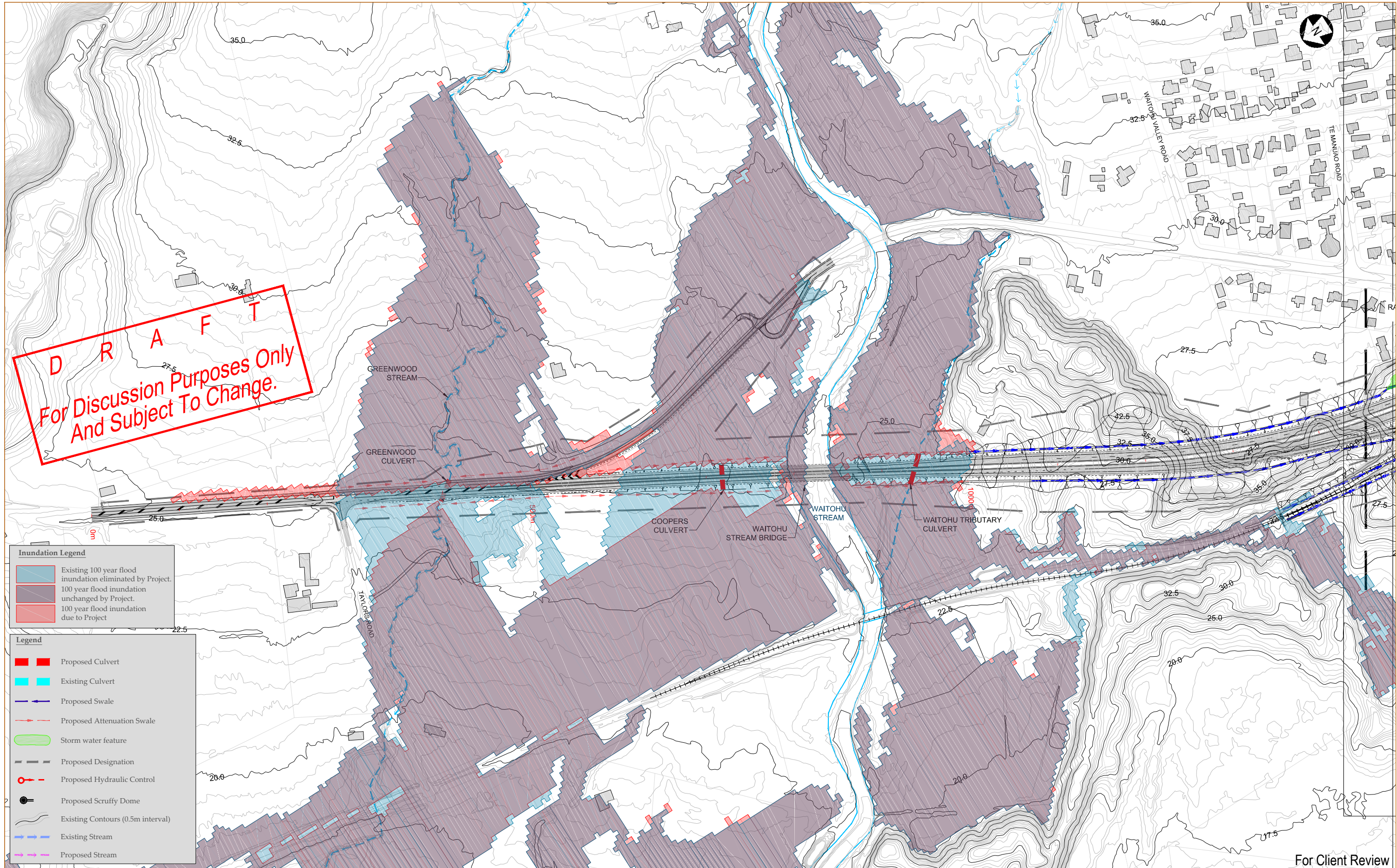


Appendix 5: Stormwater Drawings

Includes:

- 1) Stormwater plans - Sheets DR01 to DR08
- 2) Stormwater details
 - a) Sheet DR10, fish passage example through round culverts (at 2% stream grade and 4% stream grade)
 - b) Sheet DR11, fish passage example through box culverts (at 1% stream grade)
 - c) Sheet DR12, example stream diversion, based on the Gear Stream realignment
 - d) Sheet DR13, typical culvert layout
 - e) Sheet DR14, typical swale details
 - f) Sheet DR15, typical attenuation swale details
 - g) Sheets DR16, example attenuation basin, based on the Kennedy Wetland



Inundation Legend

- Existing 100 year flood inundation eliminated by Project.
- 100 year flood inundation unchanged by Project.
- 100 year flood inundation due to Project

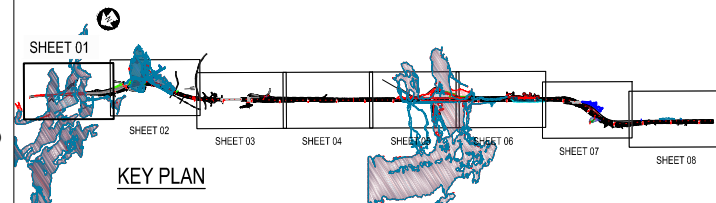
Legend

- Proposed Culvert
- Existing Culvert
- Proposed Swale
- Proposed Attenuation Swale
- Storm water feature
- Proposed Designation
- Proposed Hydraulic Control
- Proposed Scruffy Dome
- Existing Contours (0.5m interval)
- Existing Stream
- Proposed Stream

