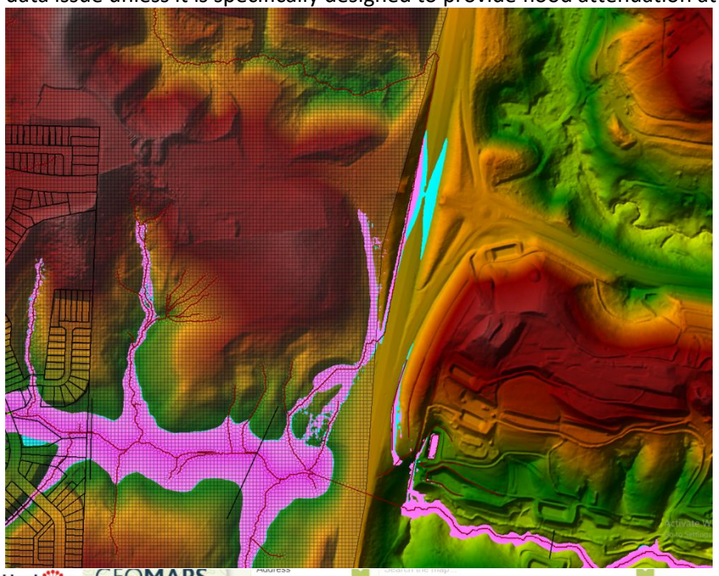
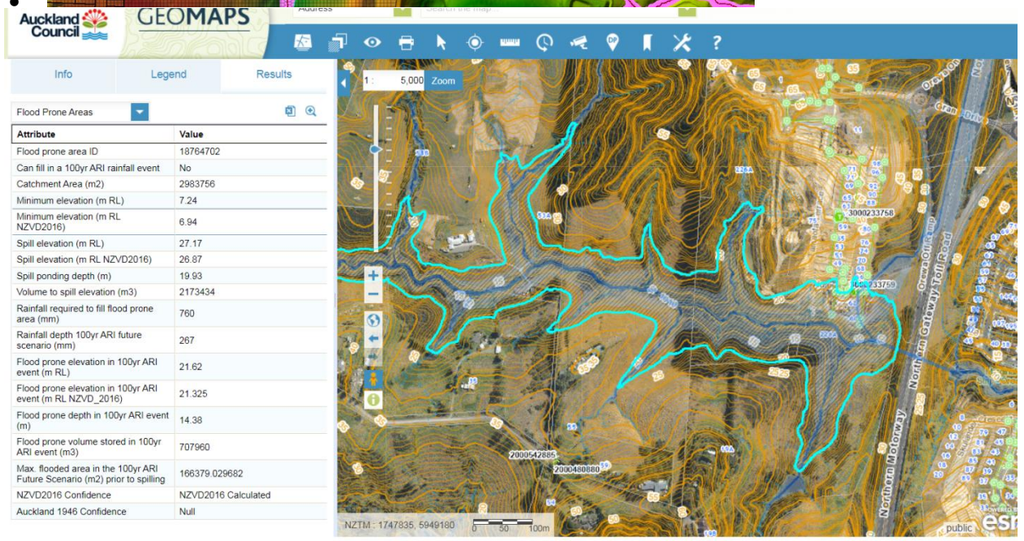
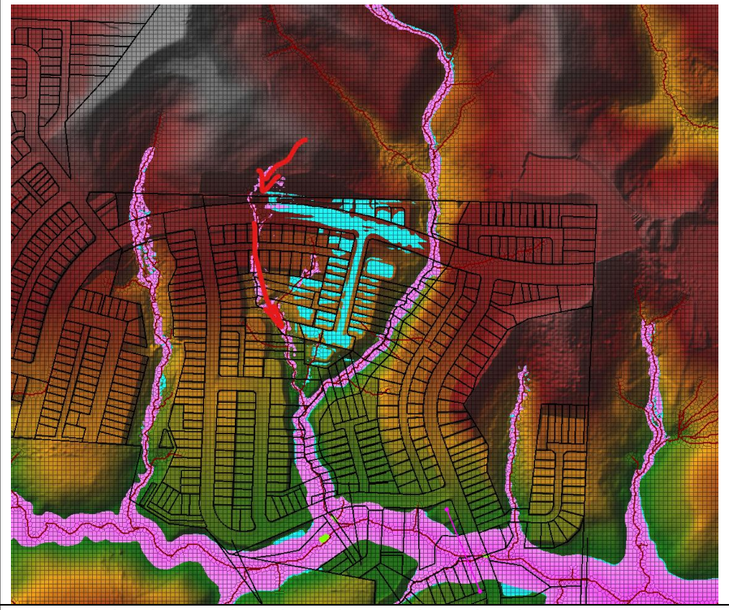
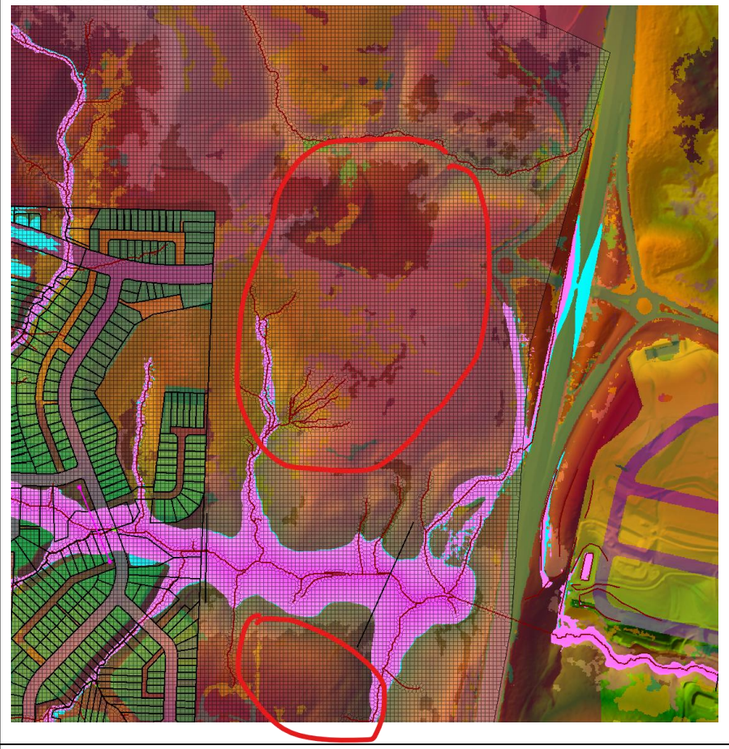
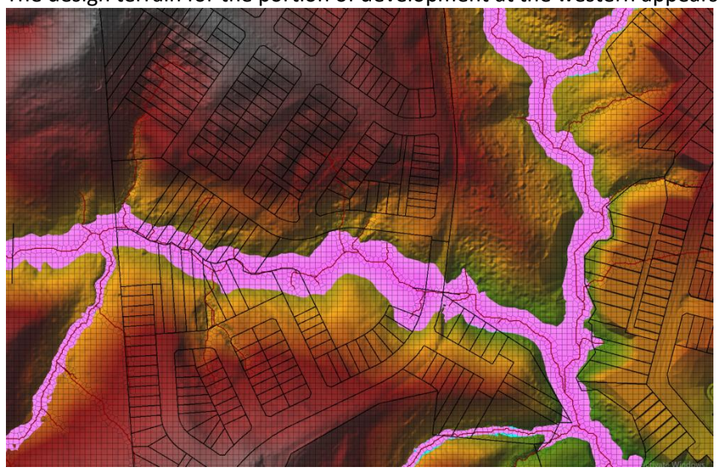
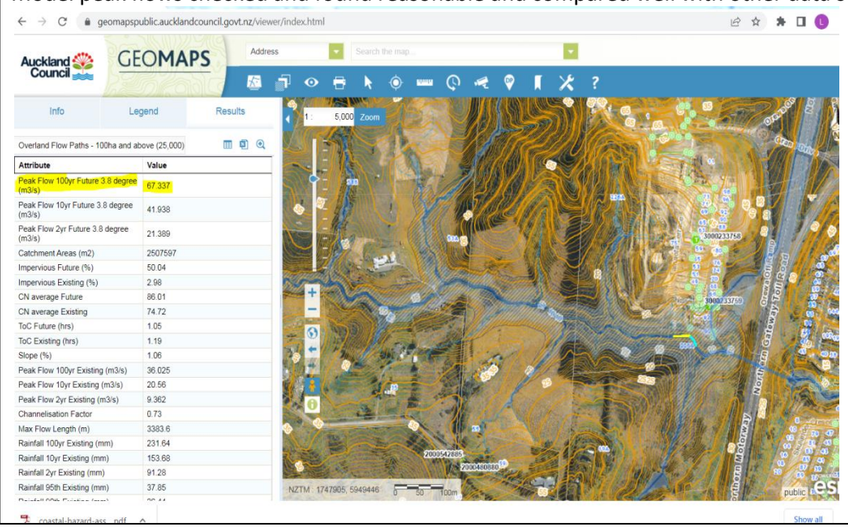
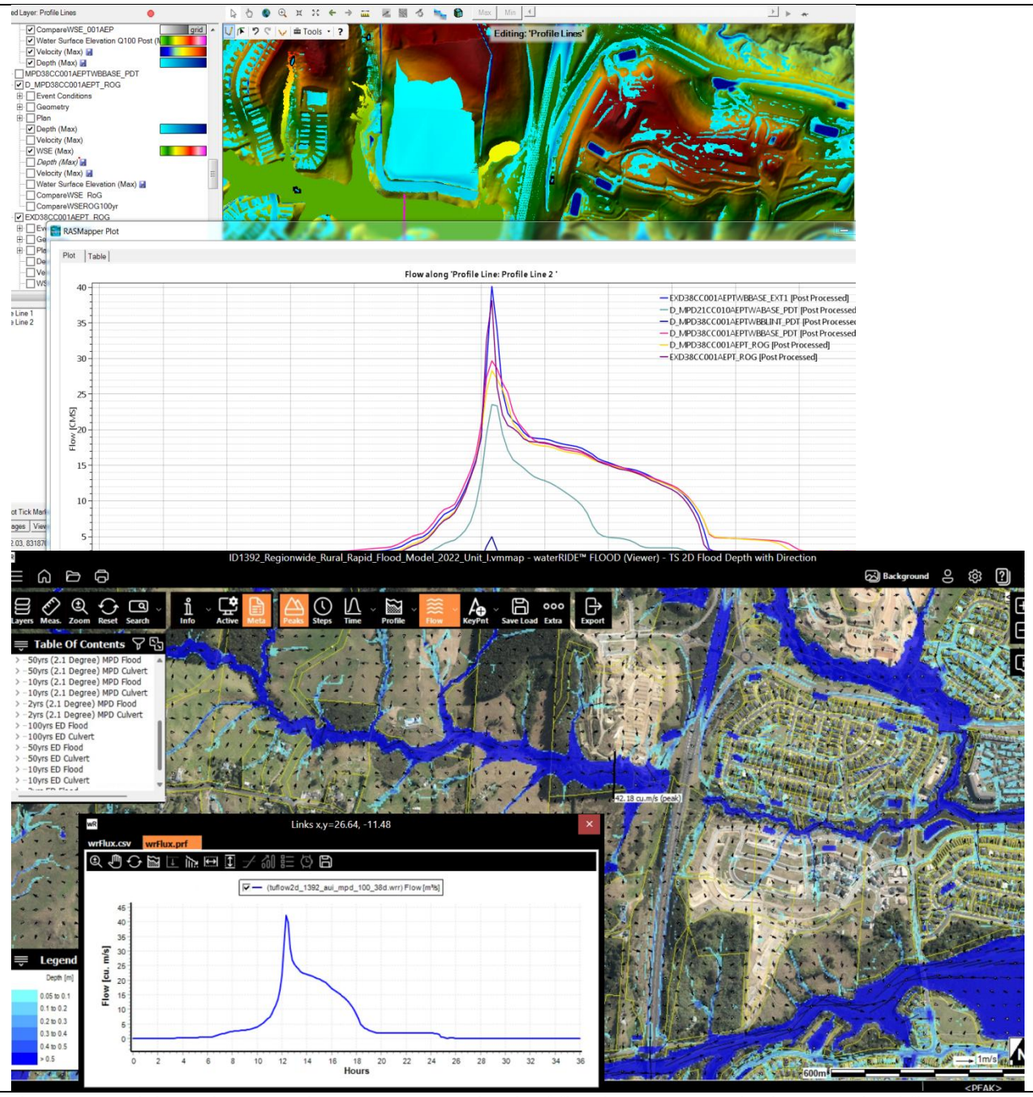
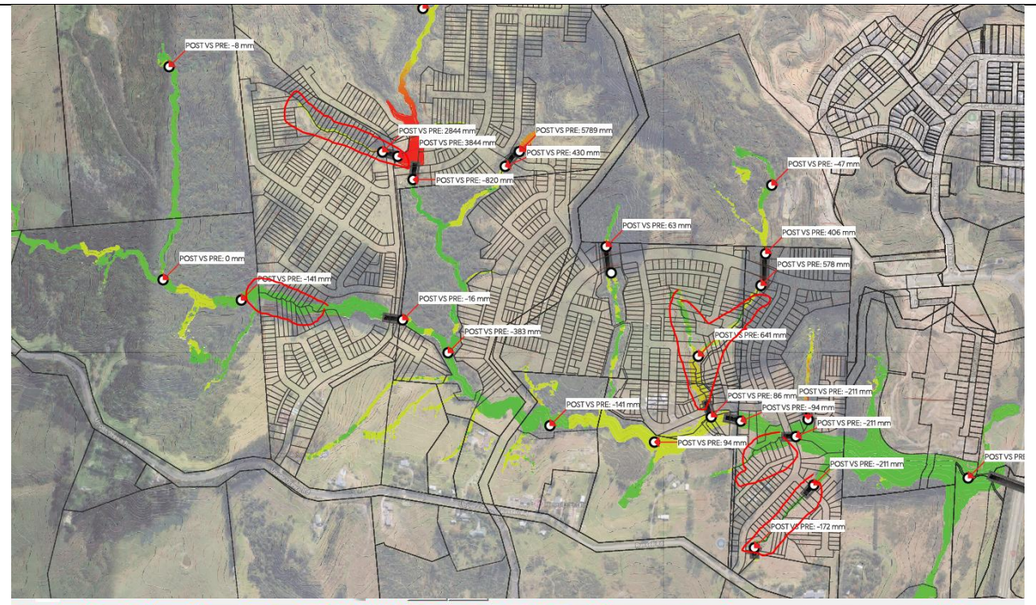
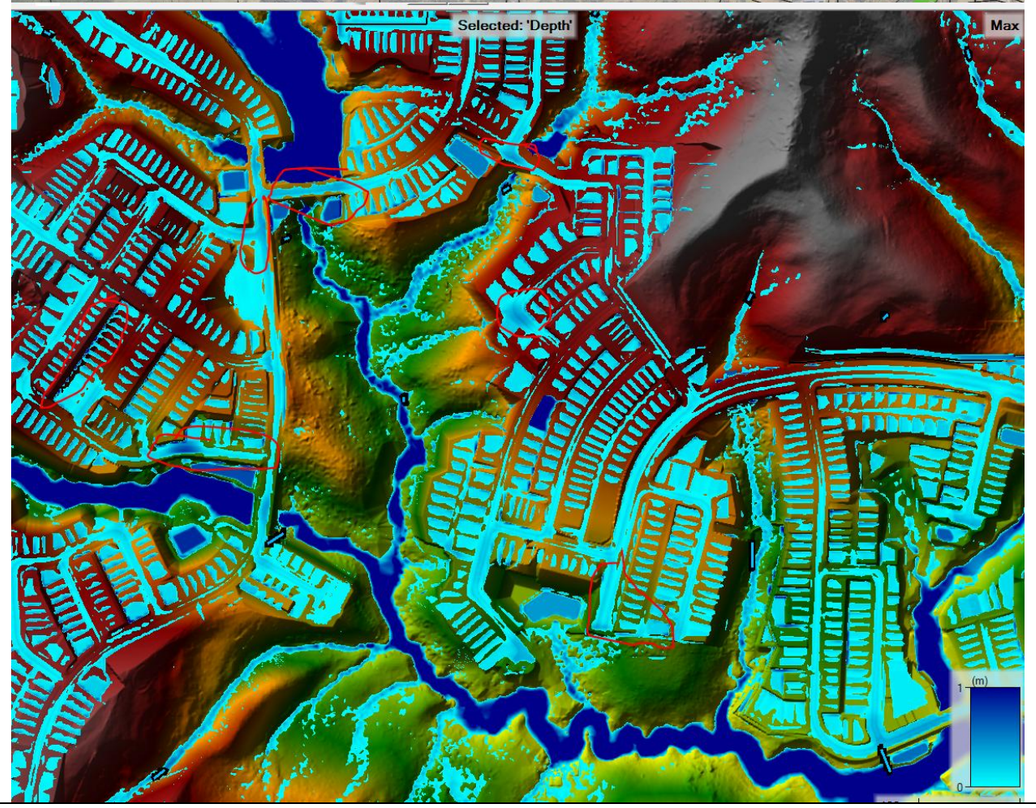
Request No.	Category of information request		Reason for request	Second Review
Flooding				
FR-01	Flood Risk	• There are noticeable increase of flood depth and extent at some downstream and upstream properties. The most significant effect will be increased flooding at the trafficable lanes and northbound off ramp at SH1. The post development peak depth at the upstream side of SH1 is predicted to reach more than 10m with an increase of 0.31m. This is due to the limited capacity of the 2.05m ID culvert. Please consider options to improve the culvert capacity. • The increased flood depth at the upstream property at 180 Upper Orewa Road is counter-intuitive, it is mostly likely a model data issue unless it is specifically designed to provide flood attenuation at this location. Please clarify.  • 	Adverse effects on downstream properties	We noticed decreased flood level for 100yrMPD 3-8 CC scenario at the upstream side of the motorway possibly due to increased attenuation at the upstream end. There are increased flood depths upto 0.3m at the upstream side of the motorway for the 10%AEP storm event. We are still concerned with the risk of blockage at the SH1 culvert (2.05m Dia). This culvert is significantly less than other culverts upstream (5x5m or 5x4m) and the downstream Arran Drive Bridge. The consequence of blockage at this culvert will result in significant ponding with a depth of over 14 meters. The culvert invert is about 20m below the Motorway. We consider that a more resilient design is needed at this location with an additional culvert of suitable size and high-level entry with screens. Some debris control structure will also be needed. There will be increase of flood depth downstream from an additional culvert, although we don't envisage flood risk at downstream properties or roads at this stage. This needs to be assessed with additional model runs for this option. Please provide the additional model runs for review.

