH7015040

APPENDIX H3

Longitudinal Section of the Proposed Drainage Pipeline at Schooner Street



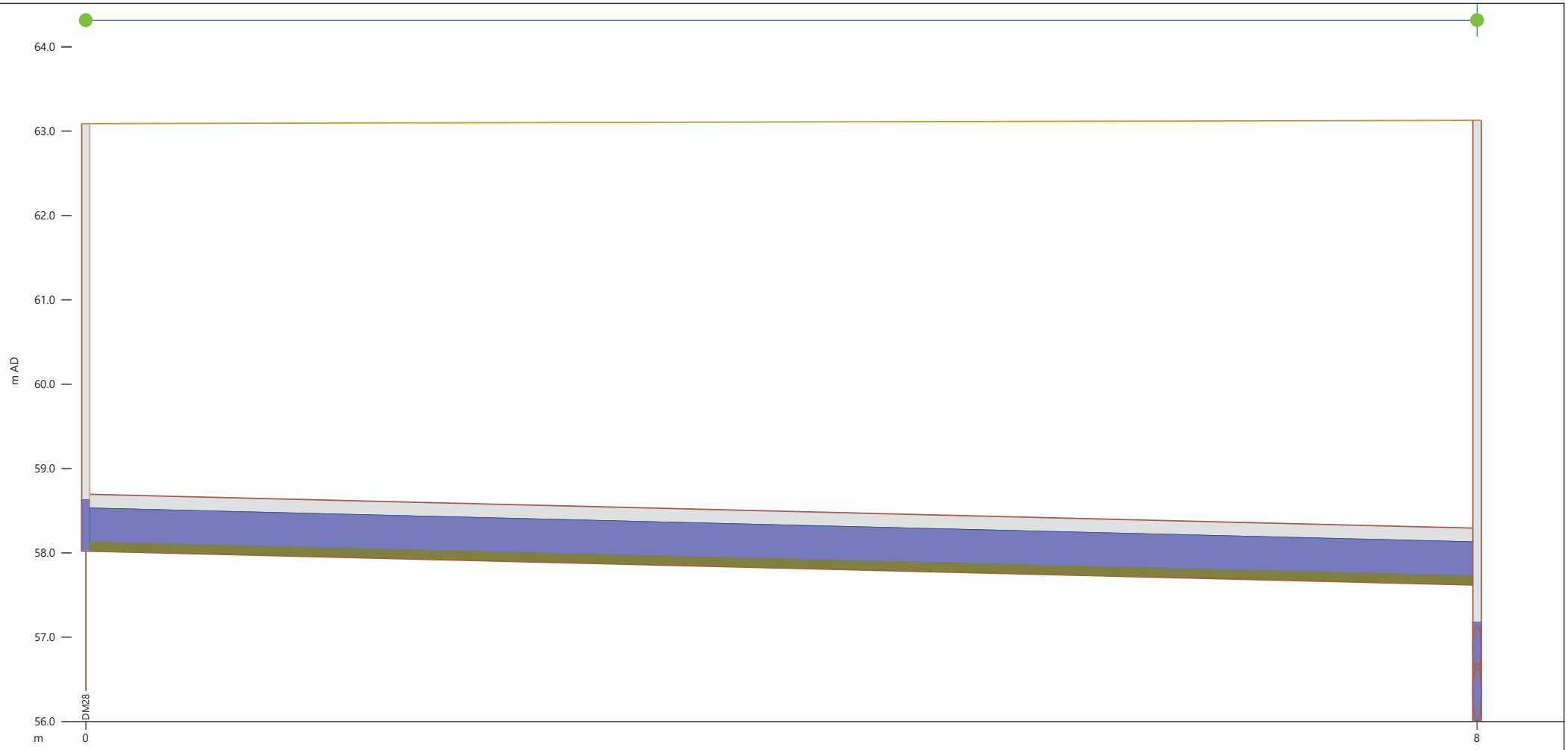
Link	SMH7015208.1	
US node ID	SMH7015208	
ds node	DM48	
length (m)	22.2	
width (mm)	450	
us inv (m AD)	18.420	
ds inv (m AD)	13.100	
grad (m/m)	0.23969	
surc	0.84	
US flow (m3/s)	0.22402	
US velocity (m/s)	5.189	
r.pfc (m3/s)	1.173	
DS flow (m3/s)	0.22392	
DS velocity (m/s)	2.914	

Node	SMH7015208	DM48
Node ID	SMH7015208	DM48
ground (m AD)	19.390	19.598
flood dep (m)	-0.807	-6.126

Proposed Development Scenario 50yr rain - SMH7015208 to DM48

APPENDIX H4

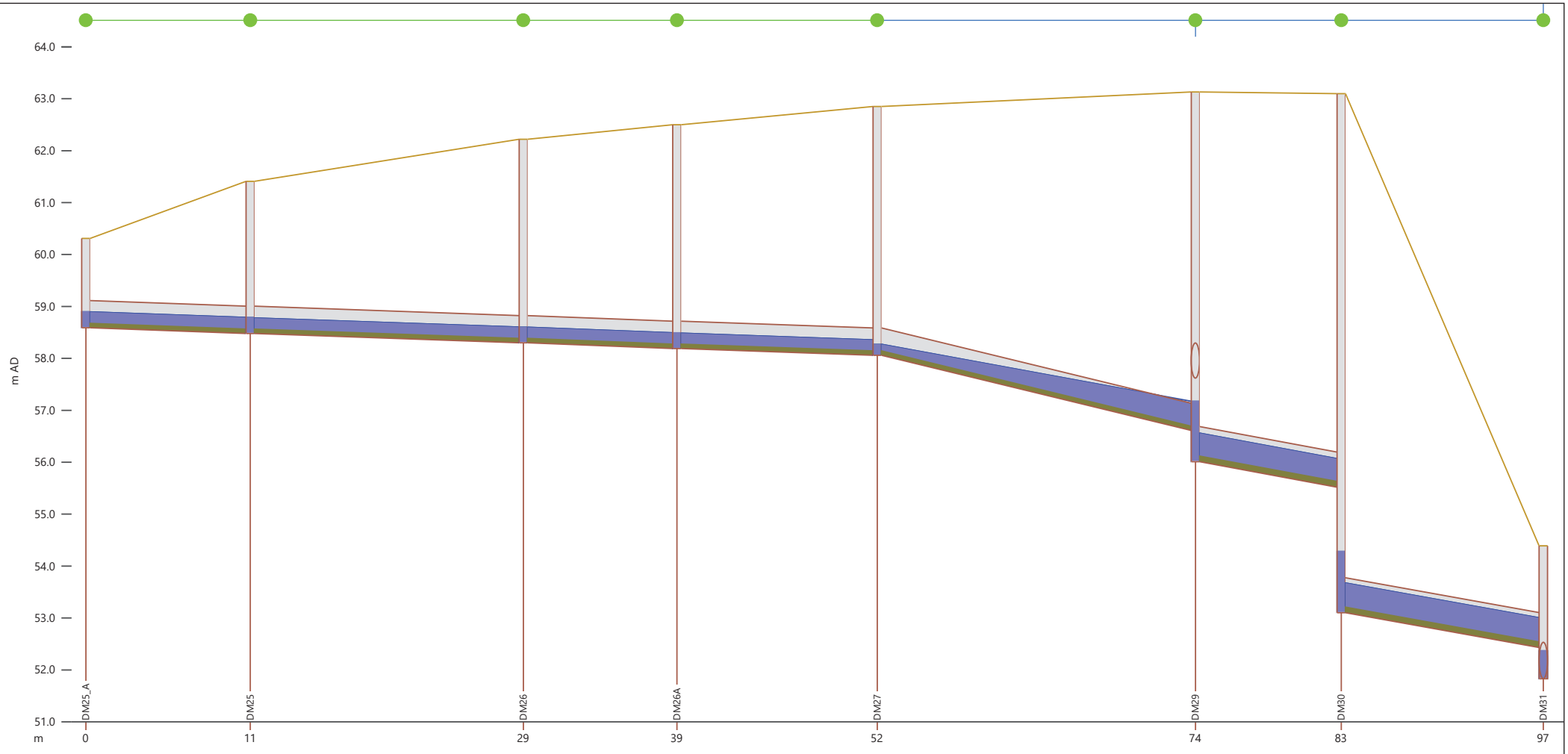
Longitudinal Section of the Proposed Western Drain (Dry Season)



Link		DM28.1
US node ID		DM28
ds node		DM29
length (m)		7.6
width (mm)		675
us inv (m AD)		58.020
ds inv (m AD)		57.620
grad (m/m)		0.05260
surc		0.75
US flow (m3/s)		1.24030
US velocity (m/s)		4.926
r.pfc (m3/s)		1.485
DS flow (m3/s)		1.23981
DS velocity (m/s)		4.925

Node	DM28	DM29
Node ID	DM28	DM29
ground (m AD)	63.090	63.130
flood dep (m)	-4.464	-5.956

