

HKRS Holdings Limited
62 Pyle Road East,
One Tree Point 0171

Attn: Karl Hansen

Flooding Summary for Stage 1 of Bream Bay Business Hub

1. Scope of summary

This flooding summary covers the extents of Stage 1 of the development at 551 Marsden Point Road, Ruakaka, Northland, illustrated in Figure 1 below.

The risks have been identified from the Northland Regional Council flood hazard maps and localised rainfall-runoff modelling.

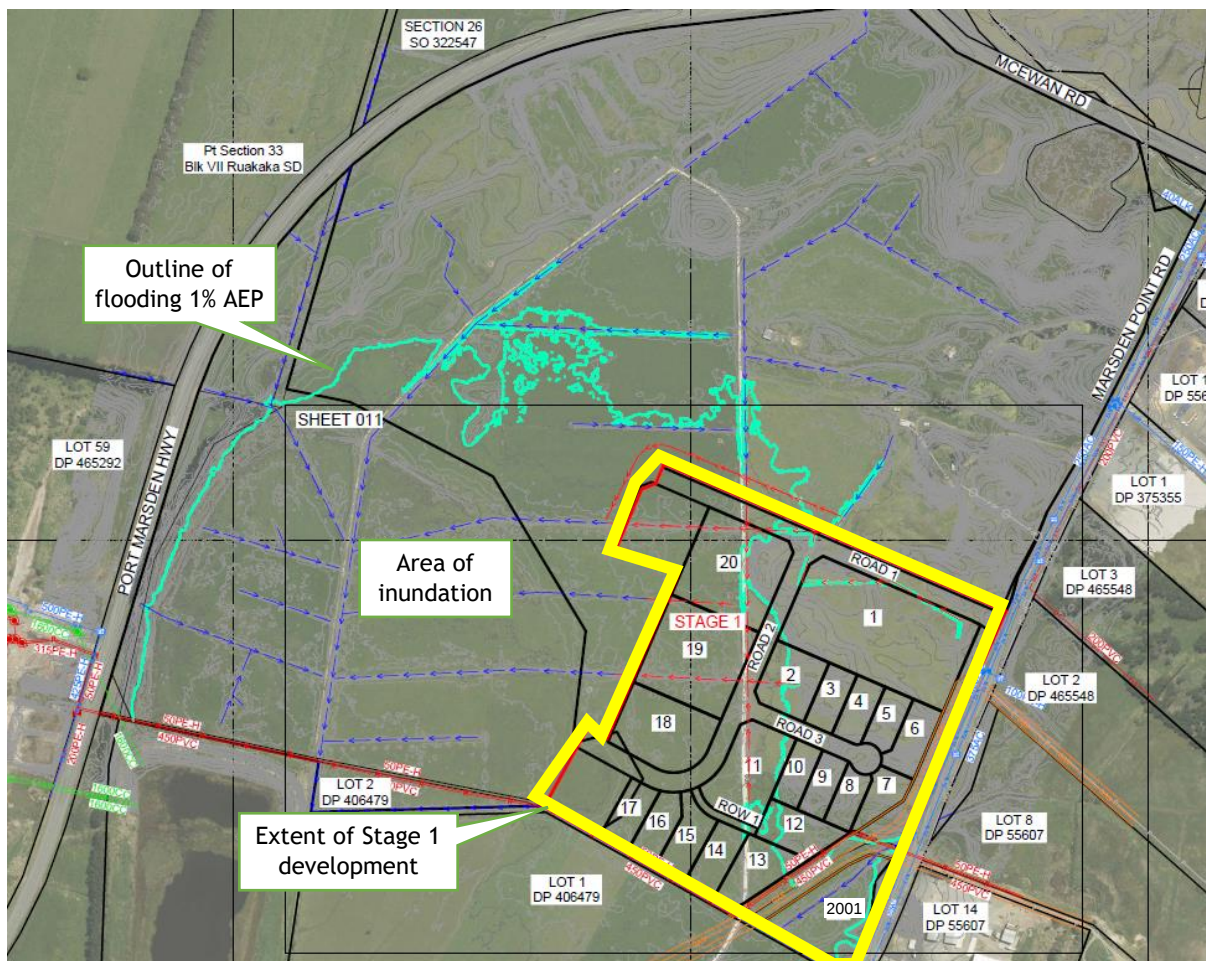


Figure 1 - Extent of Stage 1 development and summary scope.



2. Flooding risks

The Northland Regional Council (NRC) flood maps for the River Flood Hazard Zone-Priority Rivers (100 year CC Extent) suggest the flood plain from the Ruakaka river extends across the Stage 1 development up to an elevation of 4.19 m (OTP 1964). The extent of this flooding is shown in Figure 1.