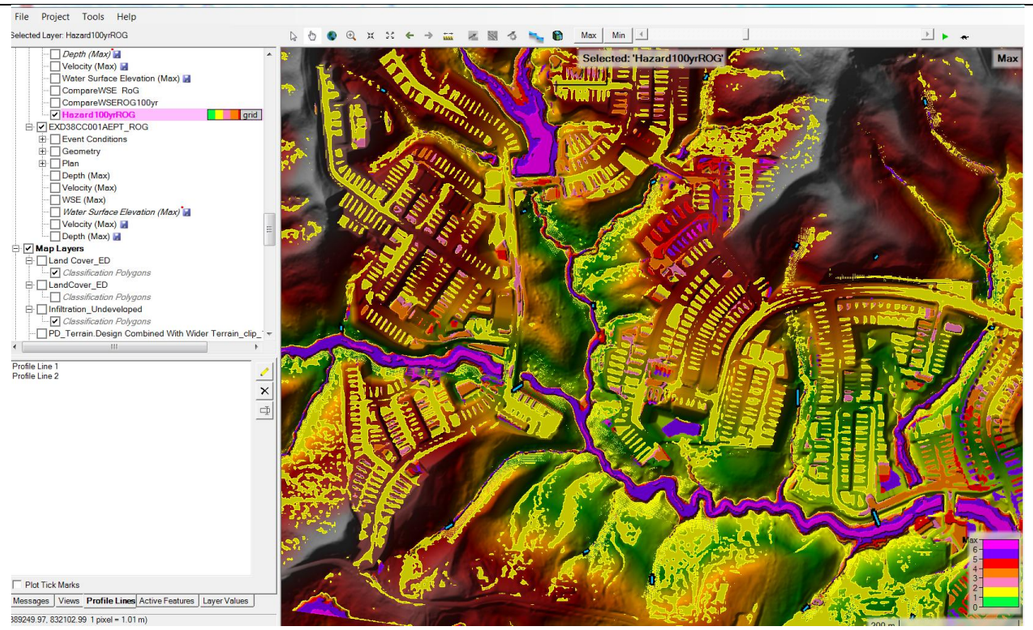
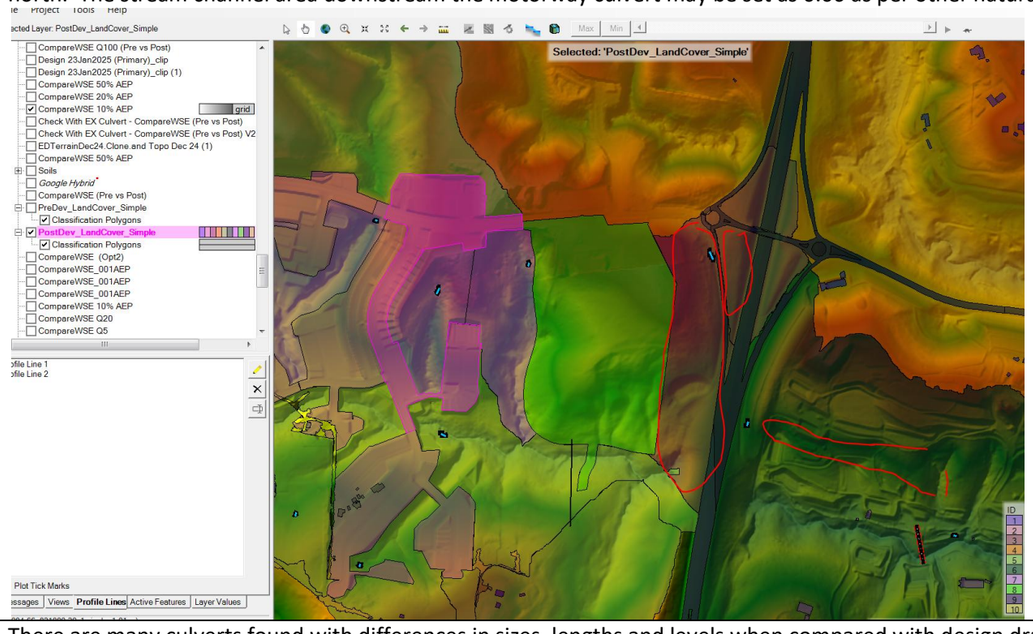
FR02	Flood Risk	An area of the proposed development on the northern side is predicted to be extensively flooded in shallow depth possibly due to inadequate provision of overland flow path. Please check. 	Post Development flood risk	We noticed an added flood flow diversion channel on the upstream side of Grand Drive. This has alleviated flooding at this location.
FR 03	Flood Risk	A normal depth water level boundary is adopted in the HEC-RAS model with a hydraulic gradient of 0.02 or 2% assumed for the receiving estuary channel. A constant tidal level boundary which takes into account of Sea Level Rise (SLR) and Vertical Land Movement (VLM) is considered more appropriate. The SLR scenario should be as per the Coastal Hazards and Climate Change Guideline (July 2024, MfE) for upto year 2130.	Tidal level can have a impact on flood levels.	Tidal boundary has been added at 3.54 mRL -okay
FR 04	Model Review	The inflows from subcatchments have been modelled using HEC-HMS for both the existing and post development scenarios. For the post development scenario, the urbanised subcatchment should be modelled as Heterogeneous Catchment as per TP108 with the pervious and the drained impervious areas modelled separately with separate time of concentrations.	Modelling pervious and impervious area separately can impact peak flows	We have reviewed the changes in the model. Only the post development urban catchment with a drainage network needs to be modelled as heterogeneous catchment as per TP108. Those under pre-development scenario or undeveloped catchment under the post development scenario with no drainage network should be modelled as homogeneous catchment. As there is minimal imperviousness for these catchments, we don't consider this change will result in only significant peak flow differences.

