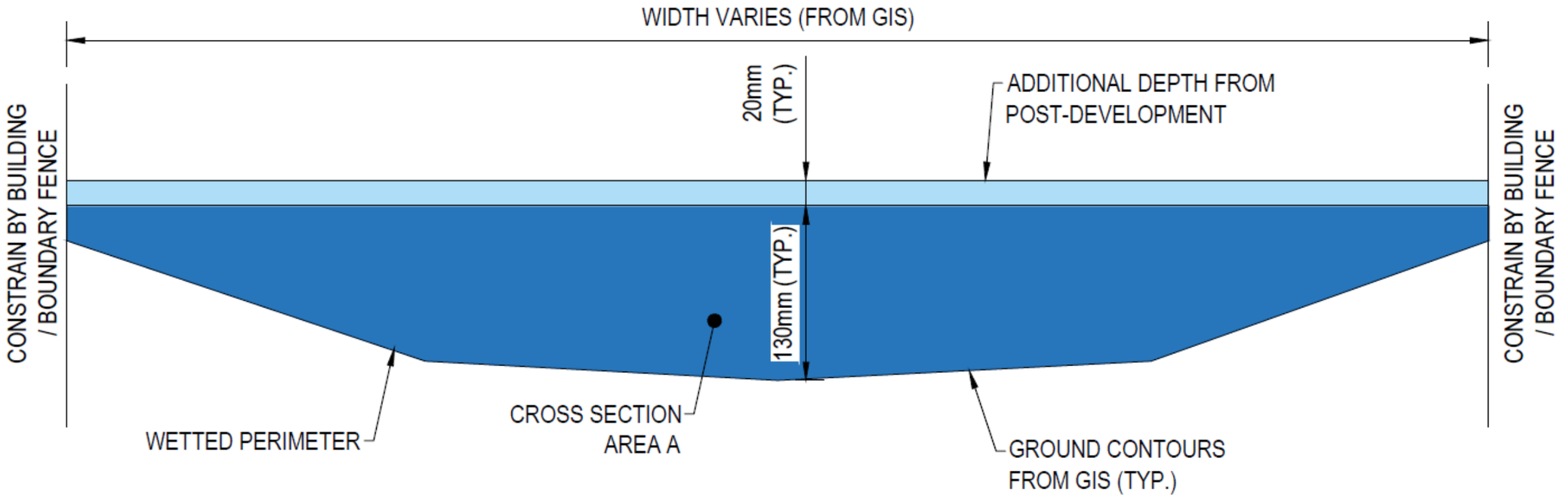
Request No.	Category of Information Request	HW Request For Information	Reason For Request	Applicant's Response 20.02.24	HW Response 23.02.24
HW1	Flood Effects	A more detailed flood effects assessment including the following is required: • Investigation and description of existing downstream flooding issues • Floor level survey of downstream properties • Details of any known floors that currently flood • Assessment of whether the land use provided for in the PPC will increase the risk of floor flooding • The flood impact on downstream properties in terms of flood flows, depths, extents, duration, velocity and frequency for the **pre- and post-development scenario** – **without** the climate change factor. Given the apparent initial proposal to divert additional catchment area that is otherwise discharging to the open watercourse to the north, and the complexities of the downstream overland flow path drainage system, more detailed modelling (such as 2D modelling) is required in conjunction with the above, to adequately understand the difference in terms of flood flows, depths, extents, duration, velocity and frequency, appropriate to the scale and significance of the actual or potential environmental effects anticipated from the implementation of the plan change.	To enable the local authority to better understand—the nature of the request in respect of the effect it will have on the environment; the ways in which any adverse effects may be mitigated; the benefits and costs, the efficiency and effectiveness, and any possible alternatives to the request; appropriate to the scale and significance of the actual or potential environmental effects anticipated from the implementation of the change or plan. Stormwater runoff from the Beach Haven Plan Change Area (PCA) has the potential to increase and/or create flooding risks to downstream properties. There is a lack of investigation and description of existing flooding issues downstream of the plan change area, which could potentially be exacerbated by future development enabled by the Beach Haven PPC. There is potential flooding of properties and buildings along the overland flow path between No. 15 and No. 27 Cresta Avenue. Additionally, the carpark at the Beach Haven Tennis Club may also be exposed to flood hazard (velocity x depth). Refer to figure – Area 1 and Area 2 below respectively. 	The applicant does not have legal access to the properties at 15 and 27 Cresta Avenue to carry out the required testing. Further, we do not consider it necessary to carry out further assessment, given we have previously provided a robust flooding assessment of effects, including mitigation of downstream flooding effects. The Overland flow path assessment undertaken by Airey's to date includes the following: • GIS supported data analysis to determine flood flows, depths, extents, duration and velocity using TP108 against rainfall data from the following conditions: • Max rainfall data analysis for 2.1° Climate Change • Max rainfall data analysis for 3.8° Climate Change • Max rainfall data analysis from Auckland Anniversary Weekend Storm (worst Auckland location adopted) • HEC-HMS Data modelling • Historic and current aerial photograph analysis Refer to the typical cross section diagram detailed below.	Healthy Waters disagree that the flooding assessment provided provides a robust assessment of effects, including mitigation of downstream flooding effects, and maintains its view that a more detailed flood effects assessment is required, as initially requested. To further detail the information sought as per this request – the following should be included: The comparisons between outflow hydrographs from the development site under 2yr, 10yr and 100yr 2.1°C future storm events, for: - Predevelopment – current natural catchment and imperviousness - Post development – modified catchment boundary, proposed imperviousness - Post development with mitigation proposed. This will enable Healthy Waters to understand the hydrological effects on the downstream overland flow path and receiving systems. The previous request for assessment of flood extents, depths, levels, durations and velocities between the pre and post development scenario on the downstream receiving environments remain valid. The 'Overland flow path assessment' and various analyses referred in the applicant's 20.02.24 response have not been made available to Council/Healthy Waters to aid in any understanding of effects this information may provide. (Note: With regard to the HW original request re existing downstream flooding issues – please be aware that downstream flooding has previously been reported (as per property file records), and that Council