In addition to this risk, there is the Coastal Flood Hazard Zone 3 (100 years + Rapid SLR Scenario) inundation. This suggests the site could be subject to flooding up to a level of 3.60 m, however this is less than the river flood hazard and was not considered further.

The development is also subject to run-off from rainfall falling directly onto the development. These flows are expected to peak at around 800 L/s in a 1% AEP event (1 in 100 year event) resulting in overland flow. The overland flow paths and extent of flooding from these flows are shown in Appendix A.

3. Mitigations

To protect the development from flooding from the Ruakaka river, the finished ground level of the development will be raised above the expected flood level of 4.19 m. The lowest building platform within Stage 1 is proposed at 5.02 m (Lot 17) which is over 800 mm above the flood level. All other building platforms within Stage 1 at an elevation greater than 5.02 m.

The development has been designed to ensure all run-off generated within the development can be contained within the piped stormwater network in the event of a 10% AEP event (1 in 10 year event). Rainfall generating flows greater than a 10% AEP event will result in overland flow down the formed roads. The overland flow paths (OLFP) direction and extents for a 1% AEP event are shown in Appendix A. The building platforms for each lot are designed to be a minimum of 300 mm above the overland flows levels in the road reserve.

Flows from the adjacent catchment on the west side of Marsden Point Road are passed through the development by extending the existing 1200 mm culvert along the northern boundary of Lot 2001 and through to the development's southern boundary. This culvert can accommodate the 10% AEP event, but larger events result in an overland flow along the northern boundary of Lot 2001. There is a formed channel above the culvert alignment which has been designed to contain the full overland flow. Adjacent building platforms are a minimum of 300 mm above this flow.

Overland flows to the north of the development are routed around the development which is at a higher elevation.

4. Summary

- There are two main sources of flooding risk for Stage 1 of the Bream Bay Business Hub development; flooding from the Ruakaka River and flooding from rainfall directly onto the development.
- The river flooding has been mitigated by raising the roading and building platforms a minimum of 800 mm above the river flood level of 4.19 m. The building platforms are at 5.02 m or higher.
- Flooding from direct rainfall and the resulting overland flows is mitigated by maintain building platforms at 300 mm above the overland flow at a minimum. This is demonstrated in the attached drawings.
- Flows upstream of the development are generally piped through and around the development and do not impact overland flow levels within the development. The exception is the overflow from the extended 1200mm diameter culvert through Lot 2001. Flow in excess of



the 10% AEP event flows along a formed channel on the northern boundary of Lot 2001. The culvert and channel combined can fully accommodate the 1% AEP event. The adjacent building platforms are a minimum of 300 mm above the flow in the channel.