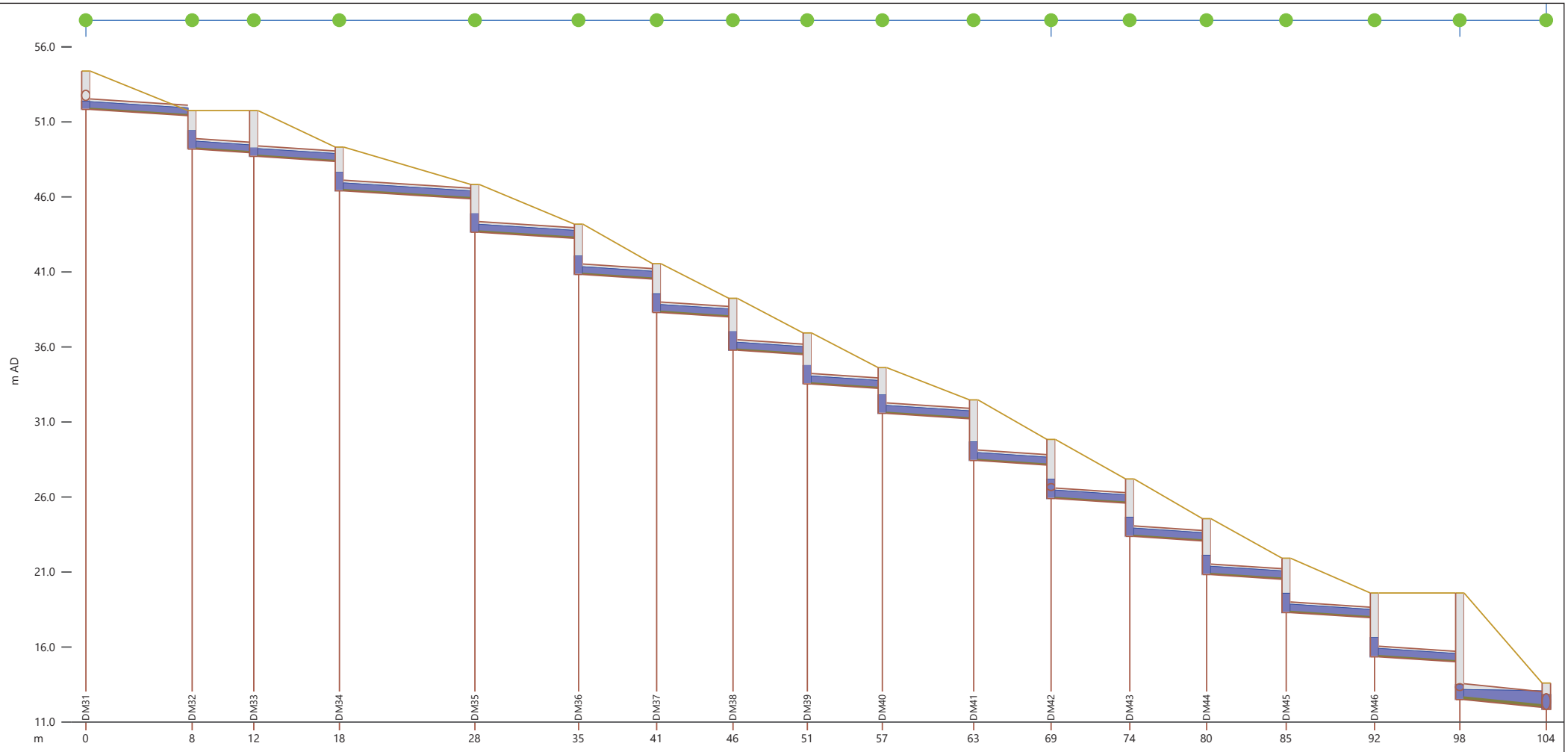
Proposed Development Scenario 10yr rain (dry season) - DM28 to DM29



Link	DM25_A.1	DM25.1	DM26.1	DM26A.2	DM27.1	DM29.1	DM30.1
US node ID	DM25_A	DM25	DM26	DM26A	DM27	DM29	DM30
ds node	DM25	DM26	DM26A	DM27	DM29	DM30	DM31
length (m)	10.9	18.1	10.2	13.3	21.1	9.7	13.4
width (mm)	525	525	525	525	525	675	675
us inv (m AD)	58.590	58.480	58.300	58.190	58.060	56.010	53.100
ds inv (m AD)	58.480	58.300	58.190	58.060	56.610	55.520	52.430
grad (m/m)	0.01009	0.00995	0.01081	0.00979	0.06876	0.05071	0.05005
surc	0.59	0.58	0.57	0.57	1.00	0.81	0.85
US flow (m3/s)	0.17471	0.17398	0.17324	0.17289	0.17272	1.35098	1.40612
US velocity (m/s)	1.624	1.677	1.652	1.667	2.958	4.910	4.892
r.pfc (m3/s)	0.333	0.331	0.345	0.328	0.871	1.458	1.448
DS flow (m3/s)	0.17410	0.17332	0.17295	0.17273	0.17164	1.35073	1.40596
DS velocity (m/s)	1.606	1.631	1.634	1.663	1.745	4.910	4.887

Node	DM25_A	DM25	DM26	DM26A	DM27	DM29	DM30	DM31
Node ID	DM25_A	DM25	DM26	DM26A	DM27	DM29	DM30	DM31
ground (m AD)	60.310	61.410	62.220	62.500	62.850	63.130	63.100	54.390
flood dep (m)	-1.412	-2.622	-3.618	-4.009	-4.579	-5.956	-8.816	-2.020

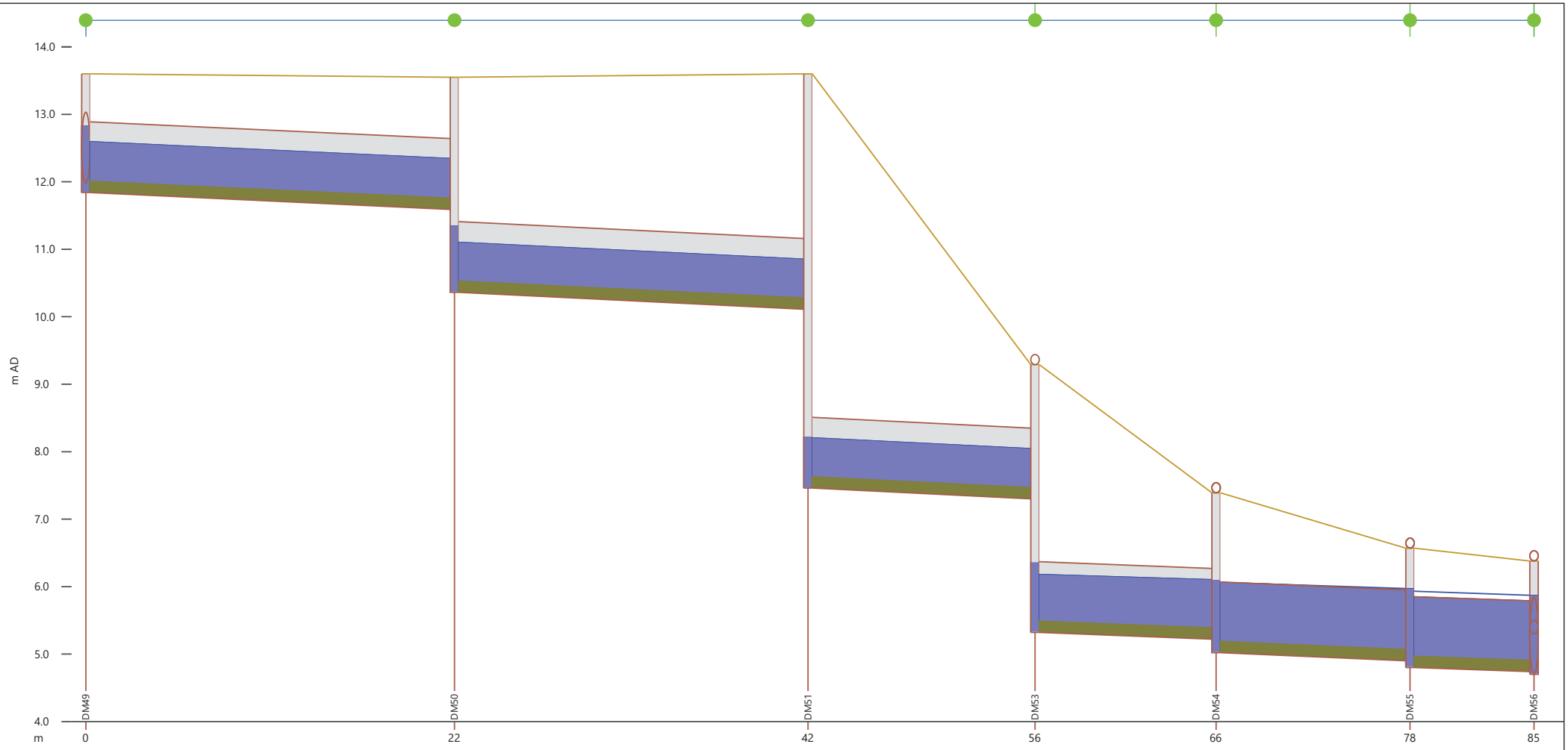
Proposed Development Scenario 10yr rain (dry season) - DM25_A to DM31