For Client Review

NOTE:
ESTIMATED EXTENT OF FLOOD
INUNDATION NOT SHOWN

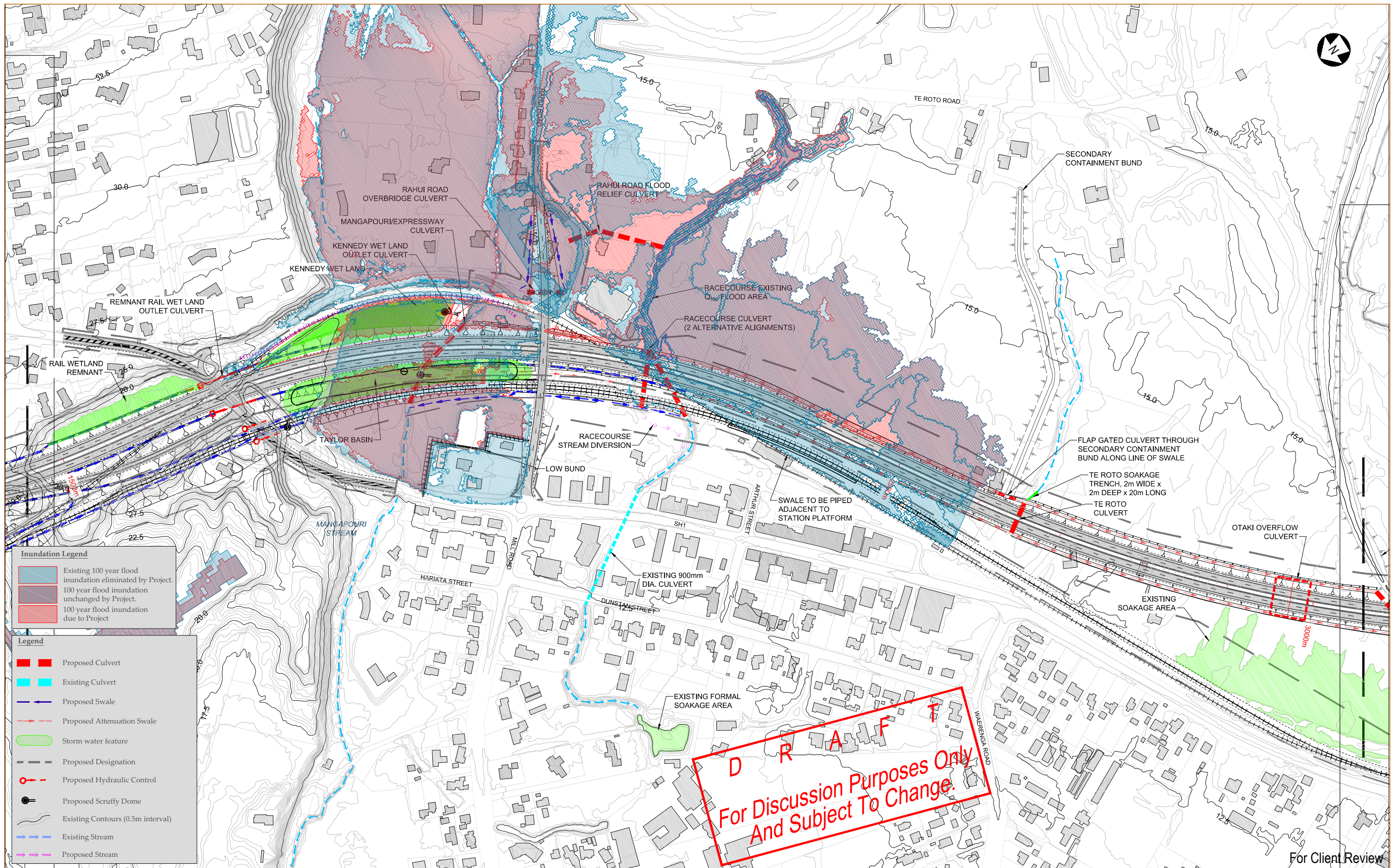
SCALE: 1:4000 @ A3



Revision	Amendment	Approved	Revision Date
R1	For Client Review	R.C.	Sept. 2012
R2	Draft for comment	R.C.	18/9/2012
R3	Inundation areas altered, draft for comment	G.W.	7/02/2013



Project			
NEW ZEALAND TRANSPORT AGENCY PEKA PEKA TO NORTH OTAKI EXPRESSWAY FOR CONSENTING			
Sheet			
DRAINAGE PLAN SHEET 1 OF 8			
Drawn	Designed	Approved	Revision Date
R.QUINEY	R.COLES	T.COULMAN	09/2011
Project No.	Scale	Drawing No.	
5C1814.00	1:2000(A1), 1:4000(A3)	5/2664/1/6504	
Sheet No.	Revision		
DR01	R3		



Inundation Legend

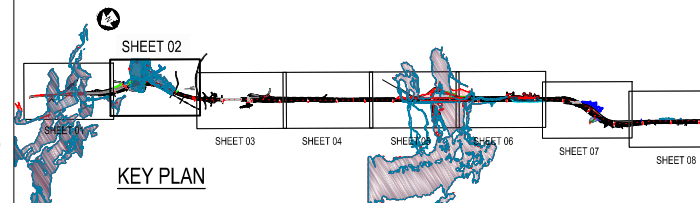
	Existing 100 year flood inundation eliminated by Project.
	100 year flood inundation unchanged by Project.
	100 year flood inundation due to Project

Legend

	Proposed Culvert
	Existing Culvert
	Proposed Swale
	Proposed Attenuation Swale
	Storm water feature
	Proposed Designation
	Proposed Hydraulic Control
	Proposed Scruffy Dome
	Existing Contours (0.5m interval)
	Existing Stream
	Proposed Stream

NOTE:
ESTIMATED EXTENT OF FLOOD
INUNDATION NOT SHOWN

0 40 80 120 160 200 (m)
SCALE: 1:4000 @ A3



Revision	Amendment	Approved	Revision Date
R1	For Client Review	R.C.	Sept. 2012
R2	Draft for comment	R.C.	18/9/2012
R3	Inundation areas altered, draft for comment	G.W.	7/02/2013