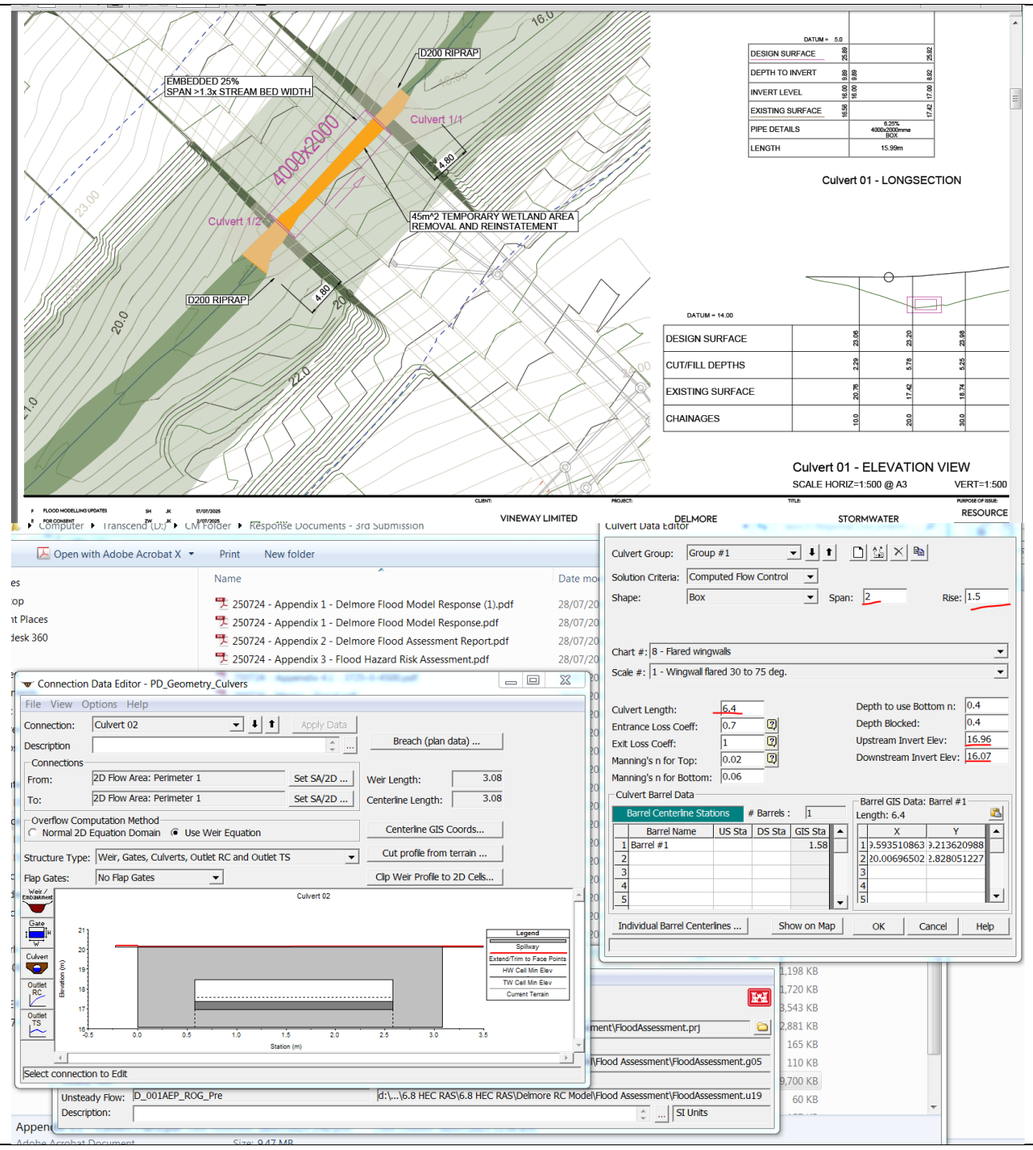
FR 05	Model Review	The existing development at CMT PD 19 and CMT PD 1, including added impervious area and terrain changes due to earthwork should be take into account for hydrological and hydraulic modelling for this development. The ultimate zoning or land uses in the overall catchment area for the future 50yr beyond the development sites should be taken into account for hydrological modelling, to ensure the flood risk is not under -estimated for the life of the development.	Change of roughness value can impact flood depth	We reviewed the changes made to the existing and future land cover data. We noticed that for the internal and external stream area, the roughness values have been kept the same at 0.06 Future riparian planting, if proposed, can increase stream margin roughness, please check and confirm this has been considered.
FR 06	Model Review	A runoff curve number of 75.7 is used for existing catchment. The land cover type, e.g. forest land and presence of good top soil should be taken into account when determining the pre-development runoff curve numbers.	Excessive flood depths at some nodes can distort the model results.	No changes made. No further changes will be required.
FR 07	Model Review	The land cover data for the proposed development scenario does not cover the new development to the west of SH1 and south of Grand Drive. Please check. 		This new development area is now included. No further response is required.
FR 08	Model Review	The subcatchment sizes are fairly large ranging from under 10 hectares to over 40 hectares. The flood flow from these subcatchments are loaded into the streams directly. The flood risk associated with overland flow paths within the subcatchments have not been modelled. It is recommended a post development scenario with rain on grid approach should be run to understand the overland flow flood risk with the proposed development terrain.	Need to understand flood risk along future overland flow paths.	Rain on grid model provided. No further response required.

FR 09	Model Review	The design terrain for the portion of development at the western appears to be incomplete. 	Future design terrain should be used in the model.	Design terrain updated in the model. No further response required.
<u>FURTHER REVIEW COMMENTS (after review of latest submitted documents and model files)</u>				
FR10	Peak Flow	Model peak flows checked and found reasonable and compared well with other data sources. 	Comment only, no response is required.	

				
FR11	Flood Risk at Post Development properties and Roads	The ROG model simulations indicates excessive depth of flood water at roads along overland flow paths or low points and on private lots with overland flow paths or ponding. We are aware of the fact that drainage pipes are not included in this model which may reduce the flood extent. However, as per SWCOP, small pipes (<600mm in Dia) should be ignored when assessing flood risk at properties. Therefore, the flood risk needs to be managed by: - require specific design of minimum floor levels on private lots with flood depth >0.1m, or with overland flow path traversing through. -easement required to protect the route of overland flow paths - no obstructions. -refined terrain and road design to minimise flood risk and ponding depths.	To protect future buildings and residents from flood risk	

		 		
FR12	Flood Hazard Assessment	A flood hazard assessment adopting the ADR flood hazard guideline classifications should be undertaken and managed appropriately. Below is a map showing flood hazard classifications for the ROG 100yr 3-8 MPD scenario using the ADR guideline. There are a few areas shown with hazard class above H2 - unsafe for vehicle. Please investigate and manage accordingly.	Protect future residents from flood hazards	

				
FR13	Model Review	Roughness values for the SH1 reserve area on the western side has been set as 0.02 - this should be higher - may be 0.04, the stream channel downstream the SH1 culvert has been set as 0.1 for roughness, being the same as the private properties to the north. The stream channel area downstream the motorway culvert may be set as 0.06 as per other natural stream channels. 	Minor inconsistencies in modelling data.	
FR14	Model Review	There are many culverts found with differences in sizes, lengths and levels when compared with design drawings. This will need to be checked, and model amended in the future.	Inconsistencies of model data on culverts proposed.	