Link	DM31.1	DM32.1	DM33.1	DM34.1	DM35.1	DM36.1	DM37.1	DM38.1	DM39.1	DM40.1	DM41.1	DM42.1	DM43.1	DM44.1	DM45.1	DM46.1	DM48.1
US node ID	DM31	DM32	DM33	DM34	DM35	DM36	DM37	DM38	DM39	DM40	DM41	DM42	DM43	DM44	DM45	DM46	DM48
ds node	DM32	DM33	DM34	DM35	DM36	DM37	DM38	DM39	DM40	DM41	DM42	DM43	DM44	DM45	DM46	DM48	DM49
length (m)	7.6	4.4	6.1	9.6	7.4	5.5	5.4	5.3	5.3	6.5	5.5	5.6	5.5	5.7	6.3	6.1	6.1
width (mm)	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	1050
us inv (m AD)	51.830	49.190	48.700	46.410	43.650	40.830	38.300	35.780	33.530	31.570	28.430	25.900	23.370	20.830	18.300	15.350	12.500
ds inv (m AD)	51.414	48.949	48.366	45.880	43.245	40.525	38.002	35.490	33.237	31.213	28.127	25.593	23.069	20.520	17.954	15.017	11.980
grad (m/m)	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.05500	0.08464
surc	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.76	0.76	0.76	0.76	0.76	1.00
US flow (m3/s)	1.45535	1.45473	1.45454	1.45436	1.45412	1.45396	1.47649	1.47638	1.47628	1.47618	1.47607	1.58072	1.58065	1.58057	1.58050	1.58042	1.73328
US velocity (m/s)	5.290	5.289	5.289	5.289	5.289	5.289	5.305	5.305	5.304	5.304	5.304	5.368	5.368	5.368	5.368	5.368	4.217
r.pfc (m3/s)	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	1.814	6.062
DS flow (m3/s)	1.45484	1.45464	1.45440	1.45417	1.45399	1.45388	1.47642	1.47630	1.47621	1.47610	1.47602	1.58066	1.58059	1.58050	1.58044	1.58036	1.73314
DS velocity (m/s)	5.289	5.289	5.289	5.288	5.288	5.288	5.304	5.304	5.304	5.304	5.304	5.368	5.368	5.368	5.368	5.368	2.977

Node	DM31	DM32	DM33	DM34	DM35	DM36	DM37	DM38	DM39	DM40	DM41	DM42	DM43	DM44	DM45	DM46	DM48	DM49
Node ID	DM31	DM32	DM33	DM34	DM35	DM36	DM37	DM38	DM39	DM40	DM41	DM42	DM43	DM44	DM45	DM46	DM48	DM49
ground (m AD)	54.390	51.750	51.750	49.320	46.830	44.190	41.550	39.240	36.930	34.620	32.480	29.840	27.200	24.560	21.920	19.598	19.598	-
flood dep (m)	-2.020	-1.346	-2.510	-1.695	-1.966	-2.146	-2.026	-2.236	-2.176	-1.826	-2.826	-2.672	-2.562	-2.462	-2.352	-2.980	-6.107	-

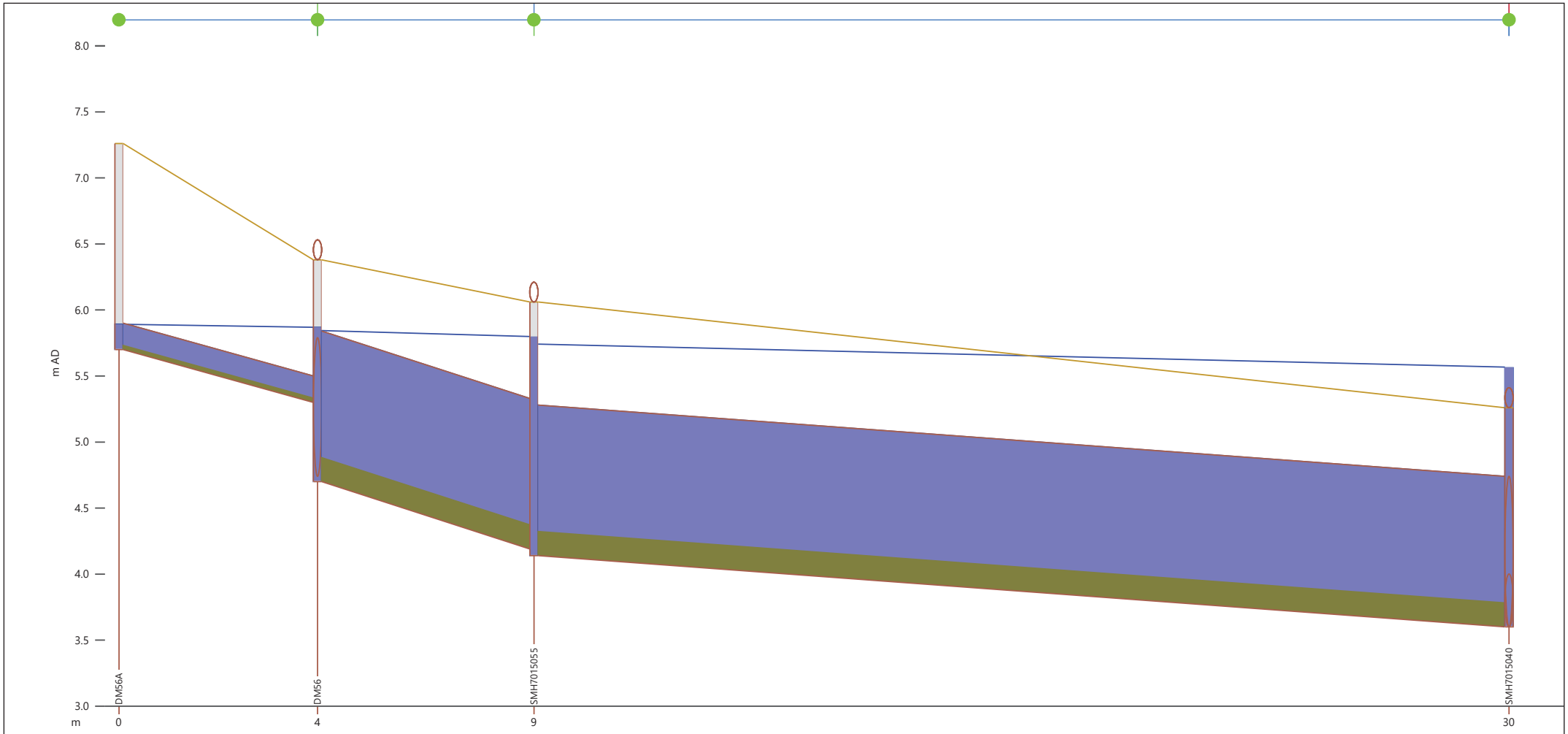
Proposed Development Scenario 10yr rain (dry season) - DM31 to DM49



Link	DM49.1	DM50.1	DM51.1	DM53.1	DM54.3	DM55.1
US node ID	DM49	DM50	DM51	DM53	DM54	DM55
ds node	DM50	DM51	DM53	DM54	DM55	DM56
length (m)	21.7	20.8	13.3	10.6	11.4	7.3
width (mm)	1050	1050	1050	1050	1050	1050
us inv (m AD)	11.840	10.360	7.460	5.320	5.020	4.800
ds inv (m AD)	11.590	10.110	7.300	5.220	4.900	4.740
grad (m/m)	0.01154	0.01204	0.01200	0.00940	0.01053	0.00824
surc	0.72	0.71	0.71	0.84	1.00	1.00
US flow (m3/s)	1.73311	1.73279	1.73252	1.73239	1.74614	1.82972
US velocity (m/s)	3.017	3.066	3.061	2.784	2.250	2.276
r.pfc (m3/s)	2.237	2.284	2.281	2.019	2.137	1.890
DS flow (m3/s)	1.73281	1.73256	1.73241	1.73261	1.74639	1.82973
DS velocity (m/s)	3.014	3.064	3.060	2.805	2.213	2.275

Node	DM49	DM50	DM51	DM53	DM54	DM55	DM56
Node ID	DM49	DM50	DM51	DM53	DM54	DM55	DM56
ground (m AD)	13.600	13.550	13.600	9.290	7.390	6.570	6.380
flood dep (m)	-0.776	-2.208	-5.386	-2.939	-1.302	-0.601	-0.511

Proposed Development Scenario 10yr rain (dry season) - DM49 to DM56



Link	DM56A.3	DM56.3	SMH7015055.1
US node ID	DM56A	DM56	SMH7015055
ds node	DM56	SMH7015055	SMH7015040
length (m)	4.3	4.7	21.1
width (mm)	200	910	910
us inv (m AD)	5.700	4.700	4.140
ds inv (m AD)	5.300	4.190	3.600
grad (m/m)	0.09298	0.10877	0.02556
surc	1.00	1.00	1.00
US flow (m3/s)	0.01811	1.84367	1.88430
US velocity (m/s)	1.363	2.135	2.054
r.pfc (m3/s)	0.077	7.526	3.647
DS flow (m3/s)	0.01803	1.84367	1.88429
DS velocity (m/s)	0.593	2.009	2.036