NEW ZEALAND TRANSPORT AGENCY
PEKA PEKA TO NORTH OTAKI EXPRESSWAY
FOR CONSENTING

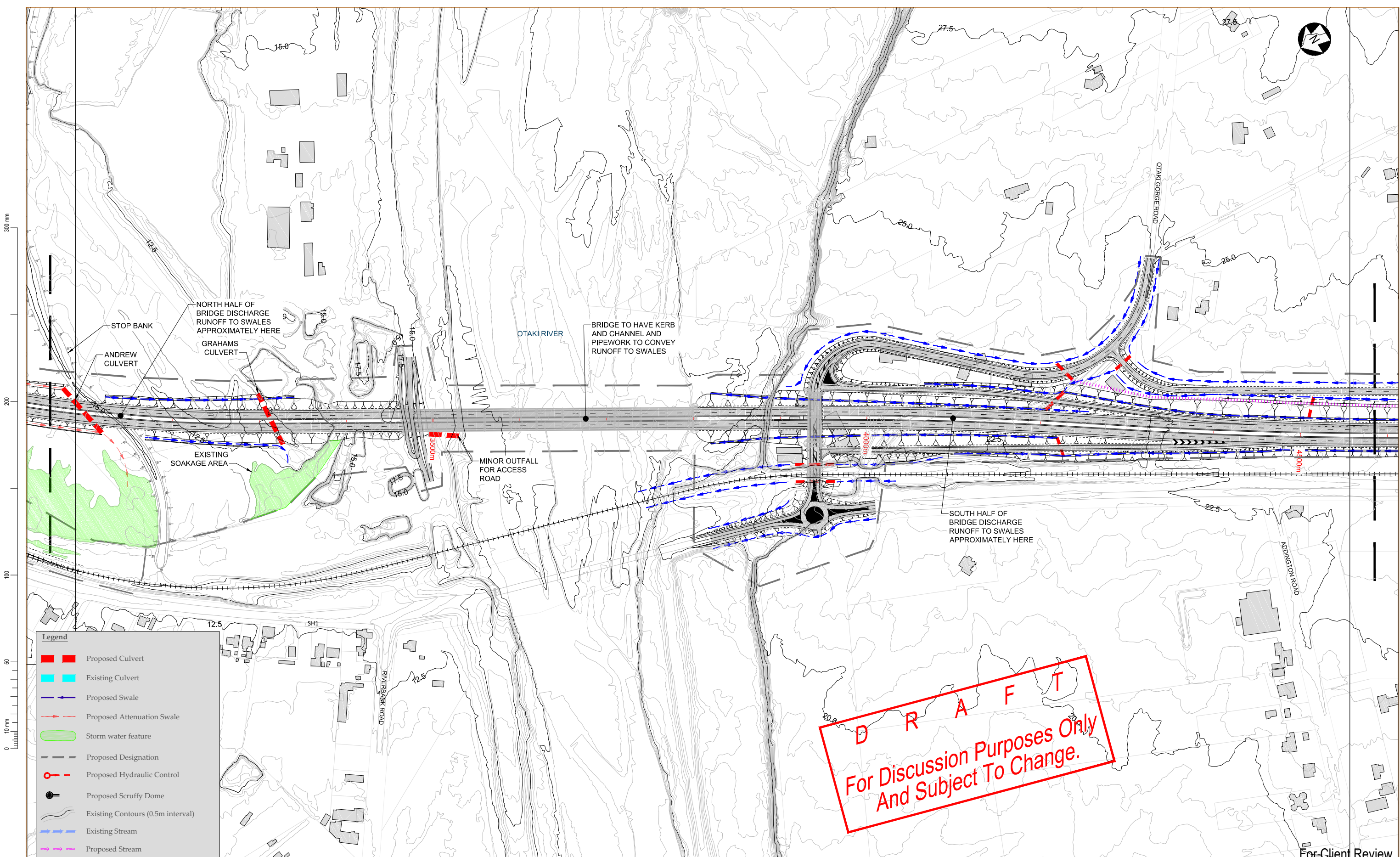
Drawn	Designed	Approved	Revision Date
R.QUINEY	R.COLES	T.COULMAN	09/2011

DRAINAGE PLAN
SHEET 2 OF 8

Project No:	Scale:	Drawing No:
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For Client Review

Sheet No.	Revision
DR02	R3



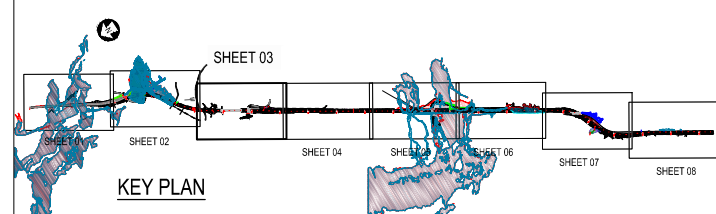
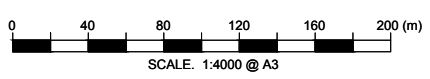
Legend