D200 RIPRAP
EMBEDDED 25%
SPAN >1.3x STREAM BED WIDTH
Culvert 1/1
4000x2000
4.80
Culvert 1/2
45m^2 TEMPORARY WETLAND AREA
REMOVAL AND REINSTATEMENT
D200 RIPRAP
4.80
16.0
23.00
20.0
22.0
DATUM = 5.0
DESIGN SURFACE
DEPTH TO INVERT
INVERT LEVEL
EXISTING SURFACE
PIPE DETAILS
LENGTH
15.99m
Culvert 01 - LONGSECTION
DATUM = 14.00
DESIGN SURFACE
CUT/FILL DEPTHS
EXISTING SURFACE
CHAINAGES
Culvert 01 - ELEVATION VIEW
SCALE HORIZ=1:500 @ A3
VERT=1:500
VINEWAY LIMITED
DELMORE
STORMWATER
RESOURCE
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250724 - Appendix 3 - Flood Hazard Risk Assessment.pdf
Culvert Data Editor
Culvert Group: Group #1
Solution Criteria: Computed Flow Control
Shape: Box
Span: 2
Rise: 1.5
Chart #: 8 - Flared wingwalls
Scale #: 1 - Wingwall flared 30 to 75 deg.
Culvert Length: 6.4
Entrance Loss Coeff: 0.7
Exit Loss Coeff: 1
Manning's n for Top: 0.02
Manning's n for Bottom: 0.06
Depth to use Bottom n: 0.4
Depth Blocked: 0.4
Upstream Invert Elev: 16.96
Downstream Invert Elev: 16.07
Culvert Barrel Data
Barrel Centerline Stations
Barrels: 1
Barrel GIS Data: Barrel #1
Length: 6.4
Barrel Name
US Sta
DS Sta
GIS Sta
Barrel #1
1.58
Individual Barrel Centerlines ...
Show on Map
OK
Cancel
Help
Connection Data Editor - PD_Geometry_Culvers
File View Options Help
Connection: Culvert 02
Apply Data
Description
Breach (plan data) ...
Connections
From: 2D Flow Area: Perimeter 1
To: 2D Flow Area: Perimeter 1
Set SA/2D ...
Weir Length: 3.08
Centerline Length: 3.08
Overflow Computation Method
Normal 2D Equation Domain
Use Weir Equation
Centerline GIS Coords...
Cut profile from terrain ...
Clip Weir Profile to 2D Cells...
Structure Type: Weir, Gates, Culverts, Outlet RC and Outlet TS
Flap Gates: No Flap Gates
Culvert 02
Legend
Spillway
Extend/Trim to Face Points
HW Cell Min Elev
TW Cell Min Elev
Current Terrain
Elevation (m)
Station (m)
Select connection to Edit
Unsteady Flow: D_001AEP_ROG_Pre
d:\...\6.8 HEC RAS\6.8 HEC RAS\Delmore RC Model\Flood Assessment\FloodAssessment.u19
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SI Units
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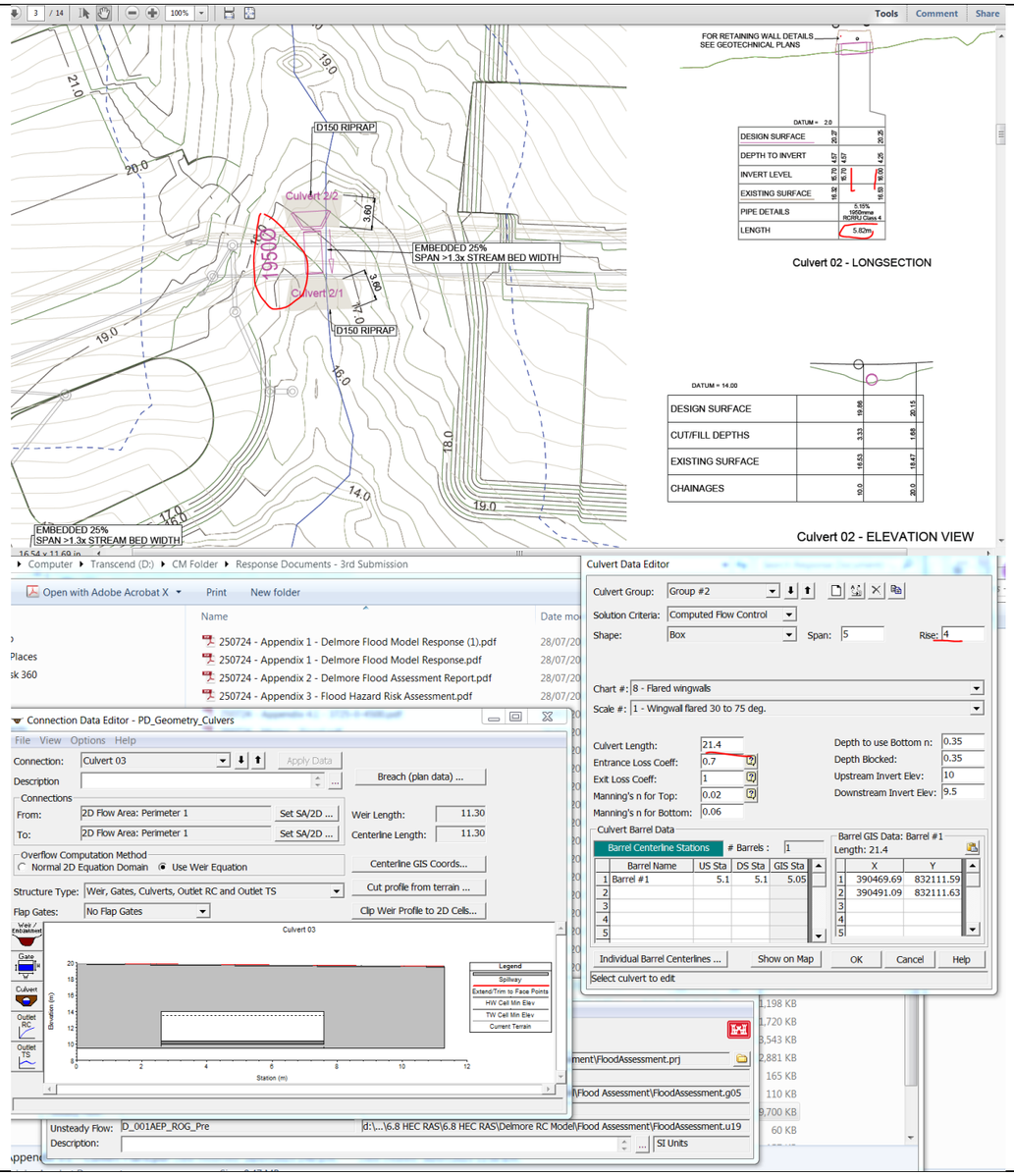
1,720 KB
3,543 KB
2,881 KB
165 KB
110 KB
9,700 KB
60 KB


FOR RETAINING WALL DETAILS SEE GEOTECHNICAL PLANS
DATUM = 20
DESIGN SURFACE
DEPTH TO INVERT
INVERT LEVEL
EXISTING SURFACE
PIPE DETAILS
LENGTH
5.82m
Culvert 02 - LONGSECTION
DATUM = 14.00
DESIGN SURFACE
CUT/FILL DEPTHS
EXISTING SURFACE
CHAINAGES
Culvert 02 - ELEVATION VIEW
D150 RIPRAP
Culvert 2/2
Culvert 2/1
EMBEDDED 25%
SPAN >1.3x STREAM BED WIDTH
Computer ▸ Transcend (D:) ▸ CM Folder ▸ Response Documents - 3rd Submission
250724 - Appendix 1 - Delmore Flood Model Response (1).pdf
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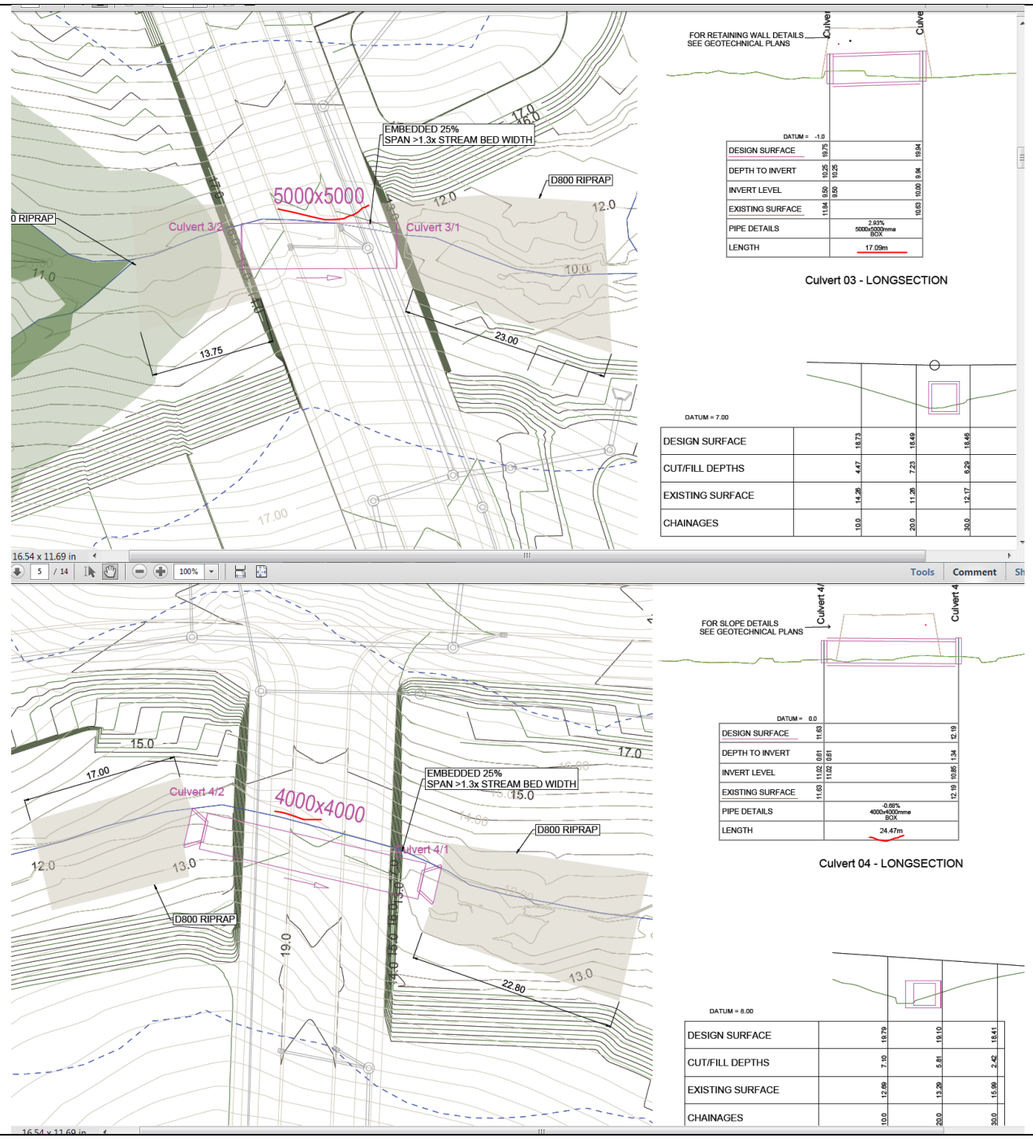
250724 - Appendix 3 - Flood Hazard Risk Assessment.pdf
Culvert Data Editor
Culvert Group: Group #2
Solution Criteria: Computed Flow Control
Shape: Box
Span: 5
Rise: 4
Chart #: 8 - Flared wingwalls
Scale #: 1 - Wingwall flared 30 to 75 deg.
Culvert Length: 21.4
Entrance Loss Coeff: 0.7
Exit Loss Coeff: 1
Manning's n for Top: 0.02
Manning's n for Bottom: 0.06
Depth to use Bottom n: 0.35
Depth Blocked: 0.35
Upstream Invert Elev: 10
Downstream Invert Elev: 9.5
Culvert Barrel Data
Barrel Centerline Stations
Barrels : 1
Barrel GIS Data: Barrel #1
Length: 21.4
Barrel #1 5.1 5.1 5.05
390469.69 832111.59
390491.09 832111.63
Individual Barrel Centerlines ...
Show on Map
OK
Cancel
Help
Select culvert to edit
Connection Data Editor - PD_Geometry_Culvers
Connection: Culvert 03
Description:
From: 2D Flow Area: Perimeter 1
To: 2D Flow Area: Perimeter 1
Weir Length: 11.30
Centerline Length: 11.30
Overflow Computation Method
Normal 2D Equation Domain
Use Weir Equation
Structure Type: Weir, Gates, Culverts, Outlet RC and Outlet TS
Flap Gates: No Flap Gates
Culvert 03
Legend
Spillway
Extend/Trim to Face Points
HW Cell Min Elev
TW Cell Min Elev
Current Terrain
Unsteady Flow: D_001AEP_ROG_Pre
Description:
SI Units



FOR RETAINING WALL DETAILS
SEE GEOTECHNICAL PLANS

DATUM = -1.0

DESIGN SURFACE	10.25	10.25		9.84
DEPTH TO INVERT	10.25	10.25		9.84
INVERT LEVEL	9.50	9.50		10.00
EXISTING SURFACE	11.84			10.83
PIPE DETAILS		2.93% 5000x5000mm BOX		
LENGTH		17.09m		

Culvert 03 - LONGSECTION

DATUM = 7.00

DESIGN SURFACE	18.73	18.49	18.48
CUT/FILL DEPTHS	4.47	7.23	8.29
EXISTING SURFACE	14.26	11.26	12.17
CHAINAGES	10.0	20.0	30.0