Request No.	Category of Information Request	HW Request For Information	Reason For Request	Applicant's Response 20.02.24	HW Response 23.02.24
					are aware of previous potential overland flow path issues through No.s 17, 21 and 23 Cresta Ave. Specifically, for example, it is understood that 17 Cresta Ave is slab on ground with therefore minimal freeboard to any flooding).



HW2	SW General	Please provide a concept drawing or plan showing the proposed layout of the stormwater drainage system, including the primary and secondary systems.	To enable the local authority to better understand—the nature of the request in respect of the effect it will have on the environment; the ways in which any adverse effects may be mitigated; the benefits and costs, the efficiency and effectiveness, and any possible alternatives to the request; appropriate to the scale and significance of the actual or potential environmental effects anticipated from the implementation of the change or plan. This information is required so that the proposed stormwater management can be clearly understood. No layout plan was included in the SMP.	Please see attached Drawing RC400 detailing the proposed Primary Stormwater Drainage system. Please see attached Drawing MS900 detailing the proposed Secondary Stormwater Drainage system through the subject Site.	Acknowledge the provision of these two drawings outlining the proposed primary drainage system, and the existing secondary system indicating the area of the site that currently discharges to the OLFP and the additional area (1650m^2) to be diverted to discharge to the OLFP as opposed to the open watercourse. Both drawings don't extend to any areas beyond the site boundaries and cover the full OLFP catchment upstream and downstream of the site. The secondary