Node	DM56A	DM56	SMH7015055	SMH7015040
Node ID	DM56A	DM56	SMH7015055	SMH7015040
ground (m AD)	7.260	6.380	6.060	5.260
flood dep (m)	-1.367	-0.511	-0.266	0.303

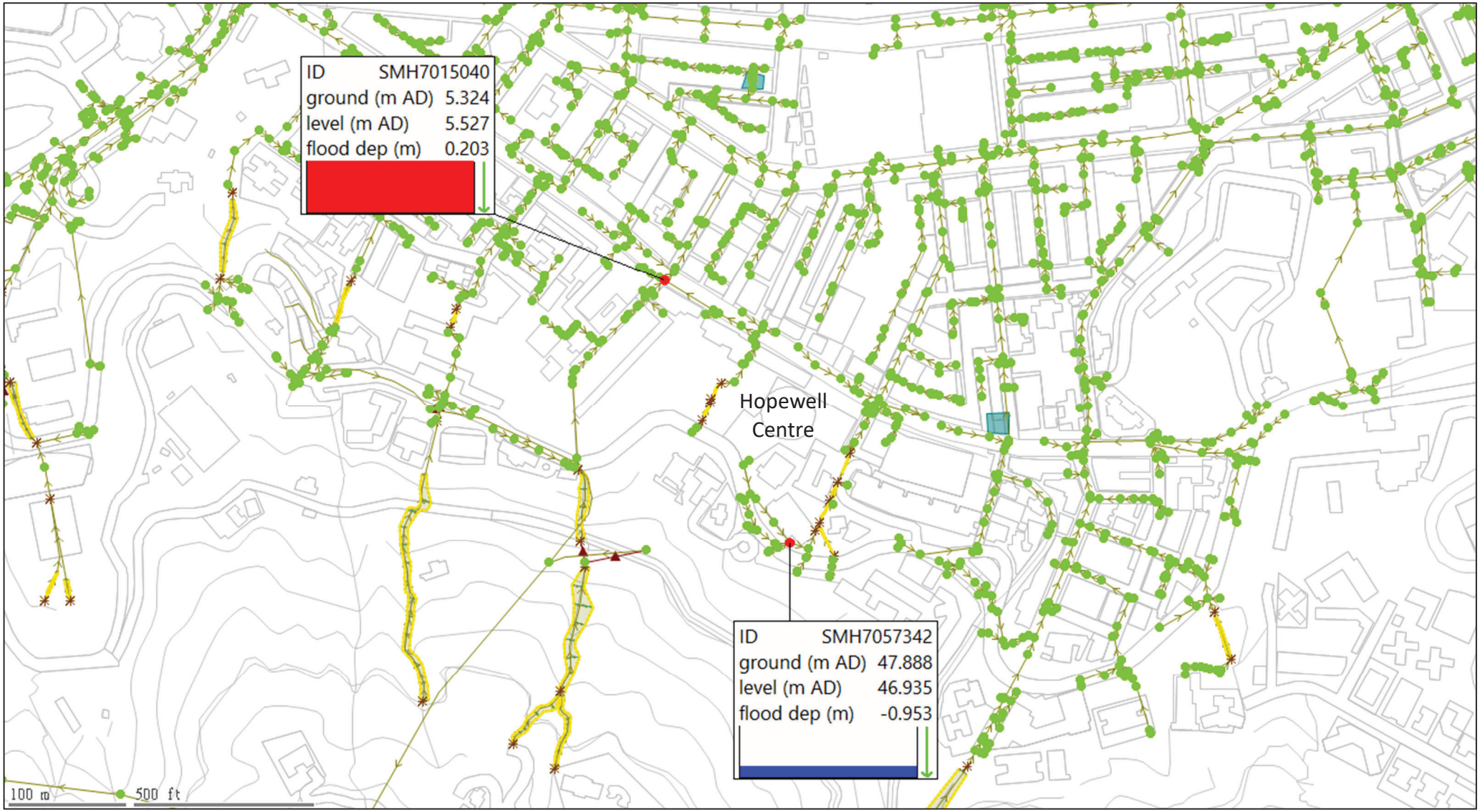
Proposed Development Scenario 10yr rain (dry season) - DM56A to SMH7015040

APPENDIX N

Boundary Levels (Provided by DSD)

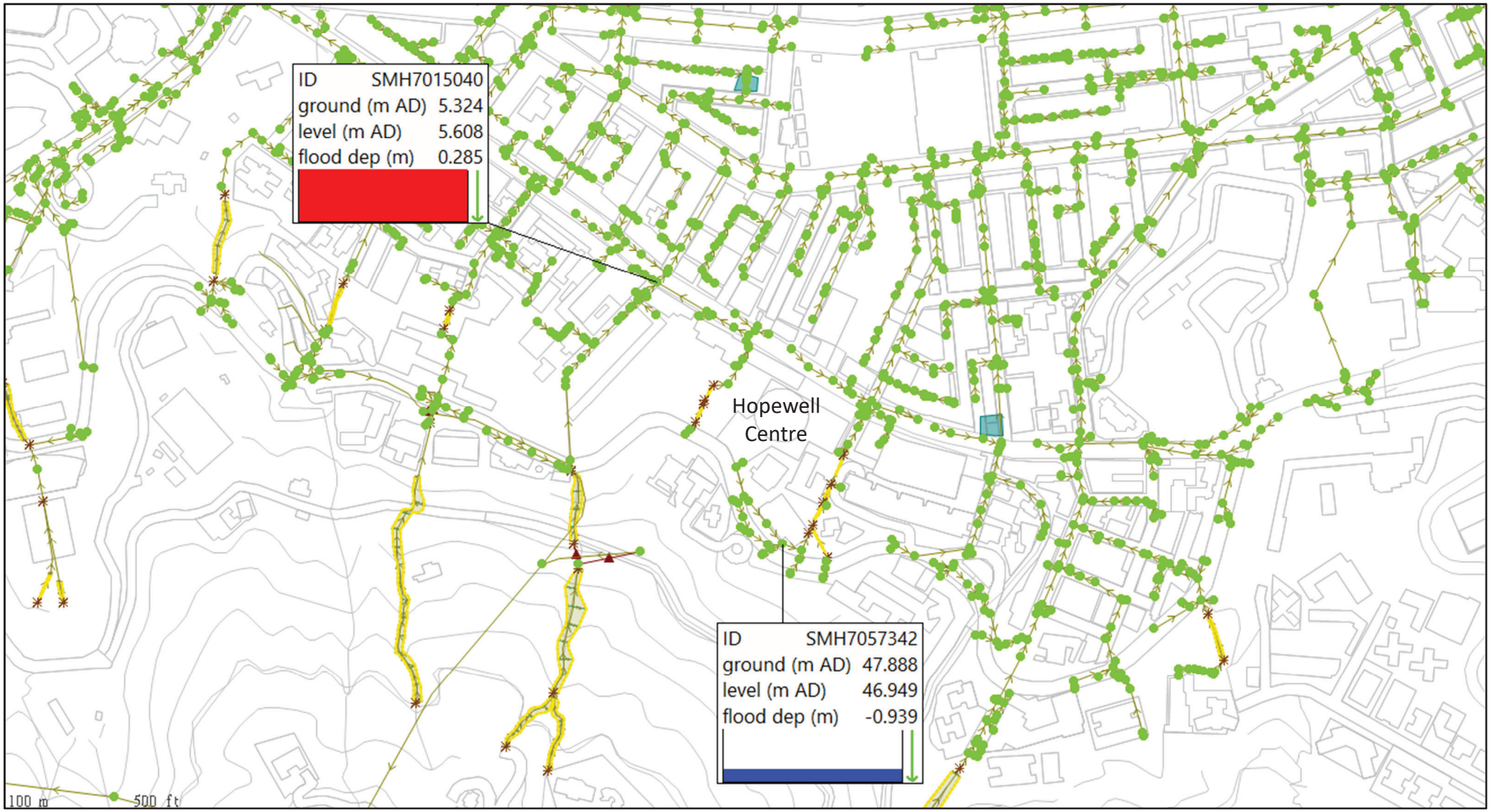
L0409 – Hopewell II Development – DIA

NHKIDMPR – West Network – EE – 10Y – Water Level (mPD)