FOR SLOPE DETAILS
SEE GEOTECHNICAL PLANS

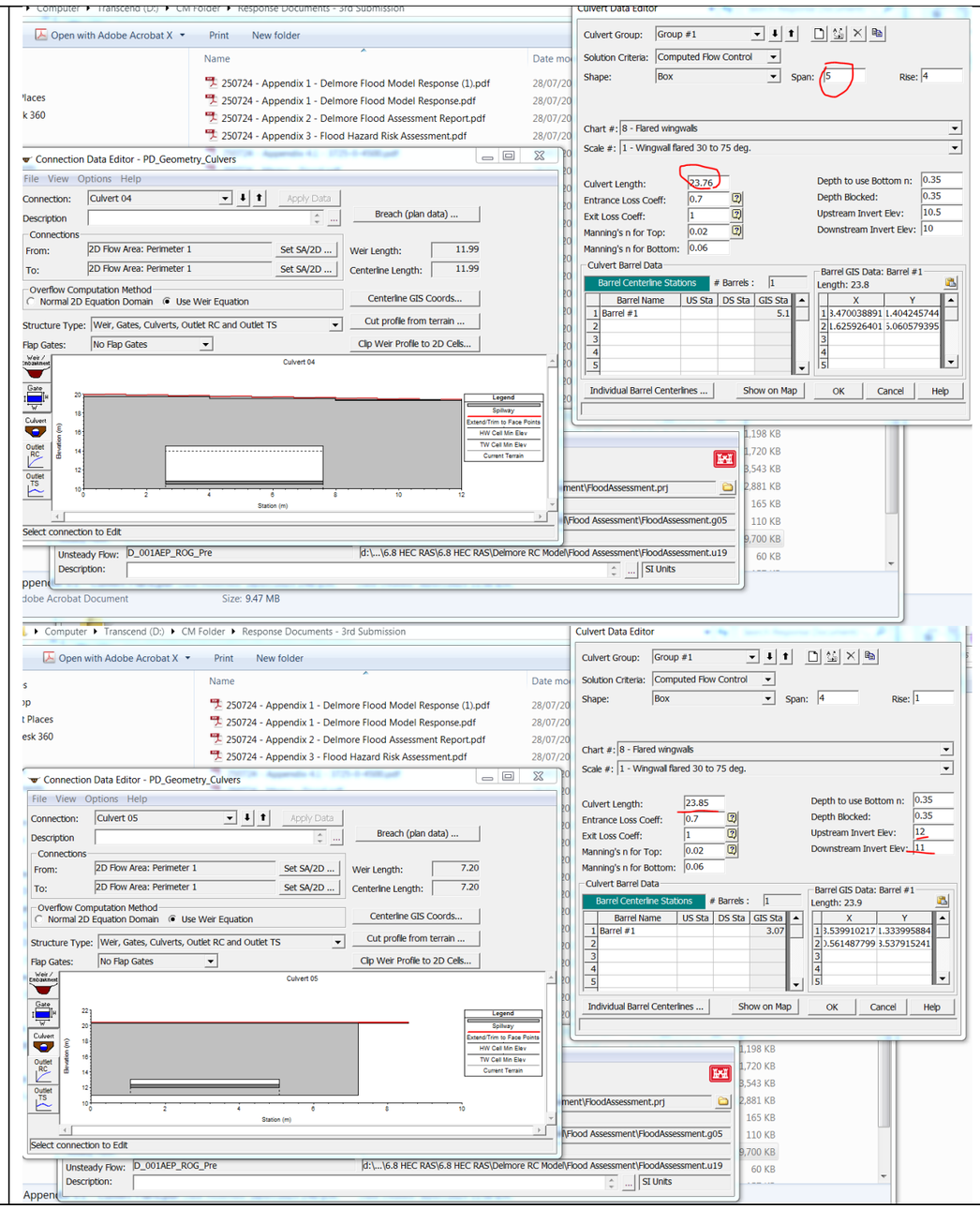
DATUM = 0.0

DESIGN SURFACE	11.63			12.19
DEPTH TO INVERT	0.81	0.81		1.34
INVERT LEVEL	11.02	11.02		10.85
EXISTING SURFACE	11.63			12.19
PIPE DETAILS		0.68% 4000x4000mm BOX		
LENGTH		24.47m		

Culvert 04 - LONGSECTION

DATUM = 8.00

DESIGN SURFACE	19.79	19.10	18.41
CUT/FILL DEPTHS	7.10	5.81	2.42
EXISTING SURFACE	12.69	13.29	15.99
CHAINAGES	10.0	20.0	30.0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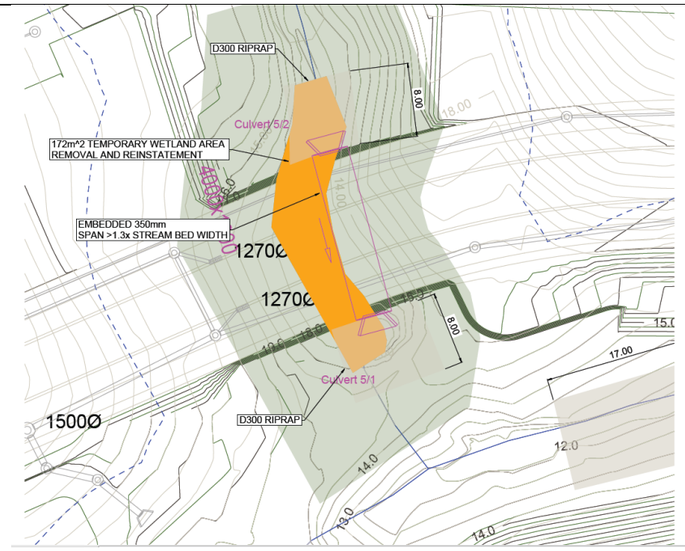
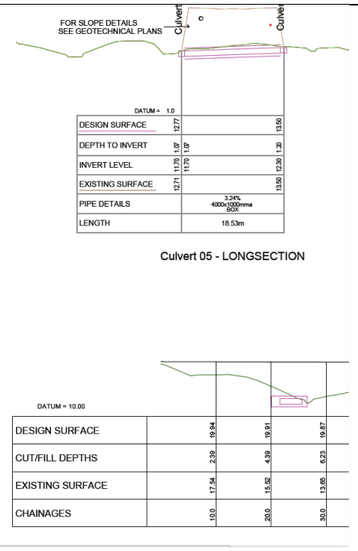
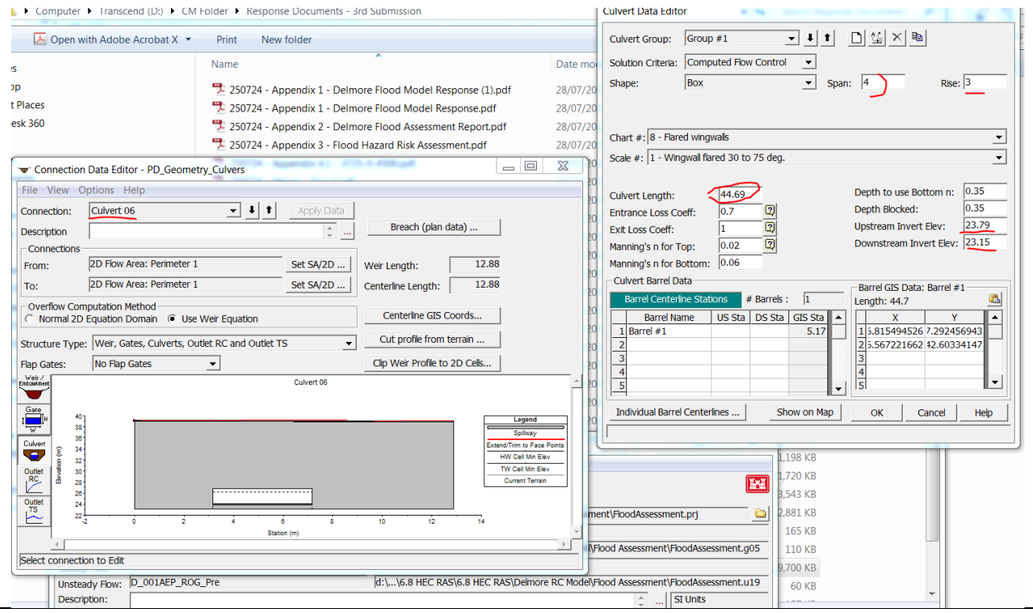
Open with Adobe Acrobat X
Print
New folder
Name
250724 - Appendix 1 - Delmore Flood Model Response (1).pdf
250724 - Appendix 1 - Delmore Flood Model Response.pdf
250724 - Appendix 2 - Delmore Flood Assessment Report.pdf
250724 - Appendix 3 - Flood Hazard Risk Assessment.pdf
Connection Data Editor - PD_Geometry_Culvers
File View Options Help
Connection: Culvert 04
Apply Data
Description
Breach (plan data) ...
Connections
From: 2D Flow Area: Perimeter 1
To: 2D Flow Area: Perimeter 1
Set SA/2D ...
Weir Length: 11.99
Centerline Length: 11.99
Overflow Computation Method
Normal 2D Equation Domain
Use Weir Equation
Centerline GIS Coords...
Structure Type: Weir, Gates, Culverts, Outlet RC and Outlet TS
Cut profile from terrain ...
Flap Gates: No Flap Gates
Clip Weir Profile to 2D Cells...
Culvert 04
Legend
Spillway
Extend/Trim to Face Points
HW Cell Min Elev
TW Cell Min Elev
Current Terrain
Elevation (m)
Station (m)
Select connection to Edit
Unsteady Flow: D_001AEP_ROG_Pre
d:\...\6.8 HEC RAS\6.8 HEC RAS\Delmore RC Model\Flood Assessment\FloodAssessment.u19
Description:
SI Units
Culvert Data Editor
Culvert Group: Group #1
Solution Criteria: Computed Flow Control
Shape: Box
Span: 5
Rise: 4
Chart #: 8 - Flared wingwalls
Scale #: 1 - Wingwall flared 30 to 75 deg.
Culvert Length: 23.76
Entrance Loss Coeff: 0.7
Exit Loss Coeff: 1
Manning's n for Top: 0.02
Manning's n for Bottom: 0.06
Depth to use Bottom n: 0.35
Depth Blocked: 0.35
Upstream Invert Elev: 10.5
Downstream Invert Elev: 10
Culvert Barrel Data
Barrel Centerline Stations
Barrels : 1
Barrel Name | US Sta | DS Sta | GIS Sta
1 Barrel #1 5.1
Barrel GIS Data: Barrel #1
Length: 23.8
X | Y
1 3.470038891 1.404245744
2 1.625926401 5.060579395
Individual Barrel Centerlines ...
Show on Map
OK
Cancel
Help
1,198 KB
1,720 KB
3,543 KB
2,881 KB
165 KB
110 KB
9,700 KB
60 KB
Size: 9.47 MB
Computer ▸ Transcend (D:) ▸ CM Folder ▸ Response Documents - 3rd Submission
Open with Adobe Acrobat X
Print
New folder
Culvert Data Editor
Culvert Group: Group #1
Solution Criteria: Computed Flow Control
Shape: Box
Span: 4
Rise: 1
Chart #: 8 - Flared wingwalls
Scale #: 1 - Wingwall flared 30 to 75 deg.
Culvert Length: 23.85
Entrance Loss Coeff: 0.7
Exit Loss Coeff: 1
Manning's n for Top: 0.02
Manning's n for Bottom: 0.06
Depth to use Bottom n: 0.35
Depth Blocked: 0.35
Upstream Invert Elev: 12
Downstream Invert Elev: 11
Culvert Barrel Data
Barrel Centerline Stations
Barrels : 1
Barrel Name | US Sta | DS Sta | GIS Sta
1 Barrel #1 3.07
Barrel GIS Data: Barrel #1
Length: 23.9
X | Y
1 3.539910217 1.333995884
2 1.561487799 5.537915241
Individual Barrel Centerlines ...
Show on Map
OK
Cancel
Help
Connection Data Editor - PD_Geometry_Culvers
File View Options Help
Connection: Culvert 05
Apply Data
Description
Breach (plan data) ...
Connections
From: 2D Flow Area: Perimeter 1
To: 2D Flow Area: Perimeter 1
Set SA/2D ...
Weir Length: 7.20
Centerline Length: 7.20
Overflow Computation Method
Normal 2D Equation Domain
Use Weir Equation
Centerline GIS Coords...
Structure Type: Weir, Gates, Culverts, Outlet RC and Outlet TS
Cut profile from terrain ...
Flap Gates: No Flap Gates
Clip Weir Profile to 2D Cells...
Culvert 05
Legend
Spillway
Extend/Trim to Face Points
HW Cell Min Elev
TW Cell Min Elev
Current Terrain
Elevation (m)
Station (m)
Select connection to Edit
Unsteady Flow: D_001AEP_ROG_Pre
d:\...\6.8 HEC RAS\6.8 HEC RAS\Delmore RC Model\Flood Assessment\FloodAssessment.u19
Description:
SI Units