			We have previously seen layout plans as part of the SMP submitted with the Resource Consent application. However, we cannot assume that the layout of the proposed stormwater system has not changed from those seen previously.		system drawing also doesn't detail proposed contours and hence OLFP routes and directions and entry points of flows to downstream properties.
HW3	SW General	Is stormwater runoff from the total development area proposed to be directed to the 750mm/400mm diameter stormwater pipe downstream and the overland flow path along the drain? Has there been any consideration of discharging some flows to the stream. The overland flowpath catchment plan in Appendix C of the SMP indicates some catchment draining to the existing overland flowpath. It is not clear what is proposed for that part of the site that currently drains to the stream.	To enable the local authority to better understand—the nature of the request in respect of the effect it will have on the environment; the ways in which any adverse effects may be mitigated; the benefits and costs, the efficiency and effectiveness, and any possible alternatives to the request; appropriate to the scale and significance of the actual or potential environmental effects anticipated from the implementation of the change or plan. There is a catchment divide within the site, with the natural drainage pattern appearing to be 40% draining to the natural stream channel to the north and 60% to the overland flow path to the west (refer to figure below). More information is required to before a full assessment of stormwater runoff effects can be completed. 	Please refer to attached drawing RC400 detailing the primary stormwater drainage system. All impervious areas are currently directed to the Detention Tanks, which in turn discharge to the existing 750/400mm stormwater line. Please refer to Drawings MS900 detailing the catchment areas of the Secondary System. Approximately 23% (1650m²) of the original site area drains to the eastern overland flow path (stream). The remaining 77% (5407m²) naturally drains to the western overland flow path through 15 Cresta Avenue to the north. Our proposal will retain approximately 14.5% of the original eastern catchment draining to the east (stream). The remainder of the eastern catchment will be diverted to the western catchment under the current proposal. This is due to the site primarily naturally sloping toward the West. As stated above, a small portion of the eastern catchment is retained, however the majority will now drain to the western overland flow path found entirely within the site boundaries. There is no defined overland flow path from the site boundaries to the eastern overland flow path (stream). Auckland Council policy typically requires the defined overland flowpaths to remain with the entry and exit points remaining as predevelopment. This is what we have adopted in our design. In short we have considered the overland flow paths and consider that sending more water to the east is more problematic and has more significant issues, than working with the existing defined overland flow paths.	
HW4	Water Quantity	The HEC-HMS model presented previously shows that 24hrs storm was used for tank sizing. Also, it appears that attenuation of the 1% AEP storm is in the model. Please	To enable the local authority to better understand—the nature of the request in respect of the effect it will have on the environment; the ways in which any adverse effects may be mitigated; the benefits and costs, the efficiency and effectiveness,	With the immediate downstream public stormwater network being less than 600mmØ diameter, the network is to be considered 100% blocked as per SWCOP.	The applicant confirms that attenuation of 10 year storm event flows is proposed, and