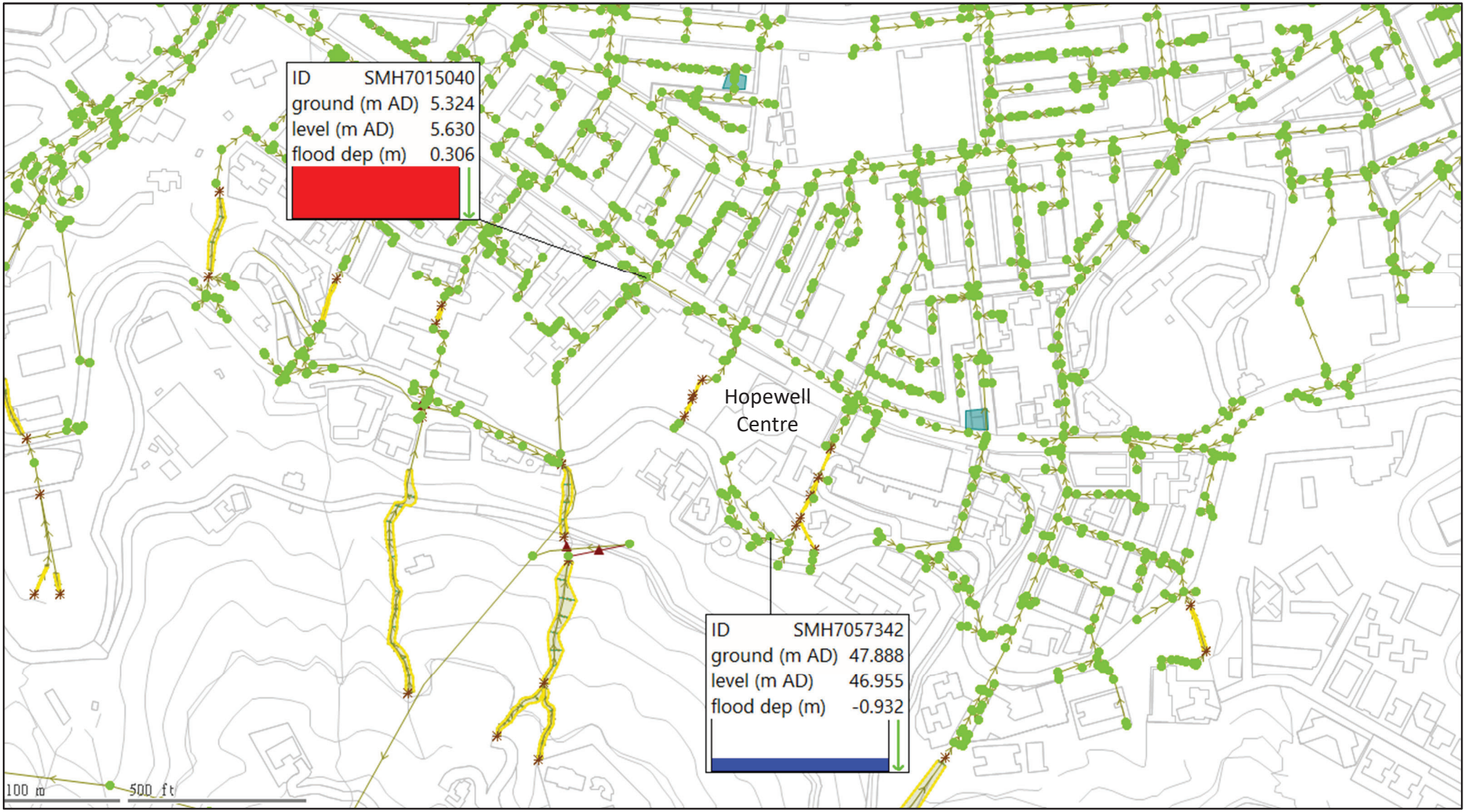
L0409 – Hopewell II Development – DIA

NHKIDMPR – West Network – EE – 50Y – Water Level (mPD)



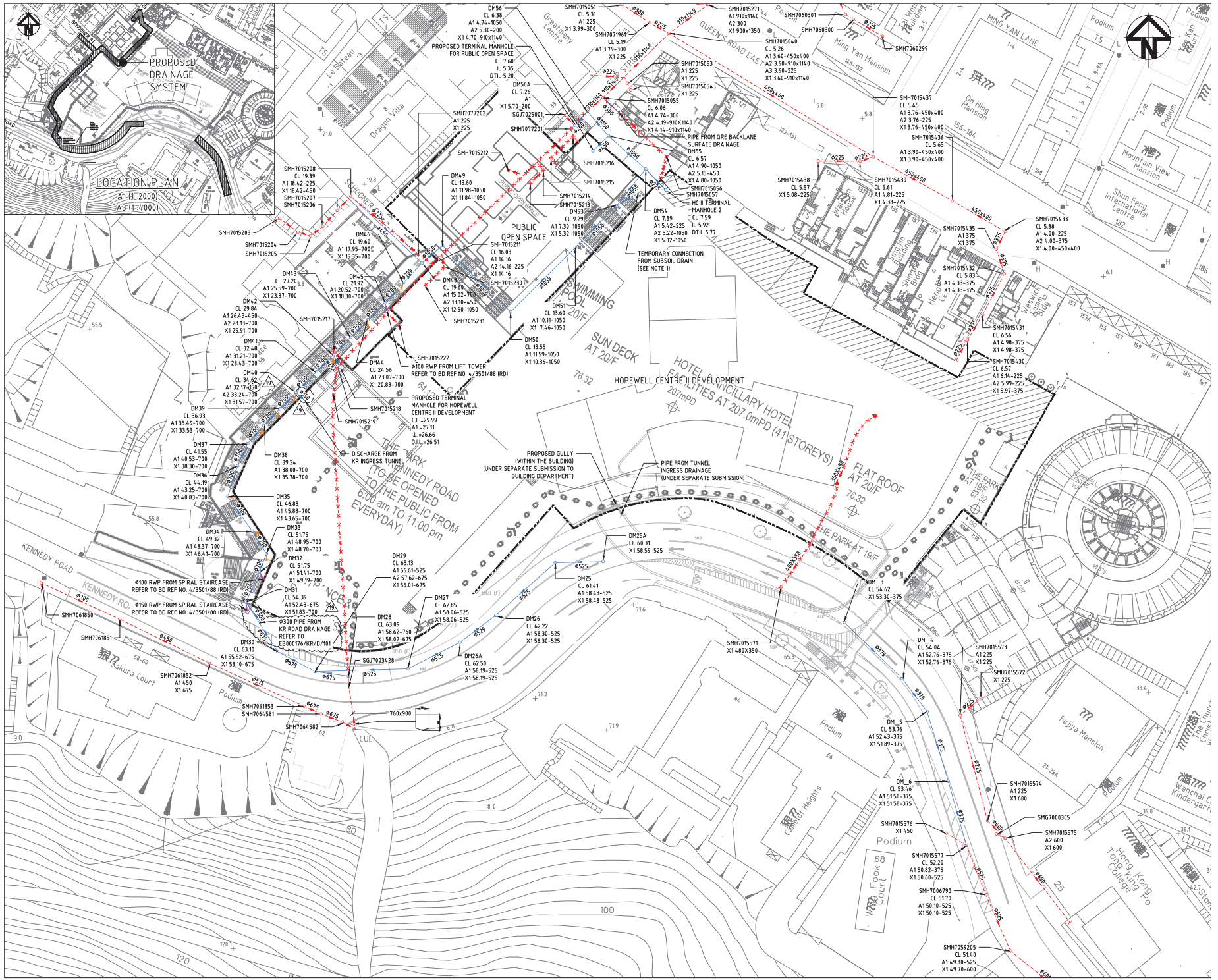
L0409 – Hopewell II Development – DIA

NHKIDMPR – West Network – EE – 200Y – Water Level (mPD)



APPENDIX E

Proposed Public Drainage Works under the Hopewell Centre II Development (For Information, extracted from HCII DIA report no. EB000176/HCII2017/R08v3)



LEGEND:

- PROPOSED STORMWATER PIPE AND MANHOLE
- EXISTING STORMWATER PIPE AND MANHOLE
- EXISTING STORMWATER PIPE AND MANHOLE TO BE ABANDONED/ DEMOLISH
- PIPE FROM SURFACE DRAINAGE (REFER TO DRAWING NO. 001/EB000176/SS/SD/07 UNDER SEPARATE SUBMISSION)

NOTE:

1. PIPE CONNECTION FROM SUBSOIL DRAIN IS FOR TEMPORARY DIVERSION ONLY. FLOW FROM TEMPORARY SUBSOIL DRAINS SHALL BE REDIRECTED TO HCII TERMINAL MANHOLE 2 ONCE COMPLETED AND IN COMMISSION.