Regards,

Rob Jack

ME.(civil) CPEng IntPE(NZ) CMEng
0272 854 566

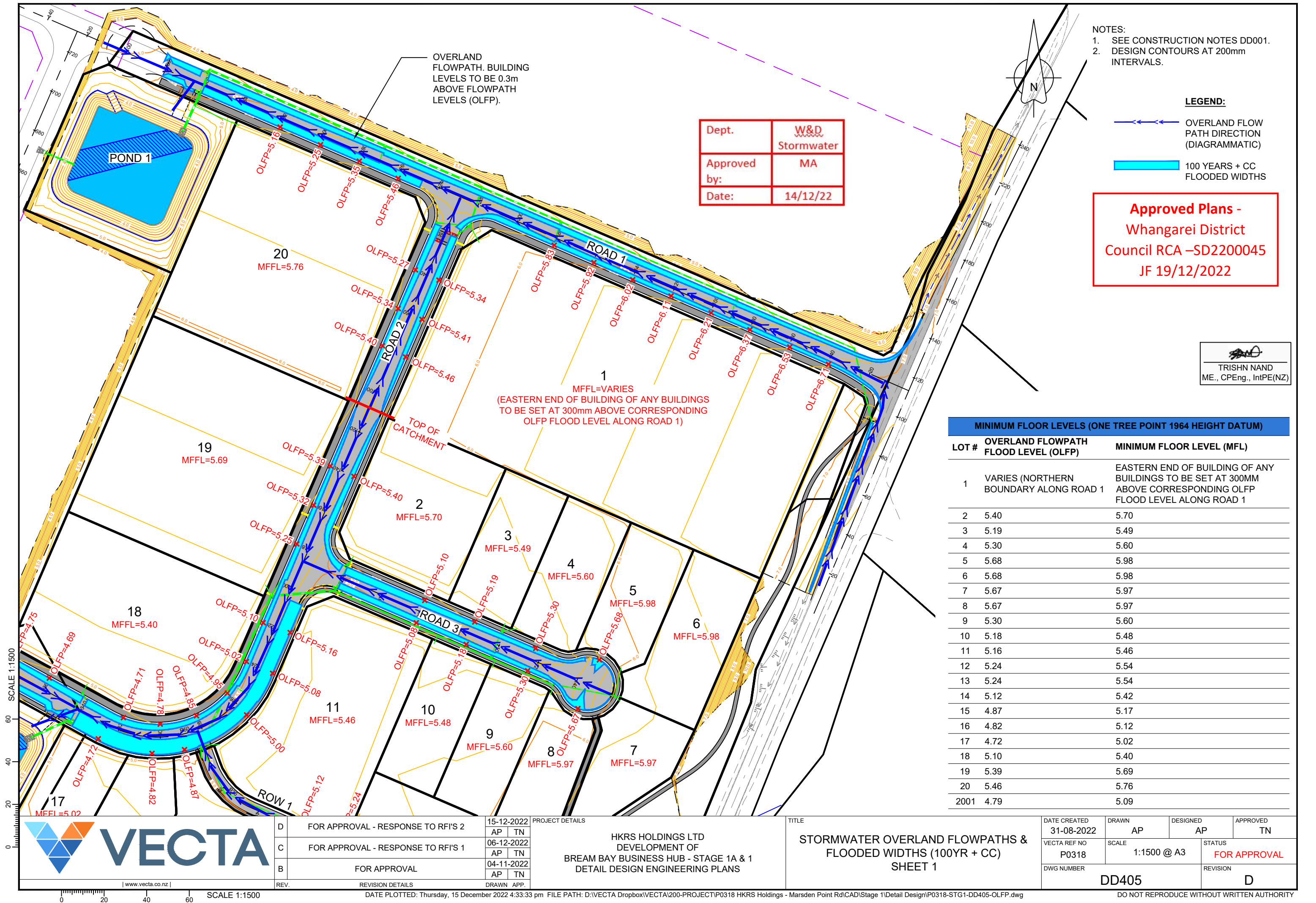


Appendix A Overland Flow Paths on Stage 1

Vecta Drawings:

DD405 - STORMWATER OVERLAND FLOWPATHS & FLOODED WIDTHS (100YR + CC) SHEET 1

DD406 - STORMWATER OVERLAND FLOWPATHS & FLOODED WIDTHS (100YR + CC) SHEET 2



- NOTES:
1. SEE CONSTRUCTION NOTES DD001.
 2. DESIGN CONTOURS AT 200mm INTERVALS.

LEGEND:

- OVERLAND FLOW PATH DIRECTION (DIAGRAMMATIC)
- 100 YEARS + CC FLOODED WIDTHS

Approved Plans -
Whangarei District
Council RCA –SD2200045
JF 19/12/2022

TRISHN NAND
ME., CPEng., IntPE(NZ)

MINIMUM FLOOR LEVELS (ONE TREE POINT 1964 HEIGHT DATUM)

LOT #	OVERLAND FLOWPATH FLOOD LEVEL (OLFP)	MINIMUM FLOOR LEVEL (MFL)
1	VARIES (NORTHERN BOUNDARY ALONG ROAD 1	EASTERN END OF BUILDING OF ANY BUILDINGS TO BE SET AT 300MM ABOVE CORRESPONDING OLFP FLOOD LEVEL ALONG ROAD 1
2	5.40	5.70
3	5.19	5.49
4	5.30	5.60
5	5.68	5.98
6	5.68	5.98
7	5.67	5.97
8	5.67	5.97
9	5.30	5.60
10	5.18	5.48
11	5.16	5.46
12	5.24	5.54
13	5.24	5.54
14	5.12	5.42
15	4.87	5.17
16	4.82	5.12
17	4.72	5.02
18	5.10	5.40
19	5.39	5.69
20	5.46	5.76
2001	4.79	5.09

D	FOR APPROVAL - RESPONSE TO RFI'S 2	15-12-2022
C	FOR APPROVAL - RESPONSE TO RFI'S 1	06-12-2022
B	FOR APPROVAL	04-11-2022
REV.	REVISION DETAILS	DRAWN APP.