D300 RIPRAP
172m^2 TEMPORARY WETLAND AREA
REMOVAL AND REINSTATEMENT
EMBEDDED 350mm
SPAN >1.3x STREAM BED WIDTH
Culvert 5/2
Culvert 5/1
1270Ø
1270Ø
1500Ø
D300 RIPRAP
8.00
8.00
17.00
18.00
16.0
15.0
14.0
13.0
12.0
14.0


FOR SLOPE DETAILS
SEE GEOTECHNICAL PLANS
Culvert
Culvert
DATUM = 1.0
DESIGN SURFACE
DEPTH TO INVERT
INVERT LEVEL
EXISTING SURFACE
PIPE DETAILS
LENGTH
18.53m
Culvert 05 - LONGSECTION
DATUM = 10.00
DESIGN SURFACE
CUT/FILL DEPTHS
EXISTING SURFACE
CHAINAGES


Computer ▸ Transcend (D:) ▸ CM Folder ▸ Response Documents - 3rd Submission
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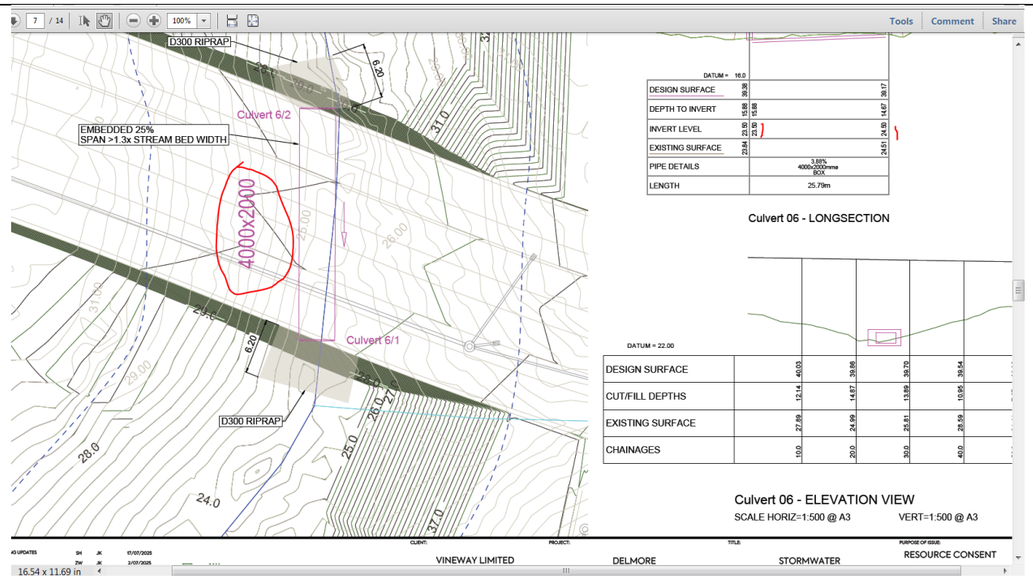
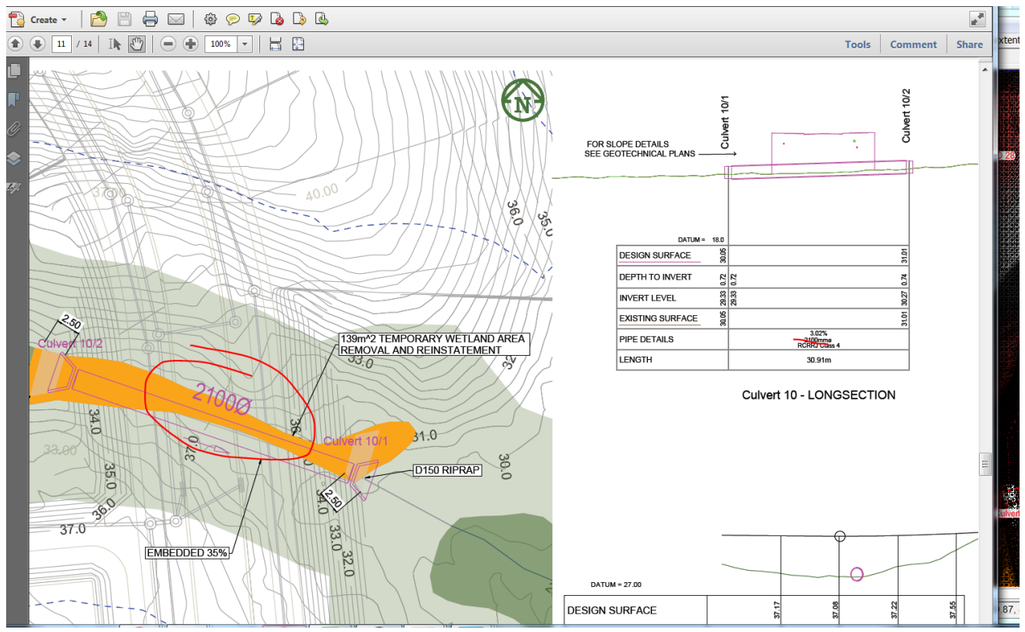
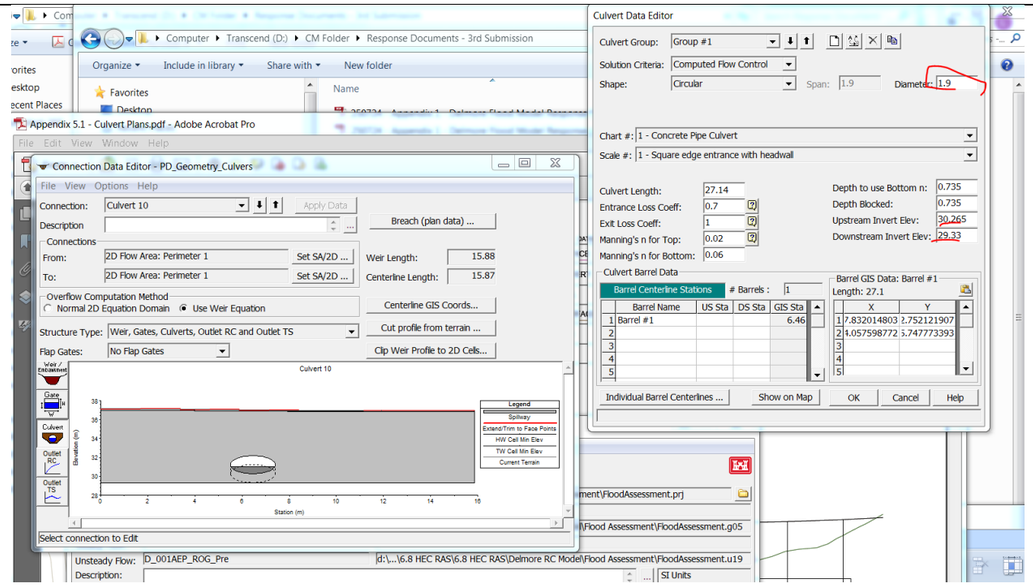
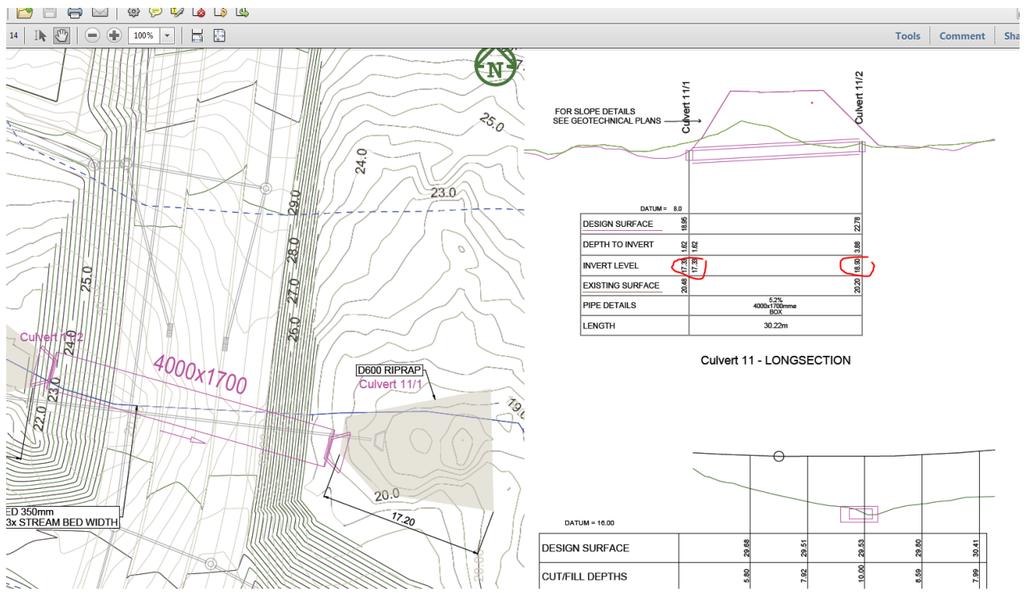
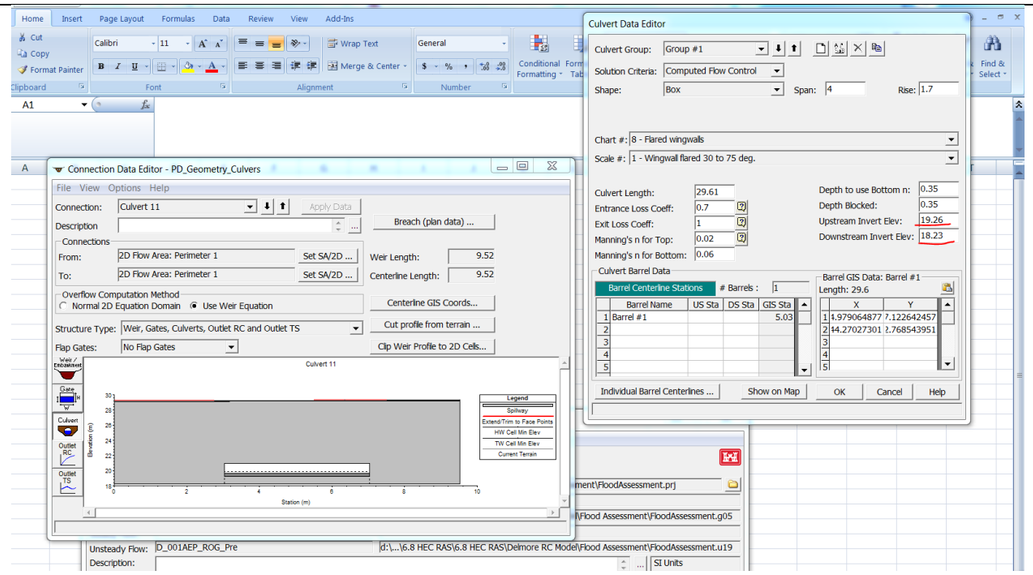
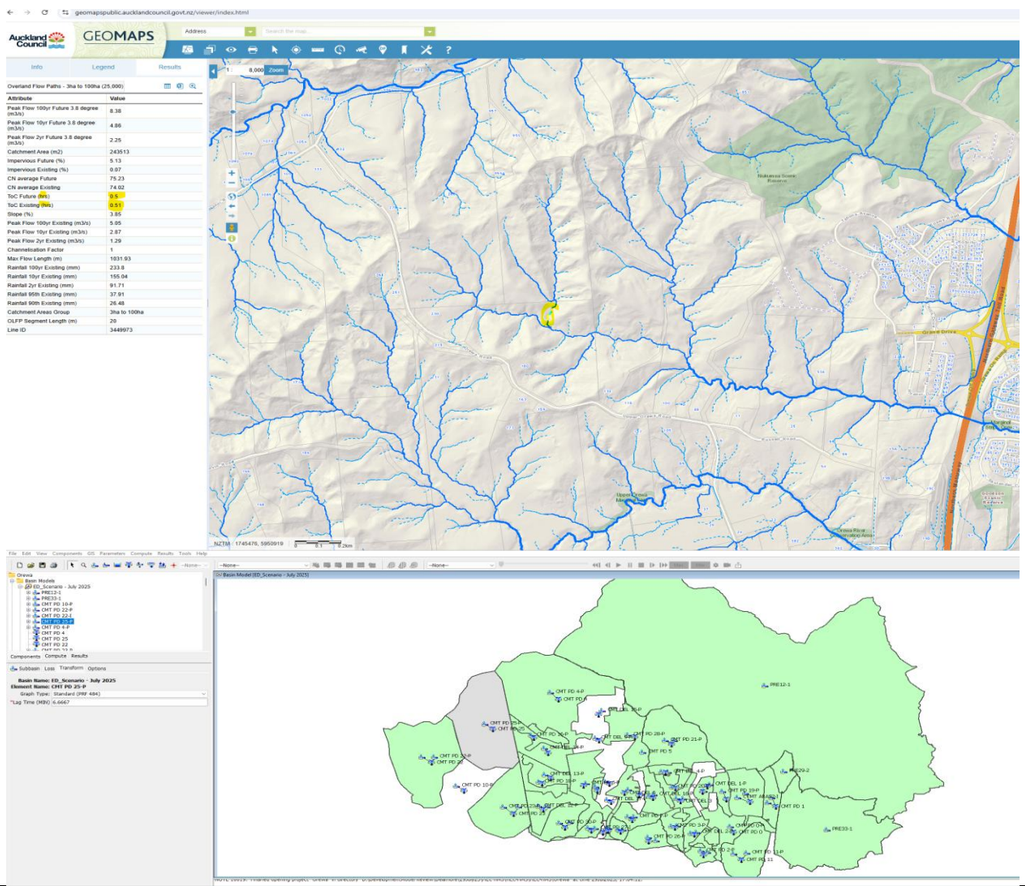
250724 - Appendix 3 - Flood Hazard Risk Assessment.pdf
Connection Data Editor - PD_Geometry_Culvers
File View Options Help
Connection: Culvert 06
Apply Data
Description
Breach (plan data) ...
Connections
From: 2D Flow Area: Perimeter 1
To: 2D Flow Area: Perimeter 1
Set SA/2D ...
Weir Length: 12.88
Centerline Length: 12.88
Overflow Computation Method
Normal 2D Equation Domain
Use Weir Equation
Centerline GIS Coords...
Cut profile from terrain ...
Clip Weir Profile to 2D Cells...
Structure Type: Weir, Gates, Culverts, Outlet RC and Outlet TS
Flap Gates: No Flap Gates
Culvert 06
Legend
Spillway
Extend/Trim to Face Points
HW Cell Min Elev
TW Cell Min Elev
Current Terrain
Elevation (m)
Station (m)
Select connection to Edit
Culvert Data Editor
Culvert Group: Group #1
Solution Criteria: Computed Flow Control
Shape: Box
Span: 4
Rise: 3
Chart #: 8 - Flared wingwalls
Scale #: 1 - Wingwall flared 30 to 75 deg.
Culvert Length: 44.69
Entrance Loss Coeff: 0.7
Exit Loss Coeff: 1
Manning's n for Top: 0.02
Manning's n for Bottom: 0.06
Depth to use Bottom n: 0.35
Depth Blocked: 0.35
Upstream Invert Elev: 23.79
Downstream Invert Elev: 23.15
Culvert Barrel Data
Barrel Centerline Stations
Barrels: 1
Barrel GIS Data: Barrel #1
Length: 44.7
Barrel Name
US Sta
DS Sta
GIS Sta
Barrel #1
5.17
X
Y
5.815494526
7.292456943
5.567221662
2.60334147
Individual Barrel Centerlines ...
Show on Map
OK
Cancel
Help
Unsteady Flow: D_001AEP_ROG_Pre
Description:
d:\...\6.8 HEC RAS\6.8 HEC RAS\Delmore RC Model\Flood Assessment\FloodAssessment.u19
SI Units
1,198 KB
1,720 KB
3,543 KB
2,881 KB
165 KB
110 KB
9,700 KB
60 KB