- █ Proposed Culvert
- █ Existing Culvert
- Proposed Swale
- - - Proposed Attenuation Swale
- █ Storm water feature
- - - Proposed Designation
- Proposed Hydraulic Control
- Proposed Scruffy Dome
- ~ Existing Contours (0.5m interval)
- Existing Stream
- Proposed Stream

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For Client Review

NOTE:
ESTIMATED EXTENT OF FLOOD
INUNDATION NOT SHOWN



Revision	Amendment	Approved	Revision Date
R1	For Client Review	R.C.	Sept. 2012
R2	Draft for comment	R.C.	18/9/2012
R3	Inundation areas altered, draft for comment	G.W.	7/02/2013



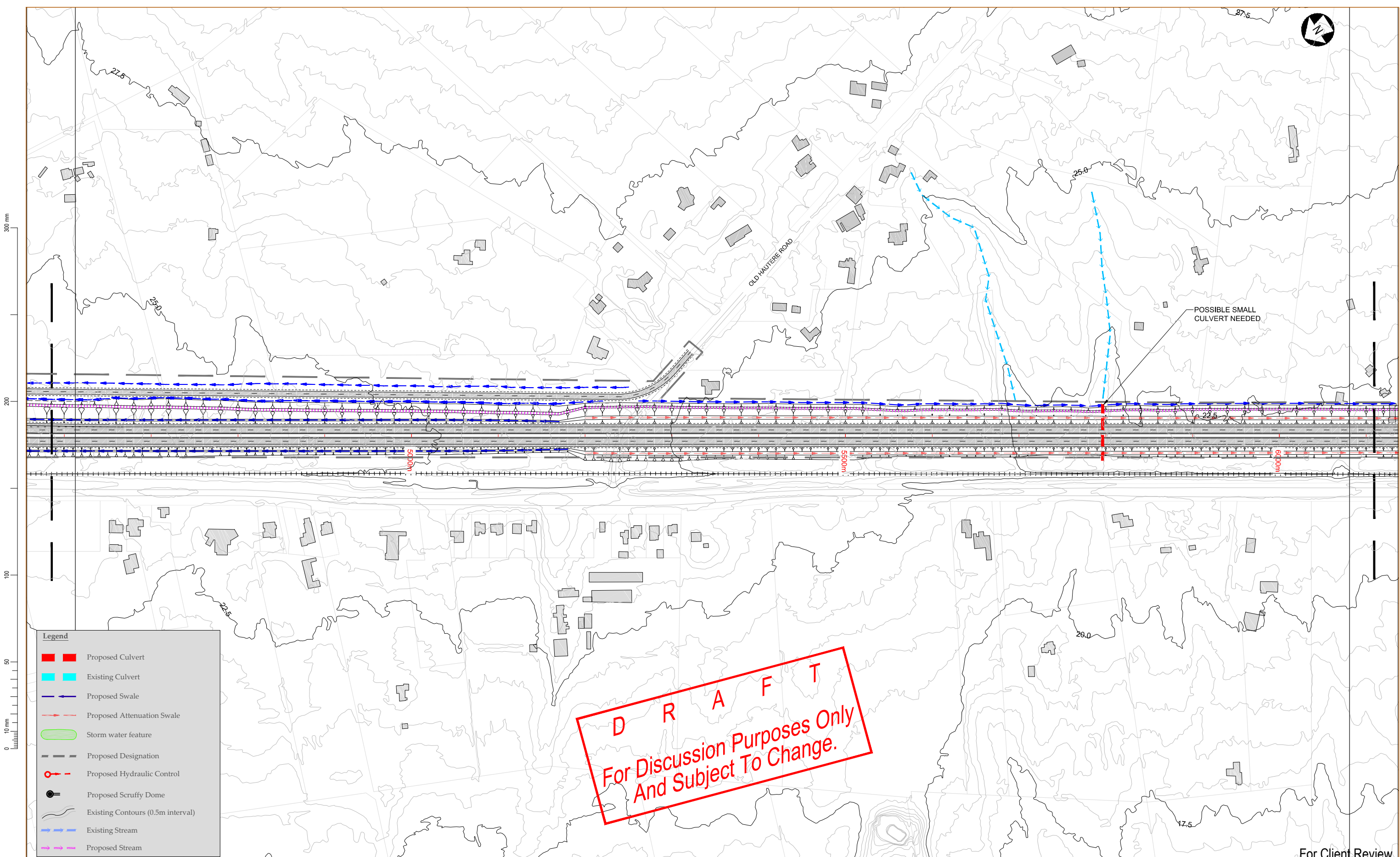
Project
NEW ZEALAND TRANSPORT AGENCY
PEKA PEKA TO NORTH OTAKI EXPRESSWAY
FOR CONSENTING