PROJECT DETAILS

HKRS HOLDINGS LTD
DEVELOPMENT OF
BREAM BAY BUSINESS HUB - STAGE 1A & 1
DETAIL DESIGN ENGINEERING PLANS

TITLE

STORMWATER OVERLAND FLOWPATHS &
FLOODED WIDTHS (100YR + CC)
SHEET 1

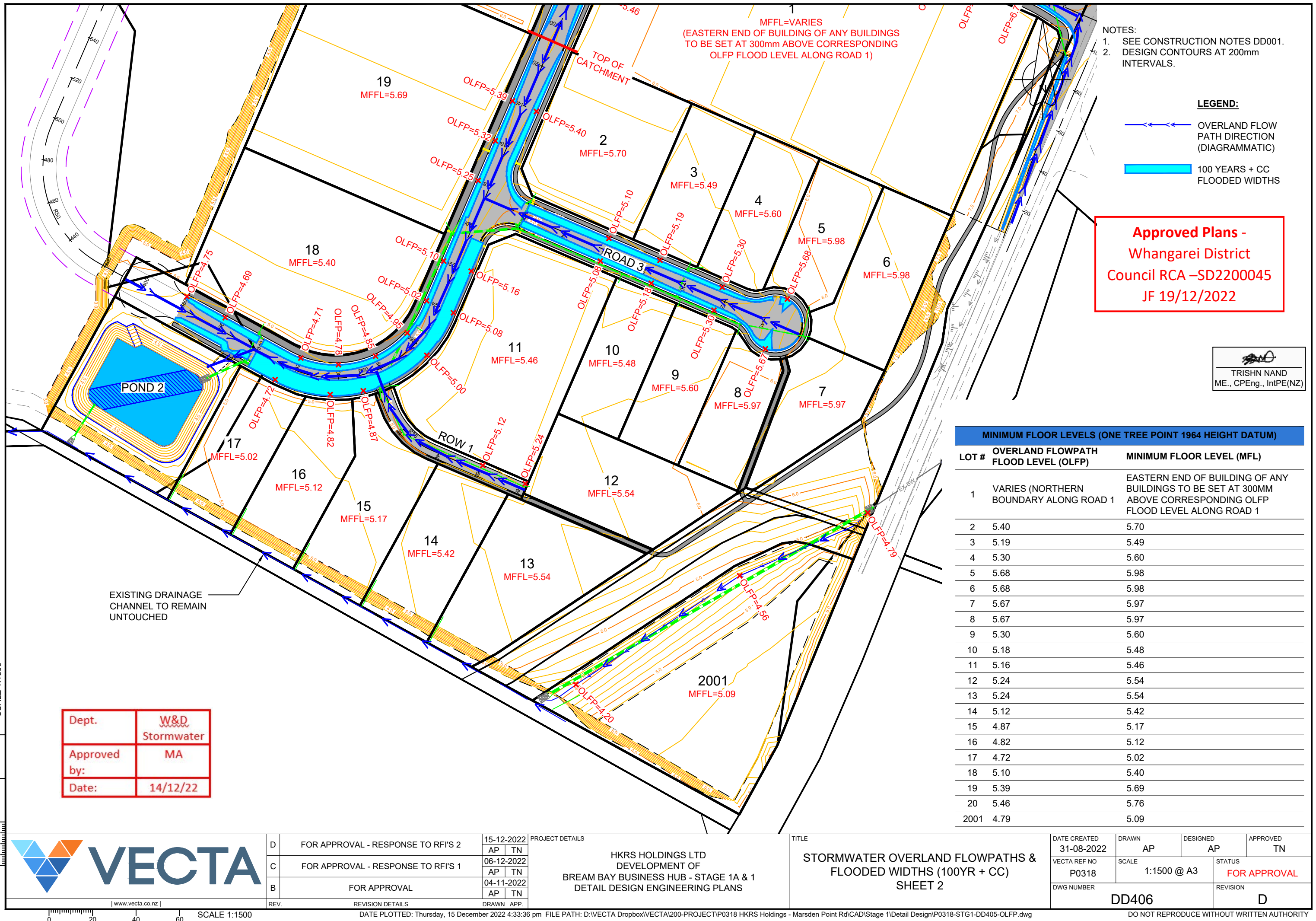
DATE CREATED 31-08-2022	DRAWN AP	DESIGNED AP	APPROVED TN
VECTA REF NO P0318	SCALE 1:1500 @ A3	STATUS FOR APPROVAL	REVISION D
DWG NUMBER DD405			



SCALE 1:1500

DATE PLOTTED: Thursday, 15 December 2022 4:33:33 pm FILE PATH: D:\VECTA Dropbox\VECTA\200-PROJECT\P0318 HKRS Holdings - Marsden Point Rd\CAD\Stage 1\Detail Design\P0318-STG1-DD405-OLFP.dwg

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Dept.	W&D Stormwater
Approved by:	MA
Date:	14/12/22

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SCALE 1:1500

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STORMWATER OVERLAND FLOWPATHS &
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SHEET 2

DATE CREATED 31-08-2022	DRAWN AP	DESIGNED AP	APPROVED TN
VECTA REF NO P0318	SCALE 1:1500 @ A3	STATUS FOR APPROVAL	
DWG NUMBER	DD406	REVISION D	

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