Issue	Description	Date
19	AMENDMENT	03-07-23
18	ISSUE FOR DIA R08V3	31-03-23
17	ISSUE FOR DIA	06-12-22
16	AMENDMENT	22-07-22
15	AMENDMENT	25-04-22
14	ISSUE FOR DIA R08	04-03-22
13	MINOR AMENDMENT	23-11-21
12	ISSUE FOR DIA	22-10-21
11	ISSUE FOR DIA	02-02-21
10	ISSUE FOR DIA	18-09-20
09	ISSUE FOR DIA	06-05-20
08	ISSUE FOR DIA	20-01-20
07	ISSUE FOR DIA	18-10-19
06	ISSUE FOR DIA	13-08-19
05	ISSUE FOR DIA	17-12-18
04	ISSUE FOR DIA	11-04-18
03	PRELIMINARY - FOR CLIENT ONLY	01-03-18
02	MINOR AMENDMENTS	18-12-17
01	FIRST ISSUE FOR DIA	16-10-17

Status: PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scales	A1 (1:400) A3 (1:800)	Current Issue Signatures	
		Author	F. COUTINHO
Original Size	–	Checker	L. LEUNG
Height Datum	HKPD	Approver	J. KWOK
Grid	HK80	© Copyright reserved	

Filename: EA01425-HCII-DIA-006-19.DWG

Client: WETHERALL INVESTMENTS LIMITED

Project: HOPEWELL CENTRE II DEVELOPMENT

Title: PROPOSED DIVERTED PUBLIC DRAINAGE SYSTEM

Drawing No.	Project No.	Issue
D006	— EA01425-HCII—	19

100mm on Original

Plot Date: 03/Jul/2023 4:21:12 pm File Location: P:\EA01425 HOPEWELL MEGA HOTEL\F-REPORTS\DIA AND SIA\HCII 2017 DIA\R08 V3\DIA DRAWINGS CAD\EA01425-HCII-DIA-006-19.DWG

APPENDIX F

InfoWorks Model Output Data Downstream of SMG7015208 in Proposed Scenarios 1 and 3 under the Hopewell Centre II Development

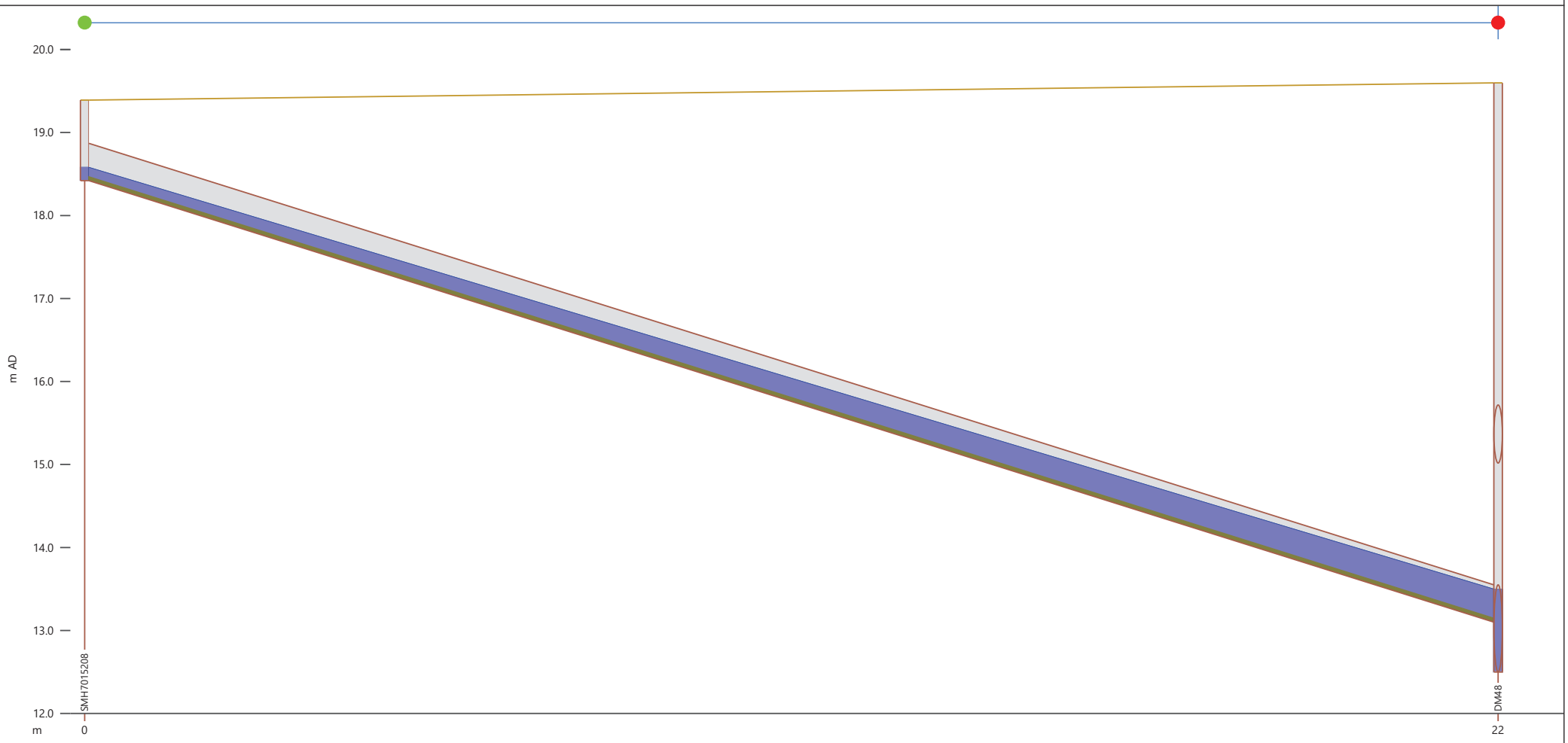
asia infrastructure solutions	Nam Koo Terrace
	Date: March 2024
	Prepared By: Fatima Ang
	Subject: Design Rainstorm Event

Duration Interval (min)		*Rate of Rainfall (mm/hr) for Return Periods T (years)	
From	To	10yr	50yr
-60.5	-59.5	48.88	66.54
-59.5	-58.5	49.21	66.94
-58.5	-57.5	49.55	67.35
-57.5	-56.5	49.90	67.77
-56.5	-55.5	50.25	68.21
-55.5	-54.5	50.62	68.65
-54.5	-53.5	51.00	69.11
-53.5	-52.5	51.38	69.57
-52.5	-51.5	51.78	70.05
-51.5	-50.5	52.19	70.54
-50.5	-49.5	52.61	71.05
-49.5	-48.5	53.04	71.57
-48.5	-47.5	53.48	72.10
-47.5	-46.5	53.94	72.65
-46.5	-45.5	54.41	73.22
-45.5	-44.5	54.90	73.80
-44.5	-43.5	55.40	74.40
-43.5	-42.5	55.92	75.02
-42.5	-41.5	56.45	75.66
-41.5	-40.5	57.01	76.32
-40.5	-39.5	57.58	77.01
-39.5	-38.5	58.17	77.72
-38.5	-37.5	58.79	78.45
-37.5	-36.5	59.43	79.21
-36.5	-35.5	60.09	80.00
-35.5	-34.5	60.78	80.82
-34.5	-33.5	61.51	81.67
-33.5	-32.5	62.26	82.56
-32.5	-31.5	63.04	83.49
-31.5	-30.5	63.86	84.46
-30.5	-29.5	64.72	85.47
-29.5	-28.5	65.62	86.53
-28.5	-27.5	66.57	87.64
-27.5	-26.5	67.56	88.80
-26.5	-25.5	68.61	90.03
-25.5	-24.5	69.72	91.33
-24.5	-23.5	70.89	92.69
-23.5	-22.5	72.14	94.14
-22.5	-21.5	73.47	95.68
-21.5	-20.5	74.88	97.32

Duration Interval (min)		*Rate of Rainfall (mm/hr) for Return Periods T (years)	
-20.5	-19.5	76.40	99.07
-19.5	-18.5	78.02	100.95
-18.5	-17.5	79.78	102.96
-17.5	-16.5	81.68	105.14
-16.5	-15.5	83.75	107.50
-15.5	-14.5	86.01	110.08
-14.5	-13.5	88.50	112.90
-13.5	-12.5	91.26	116.02
-12.5	-11.5	94.33	119.48
-11.5	-10.5	97.80	123.37
-10.5	-9.5	101.75	127.77
-9.5	-8.5	106.30	132.82
-8.5	-7.5	111.64	138.70
-7.5	-6.5	118.00	145.67
-6.5	-5.5	125.79	154.12
-5.5	-4.5	135.61	164.67
-4.5	-3.5	148.54	178.38
-3.5	-2.5	166.61	197.26
-2.5	-1.5	194.37	225.58
-1.5	-0.5	244.60	275.02
-0.5	0.5	310.58	337.59
0.5	1.5	244.60	275.02
1.5	2.5	194.37	225.58
2.5	3.5	166.61	197.26
3.5	4.5	148.54	178.38
4.5	5.5	135.61	164.67
5.5	6.5	125.79	154.12
6.5	7.5	118.00	145.67
7.5	8.5	111.64	138.70
8.5	9.5	106.30	132.82
9.5	10.5	101.75	127.77
10.5	11.5	97.80	123.37
11.5	12.5	94.33	119.48
12.5	13.5	91.26	116.02
13.5	14.5	88.50	112.90
14.5	15.5	86.01	110.08
15.5	16.5	83.75	107.50
16.5	17.5	81.68	105.14
17.5	18.5	79.78	102.96
18.5	19.5	78.02	100.95
19.5	20.5	76.40	99.07
20.5	21.5	74.88	97.32
21.5	22.5	73.47	95.68
22.5	23.5	72.14	94.14
23.5	24.5	70.89	92.69
24.5	25.5	69.72	91.33
25.5	26.5	68.61	90.03