Drawn	Designed	Approved	Revision Date
R.QUINEY	R.COLES	T.COULMAN	09/2011

Sheet
DRAINAGE PLAN
SHEET 3 OF 8

Project No.	Scale	Drawing No.
5C1814.00	1:2000(A1), 1:4000(A3)	5/2664/1/6504

Sheet No.	Revision
DR03	R3



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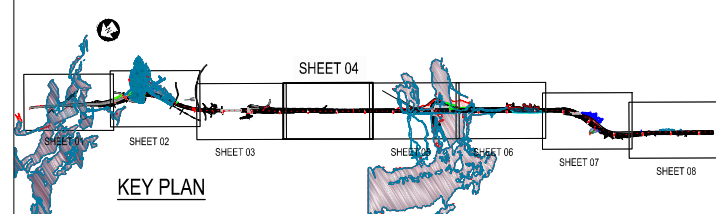
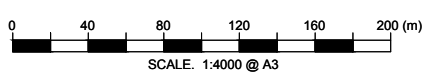
Legend	
—	Proposed Culvert
—	Existing Culvert
- - -	Proposed Swale
- - -	Proposed Attenuation Swale
—	Storm water feature
- - -	Proposed Designation
○	Proposed Hydraulic Control
●	Proposed Scruffy Dome
—	Existing Contours (0.5m interval)
—	Existing Stream
—	Proposed Stream

300 mm
 200
 100
 50
 0 10 mm
 1000 mm



For Client Review

NOTE:
ESTIMATED EXTENT OF FLOOD
INUNDATION NOT SHOWN



Revision	Amendment	Approved	Revision Date
R1	For Client Review	R.C.	Sept. 2012
R2	Draft for comment	R.C.	18/9/2012
R3	Inundation areas altered, draft for comment	G.W.	7/02/2013