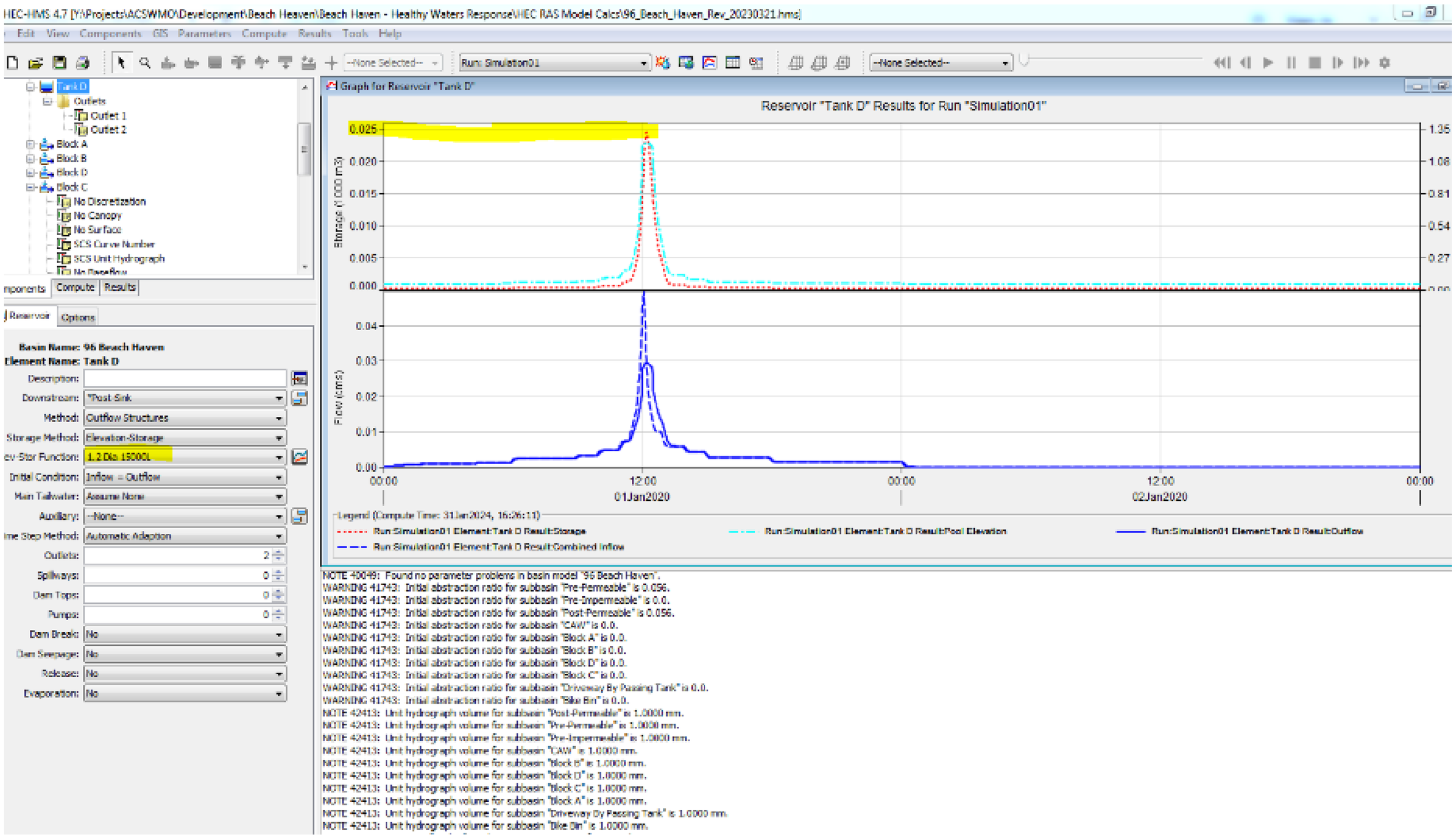
		confirm that the attenuation volume will be calculated using the storm duration that requires the largest volume (i.e., using 10 minute duration can lead to under sizing of the attenuation device).	and any possible alternatives to the request; appropriate to the scale and significance of the actual or potential environmental effects anticipated from the implementation of the change or plan. Applicant to confirm that attenuation of the 10 and 100 year storm event is proposed.	Consequently, the underground attenuation device was sized for the 10% AEP rainfall events only. Initially, spreadsheet routing model was used to size the volumes required. The HEC-HMS model was developed as a check for the spreadsheet routing model. All entries for the HEC-HMS model were as per required by TP108 (including using TP108 rainfall maps, adjusting for 2.1^{o}C climate change and 24hr temporal rainfall normalisation…etc). HEC-HMS model outputs confirmed that 10% AEP attenuation is achieved by the detention design, which reduces the peak flow by approximately 10L/s. Out of curiosity, we ran HEC-HMS model with the climate change adjusted 1% AEP rainfall volume. HEC-HMS model output suggests that 1% AEP attenuation can be achieved by the detention design, which reduces the peak flow by approximately 40L/s. With a reduced peak flow, downstream flood depth is likely to reduce. Please note HEC-HMS model does not consider downstream stormwater system blockage and considers water is constantly draining out of the detention systems. Hence, this can be considered as the best-case scenario. Our overland flow path assessment considered downstream network as fully blocked. Which is the worst-case scenario. It was determined that there is at most a 20mm increase in flood depth for 1% AEP rainfall event. Consequently, in reality, post development downstream flooding will be somewhere between a reduction in existing flood depth and a 20mm increase. As per our report, we consider this as a minor effect.	also outlines potential implications for 100 year event flows. The updated HEC-HMS model is required to verify the conclusions provided in the 20.02.24 response re proposed detention to attenuate the peak flow from the development site. It is also necessary to understand whether the extended duration of peak flow can/will increase the duration of flood – particularly in the case of any flooding of habitable floors. As per HW1 above, there has been insufficient investigation and assessment undertaken to support/demonstrate statements made in the applicant's cl23 response as to effects on flood depths. Further, assessment of the downstream impacts of increases in flood depth is required utilising a representative flow path geometry with comparison of the existing and proposed situation.

Advice Note:

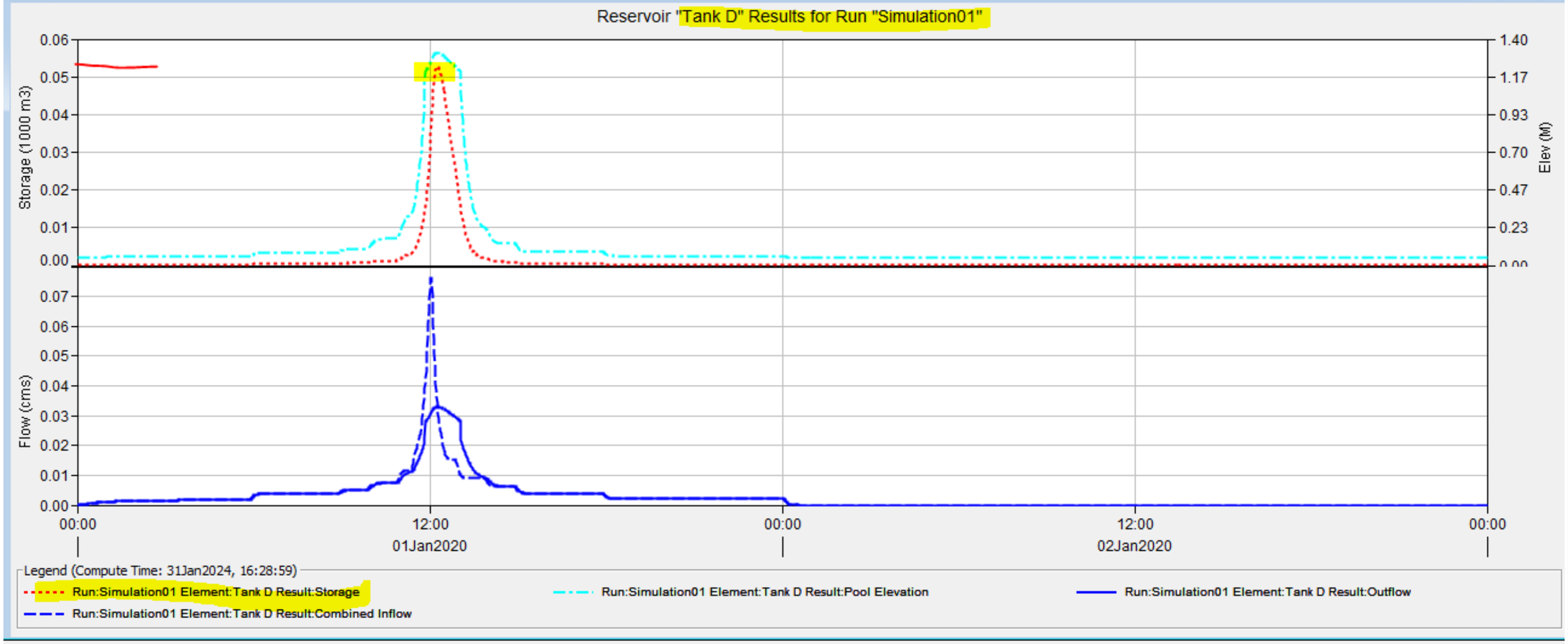
We had a quick look at the HEC-HMS model for detention tank sizing which was provided as part of the Resource Consent application (and subsequently as requested in conjunction with the recommenced PPC process). We noticed that Tank D is possibly undersized. For 10% AEP storm events, the peak storage in the tank is ~25m^3, while a 15m^3 tank is shown in the model. For 1% AEP storm events, the size of Tank D will be 52 m^3 versus 15m^3 as designed.

We have not checked the other tanks in detail.

We noticed that Tank B and Tank C are in series, and both tanks had orifices at outlets. It is more effective to use a single large tank or remove the orifices on the upstream tank to improve attenuation effects.



Graph for Reservoir "Tank D"



NOTE 40049: Found no parameter problems in basin model "96 Beach Haven".
WARNING 41743: Initial abstraction ratio for subbasin "Pre-Permeable" is 0.056.
WARNING 41743: Initial abstraction ratio for subbasin "Pre-Impermeable" is 0.0.
WARNING 41743: Initial abstraction ratio for subbasin "Post-Permeable" is 0.056.
WARNING 41743: Initial abstraction ratio for subbasin "CAW" is 0.0.