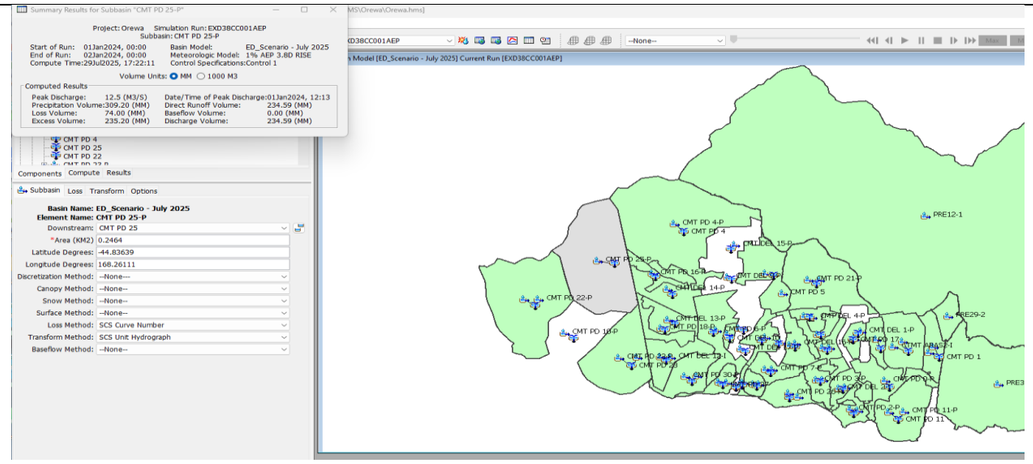

7 / 14
100%
Tools
Comment
Share
D300 RIPRAP
6.20
Culvert 6/2
EMBEDDED 25%
SPAN >1.3x STREAM BED WIDTH
4000x2000
26.00
28.00
31.0
Culvert 6/1
6.20
D300 RIPRAP
28.0
24.0
25.0
26.0
37.0
DATUM = 16.0
DESIGN SURFACE 39.38 39.17
DEPTH TO INVERT 15.88 15.88 14.67
INVERT LEVEL 23.50 23.50 24.50
EXISTING SURFACE 23.84 24.51
PIPE DETAILS 3.69% 4000x2000mm BOX
LENGTH 25.79m
Culvert 06 - LONGSECTION
DATUM = 22.00
DESIGN SURFACE 40.03 39.86 39.70 39.54
CUT/FILL DEPTHS 12.14 14.67 13.85 10.95
EXISTING SURFACE 27.89 24.99 25.81 28.59
CHAINAGES 10.0 20.0 30.0 40.0
Culvert 06 - ELEVATION VIEW
SCALE HORIZ=1:500 @ A3
VERT=1:500 @ A3
VINEWAY LIMITED
DELMORE
STORMWATER
RESOURCE CONSENT
16.54 x 11.69 in


Create
11 / 14
100%
Tools
Comment
Share
FOR SLOPE DETAILS
SEE GEOTECHNICAL PLANS
Culvert 10/1
Culvert 10/2
40.00
36.0
35.0
2.50
Culvert 10/2
139m^2 TEMPORARY WETLAND AREA
REMOVAL AND REINSTATEMENT
2100Ø
34.0
35.0
36.0
37.0
33.00
Culvert 10/1
31.0
30.0
D150 RIPRAP
2.50
33.0
32.0
EMBEDDED 35%
DATUM = 16.0
DESIGN SURFACE 30.05 31.01
DEPTH TO INVERT 0.72 0.72 0.74
INVERT LEVEL 29.33 29.33 30.27
EXISTING SURFACE 30.05 31.01
PIPE DETAILS 3.02% 2100mm RCRD Class 4
LENGTH 30.91m
Culvert 10 - LONGSECTION
DATUM = 27.00
DESIGN SURFACE 37.17 37.08 37.22 37.55

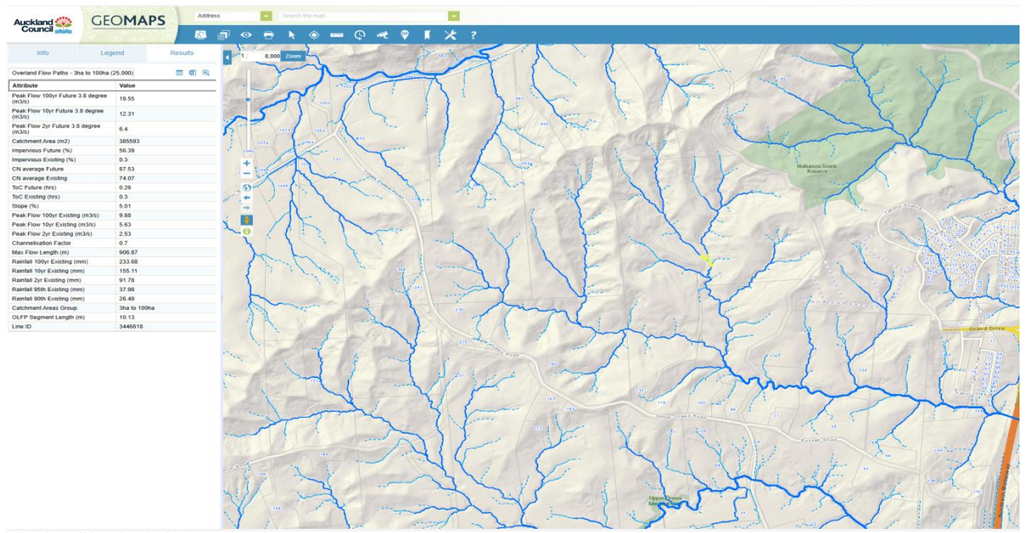

Computer ▸ Transcend (D:) ▸ CM Folder ▸ Response Documents - 3rd Submission
Organize
Include in library
Share with
New folder
Favorites
Desktop
Name
Appendix 5.1 - Culvert Plans.pdf - Adobe Acrobat Pro
File Edit View Window Help
Connection Data Editor - PD_Geometry_Culvers
File View Options Help
Connection: Culvert 10
Apply Data
Description
Breach (plan data) ...
Connections
From: 2D Flow Area: Perimeter 1
To: 2D Flow Area: Perimeter 1
Set SA/2D ...
Weir Length: 15.88
Centerline Length: 15.87
Overflow Computation Method
Normal 2D Equation Domain
Use Weir Equation
Centerline GIS Coords...
Structure Type: Weir, Gates, Culverts, Outlet RC and Outlet TS
Cut profile from terrain ...
Flap Gates: No Flap Gates
Clip Weir Profile to 2D Cells...
Culvert 10
Legend
Select connection to Edit
Culvert Data Editor
Culvert Group: Group #1
Solution Criteria: Computed Flow Control
Shape: Circular
Span: 1.9
Diameter: 1.9
Chart #: 1 - Concrete Pipe Culvert
Scale #: 1 - Square edge entrance with headwall
Culvert Length: 27.14
Entrance Loss Coeff: 0.7
Exit Loss Coeff: 1
Manning's n for Top: 0.02
Manning's n for Bottom: 0.06
Depth to use Bottom n: 0.735
Depth Blocked: 0.735
Upstream Invert Elev: 30.265
Downstream Invert Elev: 29.33
Culvert Barrel Data
Barrel Centerline Stations
Barrels: 1
Barrel GIS Data: Barrel #1
Length: 27.1
Barrel Name
US Sta
DS Sta
GIS Sta
Barrel #1
6.46
Individual Barrel Centerlines ...
Show on Map
OK
Cancel
Help
Unsteady Flow: D_001AEP_ROG_Pre
Description:
SI Units