Duration Interval (min)		*Rate of Rainfall (mm/hr) for Return Periods T (years)	
26.5	27.5	67.56	88.80
27.5	28.5	66.57	87.64
28.5	29.5	65.62	86.53
29.5	30.5	64.72	85.47
30.5	31.5	63.86	84.46
31.5	32.5	63.04	83.49
32.5	33.5	62.26	82.56
33.5	34.5	61.51	81.67
34.5	35.5	60.78	80.82
35.5	36.5	60.09	80.00
36.5	37.5	59.43	79.21
37.5	38.5	58.79	78.45
38.5	39.5	58.17	77.72
39.5	40.5	57.58	77.01
40.5	41.5	57.01	76.32
41.5	42.5	56.45	75.66
42.5	43.5	55.92	75.02
43.5	44.5	55.40	74.40
44.5	45.5	54.90	73.80
45.5	46.5	54.41	73.22
46.5	47.5	53.94	72.65
47.5	48.5	53.48	72.10
48.5	49.5	53.04	71.57
49.5	50.5	52.61	71.05
50.5	51.5	52.19	70.54
51.5	52.5	51.78	70.05
52.5	53.5	51.38	69.57
53.5	54.5	51.00	69.11
54.5	55.5	50.62	68.65
55.5	56.5	50.25	68.21
56.5	57.5	49.90	67.77
57.5	58.5	49.55	67.35
58.5	59.5	49.21	66.94
59.5	60.5	48.88	66.54

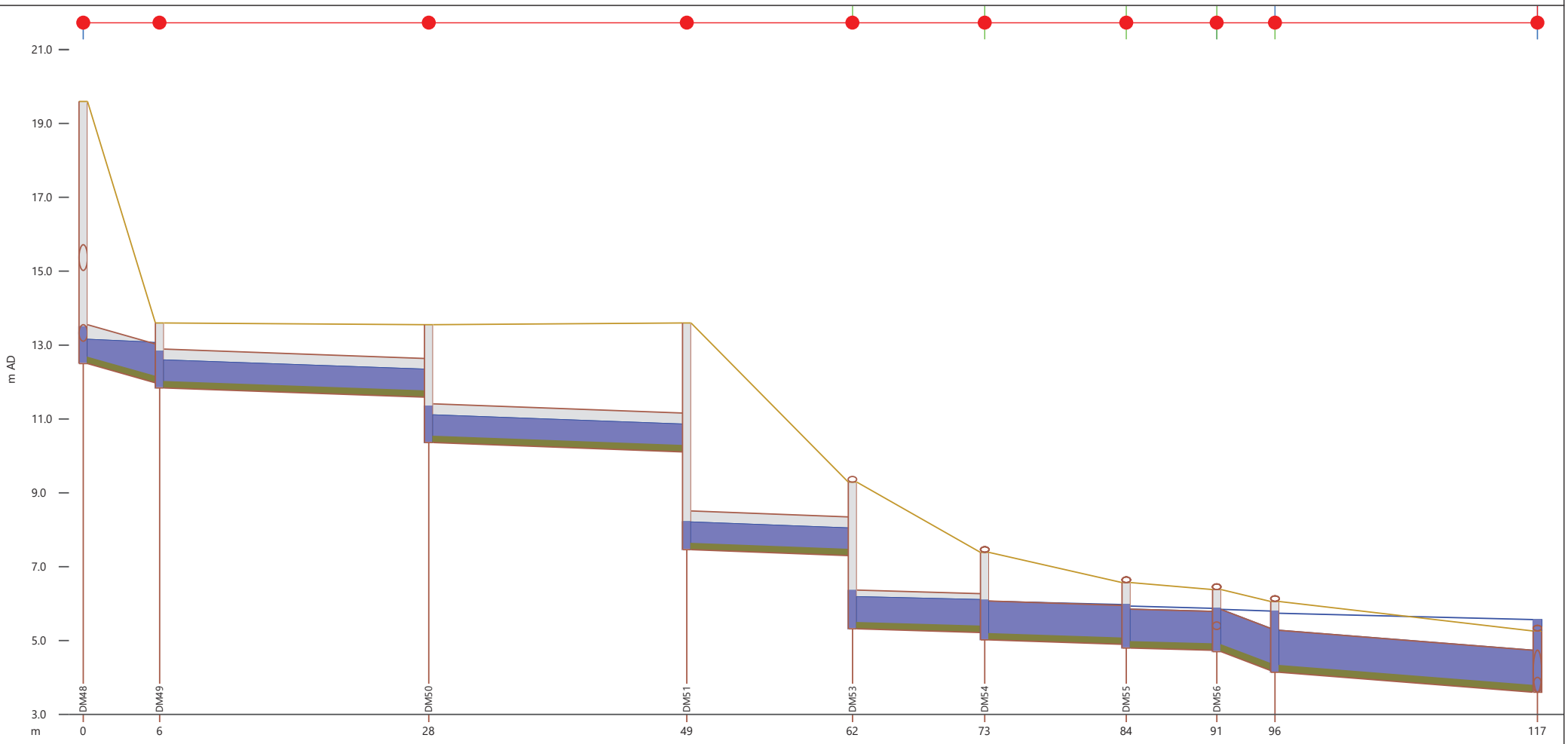
Longitudinal Scenario 1in10 yrs (Dry Season)



Link	SMH7015208.1
US node ID	SMH7015208
ds node	DM48
length (m)	22.2
width (mm)	450
us inv (m AD)	18.420
ds inv (m AD)	13.100
grad (m/m)	0.23969
r.pfc (m3/s)	1.173
surc	0.88
US flow (m3/s)	0.20484
US velocity (m/s)	4.999
DS flow (m3/s)	0.20472
DS velocity (m/s)	2.554

Node	SMH7015208	DM48
ground (m AD)	19.390	19.598
Ch floor lev (m AD)	18.420	12.500
flood dep (m)	-0.812	-6.106
level (m AD)	18.578	13.492

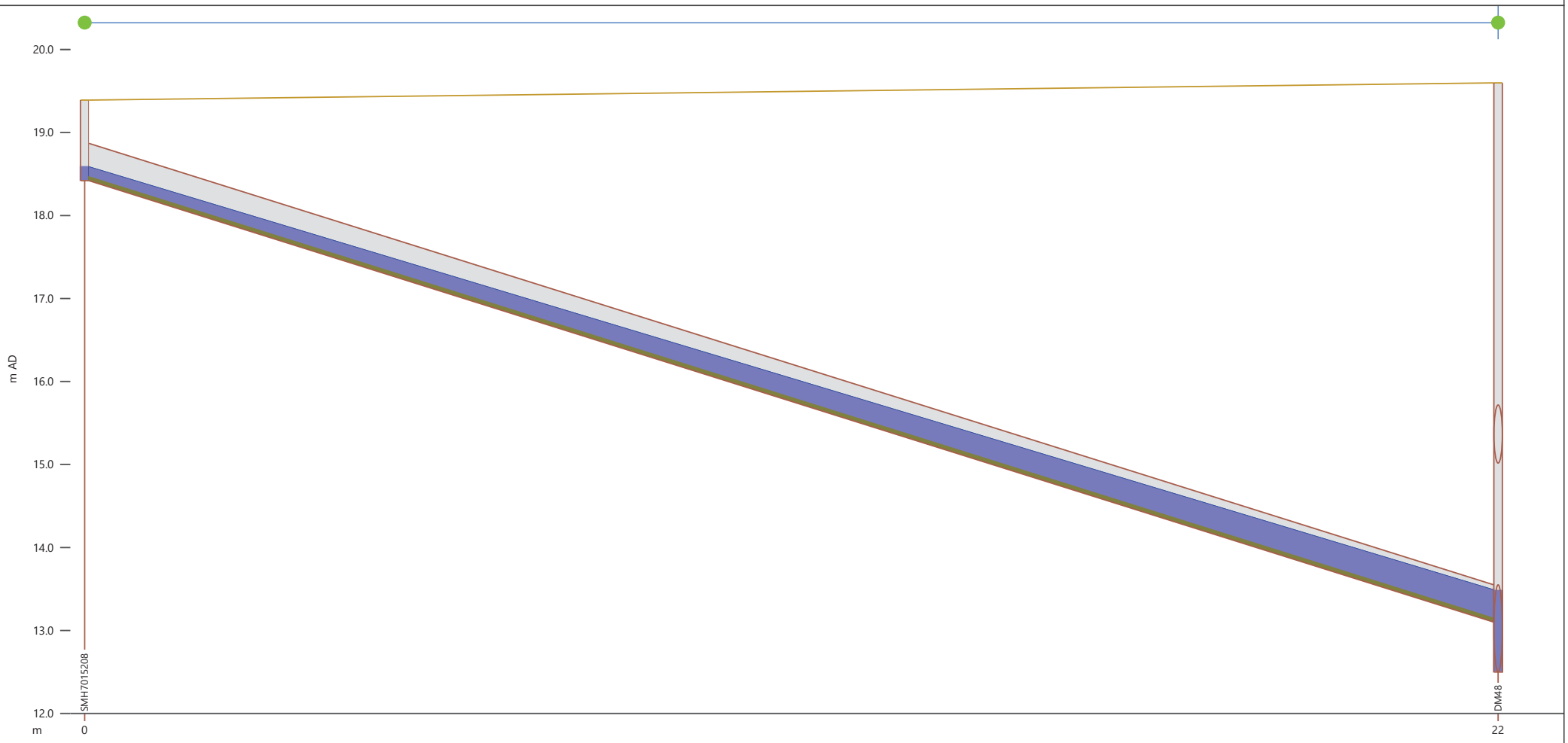
Longitudinal Scenario 1in10 yrs (Dry Season)