Drawing MS900 Detailing the proposed Secondary Stormwater Drainage

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CLIENT: BENTLEY STUDIOS LTD

JOB TITLE: PROPOSED ENGINEERING WORKS
96 BEACH HAVEN ROAD & 13 CRESTA VANUE
BEACH HAVEN

REV	AMENDMENT	DATE	BY

DRAWING STATUS: FOR INFORMATION

ISSUE PURPOSE: CONSENT

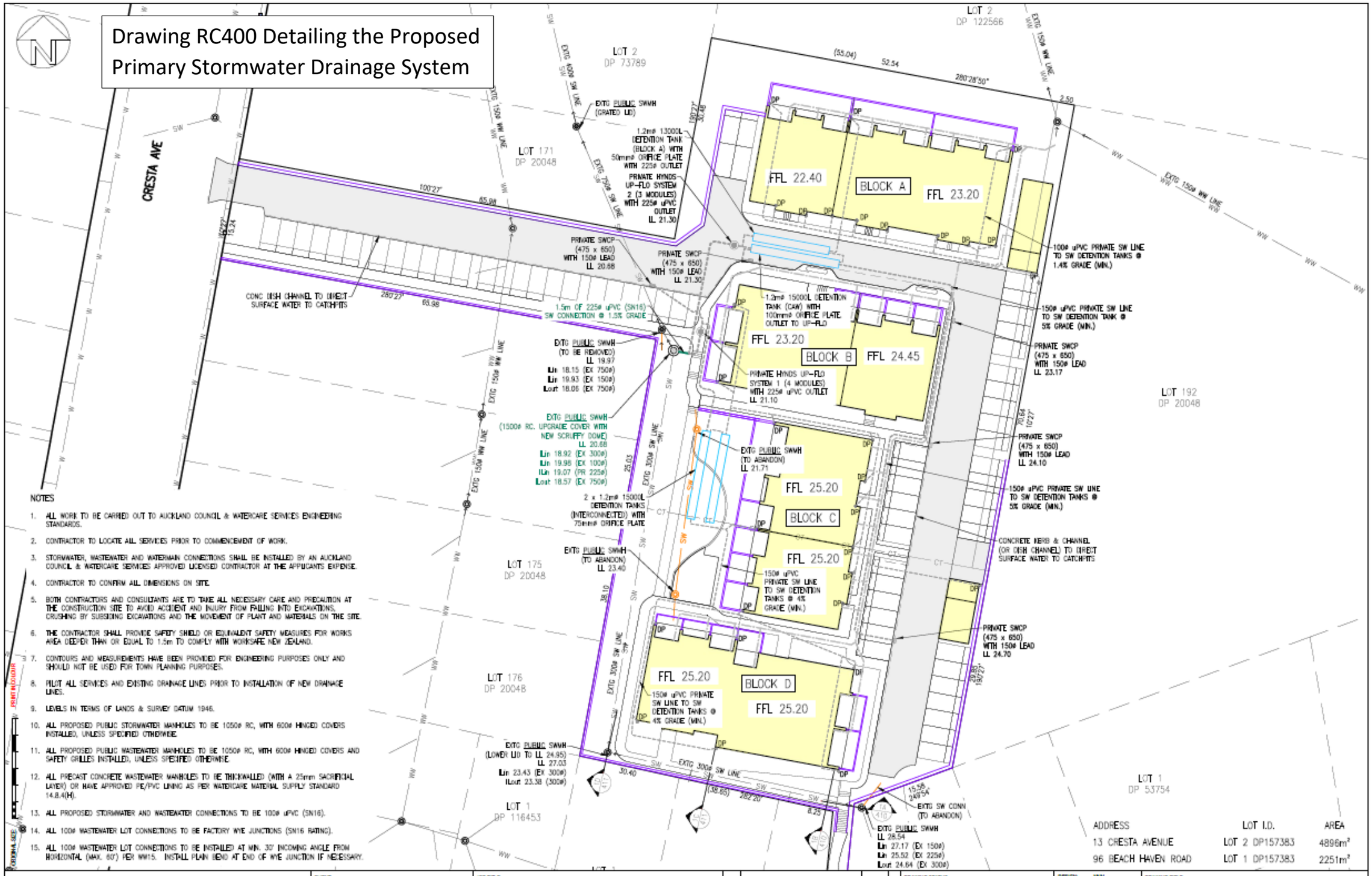
DESIGN:	-
DRAWN:	STS
CHECKED:	MNN
DATE:	19/09/2023
SCALE:	1:750 @ A3

DO NOT SCALE FROM DRAWINGS

DRAWING TITLE: OVERLAND FLOW PATH CATCHMENT
- 120 BEACH HAVEN ROAD, 29 CRESTA AVENUE, 96 BEACH HAVEN ROAD AND 13 CRESTA AVENUE

JOB No: 200626/1 | SHEET No: MS900 | REV: -

Drawing RC400 Detailing the Proposed Primary Stormwater Drainage System



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CLIENT: BEACH HAVEN ROAD APARTMENTS LIMITED

JOB TITLE: PROPOSED ENGINEERING WORKS
96 BEACH HAVEN ROAD & 13 CRESTA AVENUE
BEACH HAVEN

REV	AMENDMENT	DATE	BY

DRAWING STATUS: FINAL
ISSUE PURPOSE: RESOURCE CONSENT

DESIGN:	MW
DRAWN:	BTS
CHECKED:	MTW
DATE:	03/11/2022
SCALE:	1:500 @ A3

DO NOT SCALE FROM DRAWINGS

DRAWING TITLE: OVERALL STORMWATER PLAN

JOB No: 200626/1 | SHEET No: RC400 | REV: -