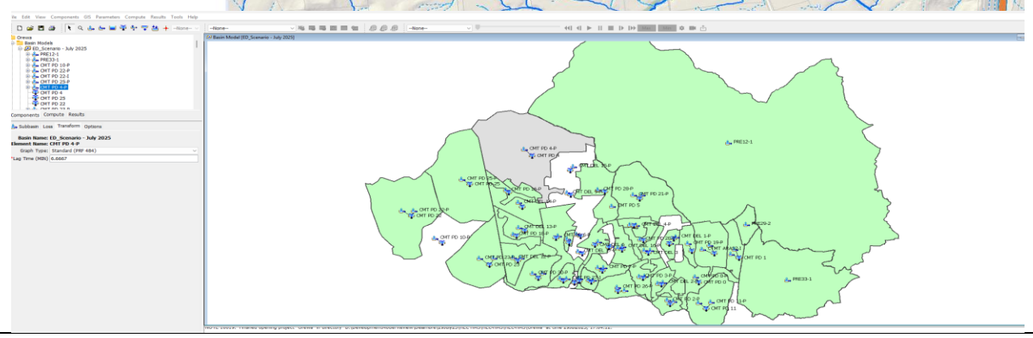

Tools
Comment
25.0
24.0
23.0
26.0
27.0
Culvert
4000x1700
D600 RIPRAP
Culvert 11/1
20.0
17.20
ED 350mm
3x STREAM BED WIDTH
FOR SLOPE DETAILS
SEE GEOTECHNICAL PLANS
Culvert 11/1
Culvert 11/2
DATUM = 8.0
DESIGN SURFACE
DEPTH TO INVERT
INVERT LEVEL
EXISTING SURFACE
PIPE DETAILS
LENGTH
0.2%
4000x1700mm
BOX
30.22m
Culvert 11 - LONGSECTION
DATUM = 16.00
DESIGN SURFACE
CUT/FILL DEPTHS

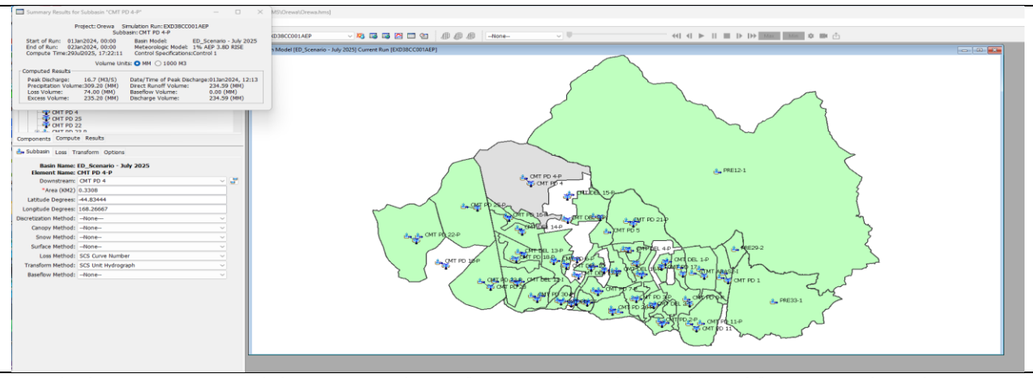
				
FR15	Model Review	A couple of subcatchments were checked for peak flows and times of concentration comparison with GeoMaps overland flow path data. Differences have been noted especially for Tc. 	Model data inconsistencies .	


Summary Results for Subbasin "CMT PD 25-P"
Project: Orewa Simulation Run: EXD38CC001AEP
Subbasin: CMT PD 25-P
Start of Run: 01Jan2024, 00:00
End of Run: 02Jan2024, 00:00
Compute Time: 29Jul2025, 17:22:11
Basin Model: ED_Scenario - July 2025
Meteorologic Model: 1% AEP 3.8D RISE
Control Specifications: Control 1
Volume Units: MM 1000 M3
Computed Results
Peak Discharge: 12.5 (M3/S)
Precipitation Volume: 309.20 (MM)
Loss Volume: 74.00 (MM)
Excess Volume: 235.20 (MM)
Date/Time of Peak Discharge: 01Jan2024, 12:13
Direct Runoff Volume: 234.59 (MM)
Baseflow Volume: 0.00 (MM)
Discharge Volume: 234.59 (MM)
Components
Compute
Results
Subbasin
Loss
Transform
Options
Basin Name: ED_Scenario - July 2025
Element Name: CMT PD 25-P
Downstream: CMT PD 25
*Area (KM2): 0.2464
Latitude Degrees: -44.83639
Longitude Degrees: 168.26111
Discretization Method: --None--
Canopy Method: --None--
Snow Method: --None--
Surface Method: --None--
Loss Method: SCS Curve Number
Transform Method: SCS Unit Hydrograph
Baseflow Method: --None--

Basin Model [ED_Scenario - July 2025] Current Run [EXD38CC001AEP]
PRE12-1
PRE29-2
PRE33-1
CMT PD 4-P
CMT PD 25-P
CMT PD 22-P
CMT PD 16-P
CMT PD 15-P
CMT PD 14-P
CMT PD 13-P
CMT PD 10-P
CMT PD 21-P
CMT PD 5
CMT PD 1-P
CMT PD 1
CMT PD 11-P
CMT PD 11


Auckland Council
GEOMAPS
Info
Legend
Results
Overland Flow Paths - 3ha to 100ha (25,000)
Attribute
Value
Peak Flow 100yr Future 3.8 degree (m3/s) 19.55
Peak Flow 10yr Future 3.8 degree (m3/s) 12.31
Peak Flow 2yr Future 3.8 degree (m3/s) 6.4
Catchment Area (m2) 385593
Impervious Future (%) 56.39
Impervious Existing (%) 0.3
CN average Future 87.53
CN average Existing 74.07
ToC Future (hrs) 0.26
ToC Existing (hrs) 0.3
Slope (%) 5.01
Peak Flow 100yr Existing (m3/s) 9.88
Peak Flow 10yr Existing (m3/s) 5.63
Peak Flow 2yr Existing (m3/s) 2.53
Channelisation Factor 0.7
Max Flow Length (m) 906.87
Rainfall 100yr Existing (mm) 233.68
Rainfall 10yr Existing (mm) 155.11
Rainfall 2yr Existing (mm) 91.78
Rainfall 95th Existing (mm) 37.98
Rainfall 90th Existing (mm) 26.49
Catchment Areas Group 3ha to 100ha
OLFP Segment Length (m) 10.13
Line ID 3446518


Basin Model [ED_Scenario - July 2025]
PRE12-1
PRE33-1
PRE29-2
CMT PD 4-P
CMT PD 25-P
CMT PD 22-P
CMT PD 16-P
CMT PD 15-P
CMT PD 14-P
CMT PD 13-P
CMT PD 10-P
CMT PD 21-P
CMT PD 5
CMT PD 1-P
CMT PD 1
CMT PD 11-P
CMT PD 11

				
FR16	Model Review	Tc Calculations - It is noted that generic slope of 0.05 m/m has been adopted for many subcatchments. The catchment slope should be analysed in GIS using Equal Area method. Catchment lengths have been assumed as 0.1km generically not from GIS analysis. The channelisation factor should be 1 for natural channel and flow path through future urban area, and 0.6 for impervious catchment drained via pipe network. (not the full list - only examples) 6.6667	Model data inconsistencies .	

Catchment Label	Catchment Area	Subcatchment 1	Subcatchment 2	Catchment Slope	Catchment Length	Channel Factor	Impervious (Sub C1)	Impervious (Sub C2)	Impervious (Combined)	Soil Type	SCS Curve Number	Weighted CN	I_a weighted	t_c	Lag Time	Storage S
	ha	*ha*	*ha*	*m/m*	*km*		*%*	*%*	*%*				*mm*	*hours*	*hours*	*mm*
CMT DEL 1-I	0.00000	0.0000		0.050	0.100	0.8	100%		100%	Pasture - Type C (Mud/Sandstone)	74	98.0	0.00	0.16667	0.11111	5
CMT DEL 1-P	3.81000	3.8100		0.050	0.100	0.8	0%		0%	Pasture - Type C (Mud/Sandstone)	74	74.0	5.00	0.16667	0.11111	89
CMT DEL 10-I	0.00000	0.0000		0.050	0.100	0.8	100%		100%	Pasture - Type C (Mud/Sandstone)	74	98.0	0.00	0.16667	0.11111	5
CMT DEL 10-P	0.87000	0.8700		0.050	0.100	0.8	0%		0%	Pasture - Type C (Mud/Sandstone)	74	74.0	5.00	0.16667	0.11111	89
CMT DEL 11-I	0.04340	0.0434		0.050	0.100	0.8	100%		100%	Pasture - Type C (Mud/Sandstone)	74	98.0	0.00	0.16667	0.11111	5
CMT DEL 11-P	0.57660	0.5766		0.050	0.100	0.8	0%		0%	Pasture - Type C (Mud/Sandstone)	74	74.0	5.00	0.16667	0.11111	89
CMT DEL 12-I	0.36780	0.3678		0.050	0.100	0.8	100%		100%	Pasture - Type C (Mud/Sandstone)	74	98.0	0.00	0.16667	0.11111	5
CMT DEL 12-P	5.76220	5.7622		0.050	0.100	0.8	0%		0%	Pasture - Type C (Mud/Sandstone)	74	74.0	5.00	0.16667	0.11111	89
CMT DEL 13-I	0.00000	0.0000		0.050	0.100	0.8	100%		100%	Pasture - Type C (Mud/Sandstone)	74	98.0	0.00	0.16667	0.11111	5
CMT DEL 13-P	4.27000	4.2700		0.050	0.100	0.8	0%		0%	Pasture - Type C (Mud/Sandstone)	74	74.0	5.00	0.16667	0.11111	89
CMT DEL 14-I	0.00000	0.0000		0.050	0.100	0.8	100%		100%	Pasture - Type C (Mud/Sandstone)	74	98.0	0.00	0.16667	0.11111	5
CMT DEL 14-P	7.66000	7.6600		0.050	0.100	0.8	0%		0%	Pasture - Type C (Mud/Sandstone)	74	74.0	5.00	0.16667	0.11111	89
CMT DEL 15-I	0.00000	0.0000		0.050	0.100	0.8	100%		100%	Pasture - Type C (Mud/Sandstone)	74	98.0	0.00	0.16667	0.11111	5
CMT DEL 15-P	4.72000	4.7200		0.050	0.100	0.8	0%		0%	Pasture - Type C (Mud/Sandstone)	74	74.0	5.00	0.16667	0.11111	89
CMT DEL 16-I	0.19170	0.1917		0.050	0.100	0.8	100%		100%	Pasture - Type C (Mud/Sandstone)	74	98.0	0.00	0.16667	0.11111	5
CMT DEL 16-P	4.06830	4.0683		0.050	0.100	0.8	0%		0%	Pasture - Type C (Mud/Sandstone)	74	74.0	5.00	0.16667	0.11111	89
CMT DEL 17-I	0.00000	0.0000		0.050	0.100	0.8	100%		100%	Pasture - Type C (Mud/Sandstone)	74	98.0	0.00	0.16667	0.11111	5