Link	DM48.1	DM49.1	DM50.1	DM51.1	DM53.1	DM54.3	DM55.1	DM56.3	SMH7015055.1
US node ID	DM48	DM49	DM50	DM51	DM53	DM54	DM55	DM56	SMH7015055
ds node	DM49	DM50	DM51	DM53	DM54	DM55	DM56	-	SMH7015040
length (m)	6.1	21.7	20.8	13.3	10.6	11.4	7.3	4.7	21.1
width (mm)	1050	1050	1050	1050	1050	1050	1050	910	910
us inv (m AD)	12.500	11.840	10.360	7.460	5.320	5.020	4.800	4.700	4.140
ds inv (m AD)	11.980	11.590	10.110	7.300	5.220	4.900	4.740	4.190	3.600
grad (m/m)	0.08464	0.01154	0.01204	0.01200	0.00940	0.01053	0.00824	0.10877	0.02556
r.pfc (m3/s)	6.062	2.237	2.284	2.281	2.019	2.137	1.890	7.526	3.647
surc	1.00	0.72	0.71	0.71	0.84	1.00	1.00	1.00	1.00
US flow (m3/s)	1.73659	1.73641	1.73610	1.73584	1.73571	1.74950	1.83314	1.84711	1.88781
US velocity (m/s)	4.217	3.018	3.067	3.062	2.781	2.252	2.279	2.137	2.057
DS flow (m3/s)	1.73645	1.73612	1.73587	1.73572	1.73596	1.74975	1.83315	1.84711	1.88781
DS velocity (m/s)	2.978	3.016	3.065	3.061	2.805	2.214	2.278	2.013	2.040

Node	-	DM49	DM50	DM51	DM53	DM54	DM55	DM56	SMH7015055	SMH7015040
ground (m AD)	-	13.600	13.550	13.600	9.290	7.390	6.570	6.380	6.060	5.260
Ch floor lev (m AD)	-	11.840	10.360	7.460	5.320	5.020	4.800	4.700	4.140	3.600
flood dep (m)	-	-0.775	-2.207	-5.385	-2.937	-1.300	-0.599	-0.509	-0.265	0.303
level (m AD)	-	12.825	11.343	8.215	6.353	6.090	5.971	5.871	5.795	5.563

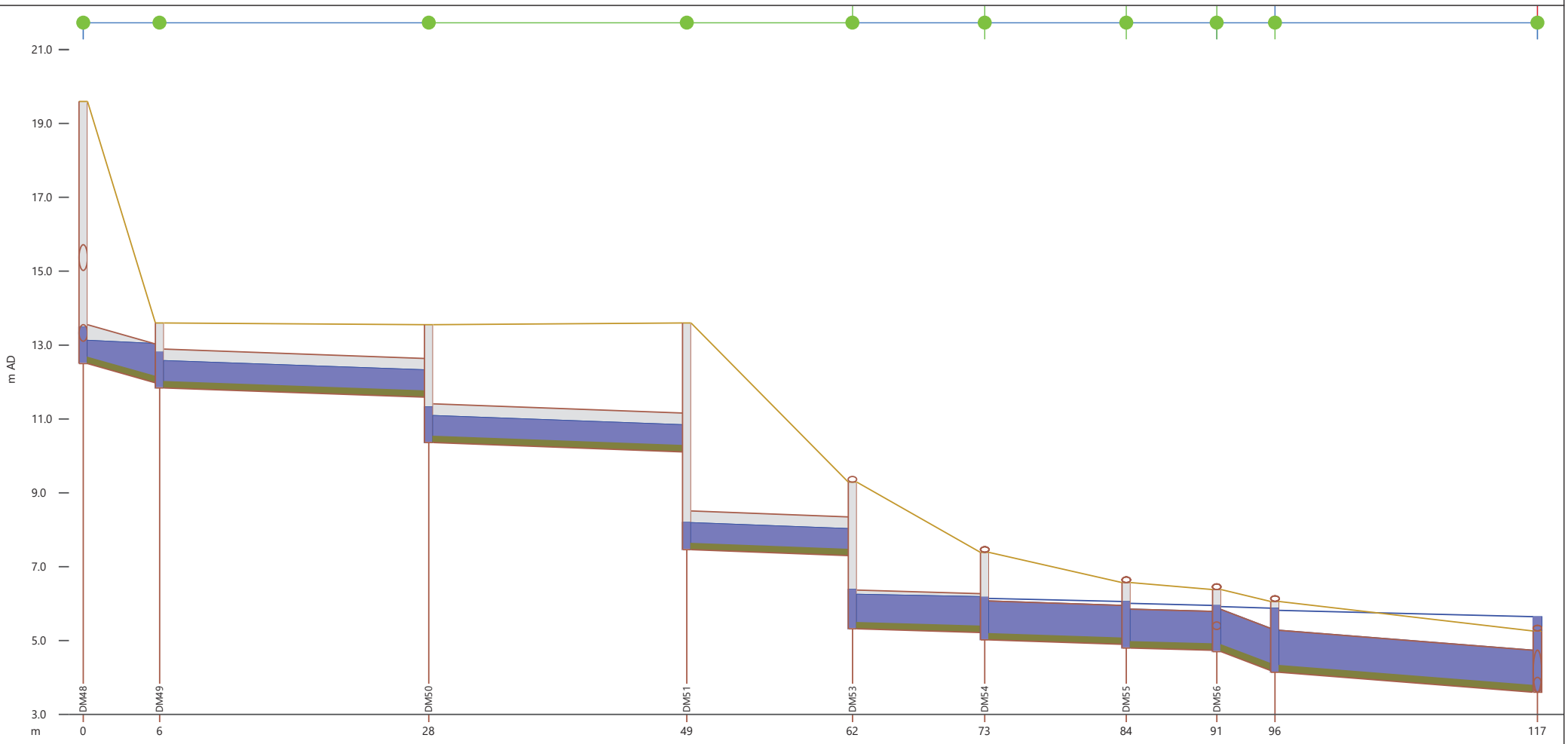
Longitudinal Scenario 1in50 yrs (Wet Season)



Link	SMH7015208.1	
US node ID	SMH7015208	
ds node	DM48	
length (m)	22.2	
width (mm)	450	
us inv (m AD)	18.420	
ds inv (m AD)	13.100	
grad (m/m)	0.23969	
r.pfc (m3/s)	1.173	
surc	0.86	
US flow (m3/s)	0.23502	
US velocity (m/s)	5.292	
DS flow (m3/s)	0.23492	
DS velocity (m/s)	2.960	

Node	SMH7015208	DM48
ground (m AD)	19.390	19.598
Ch floor lev (m AD)	18.420	12.500
flood dep (m)	-0.804	-6.117
level (m AD)	18.586	13.481

Longitudinal Scenario 1in50 yrs (Wet Season)



Link	DM48.1	DM49.1	DM50.1	DM51.1	DM53.1	DM54.3	DM55.1	DM56.3	SMH7015055.1
US node ID	DM48	DM49	DM50	DM51	DM53	DM54	DM55	DM56	SMH7015055
ds node	DM49	DM50	DM51	DM53	DM54	DM55	DM56	-	SMH7015040
length (m)	6.1	21.7	20.8	13.3	10.6	11.4	7.3	4.7	21.1
width (mm)	1050	1050	1050	1050	1050	1050	1050	910	910
us inv (m AD)	12.500	11.840	10.360	7.460	5.320	5.020	4.800	4.700	4.140
ds inv (m AD)	11.980	11.590	10.110	7.300	5.220	4.900	4.740	4.190	3.600
grad (m/m)	0.08464	0.01154	0.01204	0.01200	0.00940	0.01053	0.00824	0.10877	0.02556
r.pfc (m3/s)	6.062	2.237	2.284	2.281	2.019	2.137	1.890	7.526	3.647
surc	1.00	0.70	0.69	0.69	0.92	1.00	1.00	1.00	1.00
US flow (m3/s)	1.66945	1.66917	1.66866	1.66825	1.66820	1.68730	1.79631	1.81545	1.87324
US velocity (m/s)	4.216	2.991	3.038	3.034	2.534	2.105	2.218	2.019	2.038
DS flow (m3/s)	1.66922	1.66869	1.66831	1.66810	1.66980	1.68772	1.79631	1.81546	1.87323
DS velocity (m/s)	2.974	2.989	3.037	3.033	2.479	2.091	2.218	1.975	2.020

Node	-	DM49	DM50	DM51	DM53	DM54	DM55	DM56	SMH7015055	SMH7015040
ground (m AD)	-	13.600	13.550	13.600	9.290	7.390	6.570	6.380	6.060	5.260
Ch floor lev (m AD)	-	11.840	10.360	7.460	5.320	5.020	4.800	4.700	4.140	3.600
flood dep (m)	-	-0.797	-2.229	-5.404	-2.906	-1.220	-0.516	-0.431	-0.188	0.382
level (m AD)	-	12.803	11.321	8.196	6.384	6.170	6.054	5.949	5.872	5.642

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