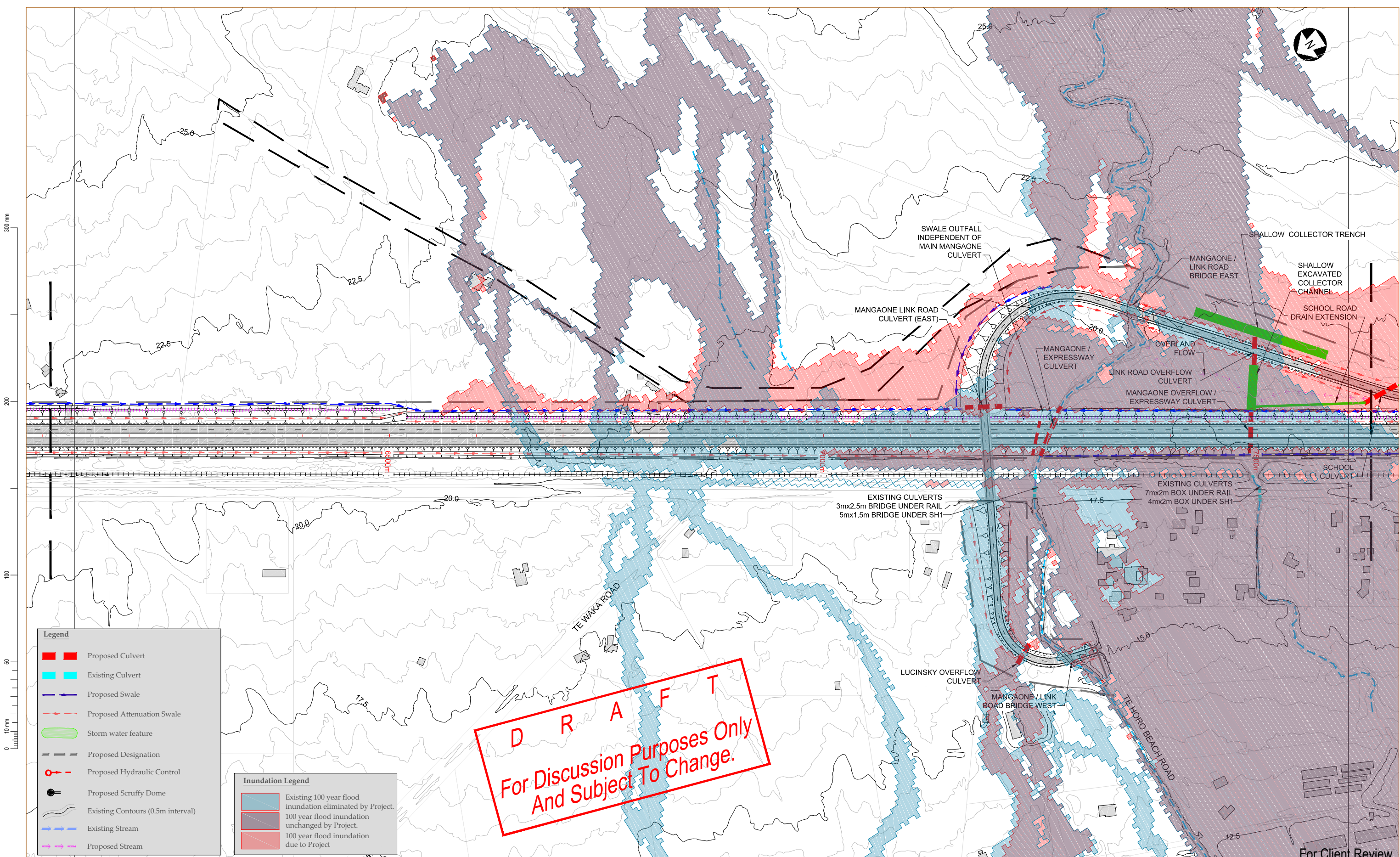
Project
NEW ZEALAND TRANSPORT AGENCY
PEKA PEKA TO NORTH OTAKI EXPRESSWAY
FOR CONSENTING

Drawn	Designed	Approved	Revision Date
R.QUINEY	R.COLES	T.COULMAN	09/2011

Sheet
DRAINAGE PLAN
SHEET 4 OF 8

Project No.	Scale	Drawing No.
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Sheet No.	Revision
DR04	R3

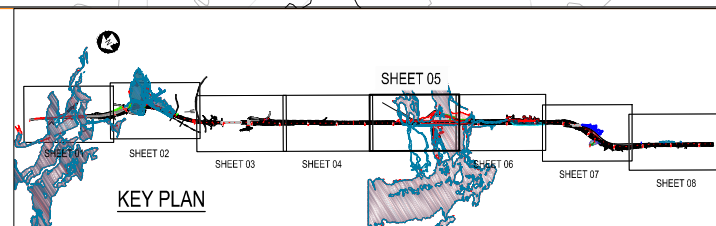
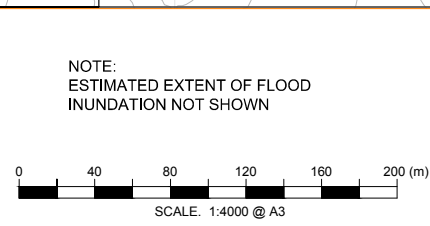


- Legend**
- █ Proposed Culvert
 - █ Existing Culvert
 - Proposed Swale
 - - - Proposed Attenuation Swale
 - █ Storm water feature
 - - - Proposed Designation
 - Proposed Hydraulic Control
 - Proposed Scruffy Dome
 - Existing Contours (0.5m interval)
 - Existing Stream
 - Proposed Stream

- Inundation Legend**
- █ Existing 100 year flood inundation eliminated by Project.
 - █ 100 year flood inundation unchanged by Project.
 - █ 100 year flood inundation due to Project

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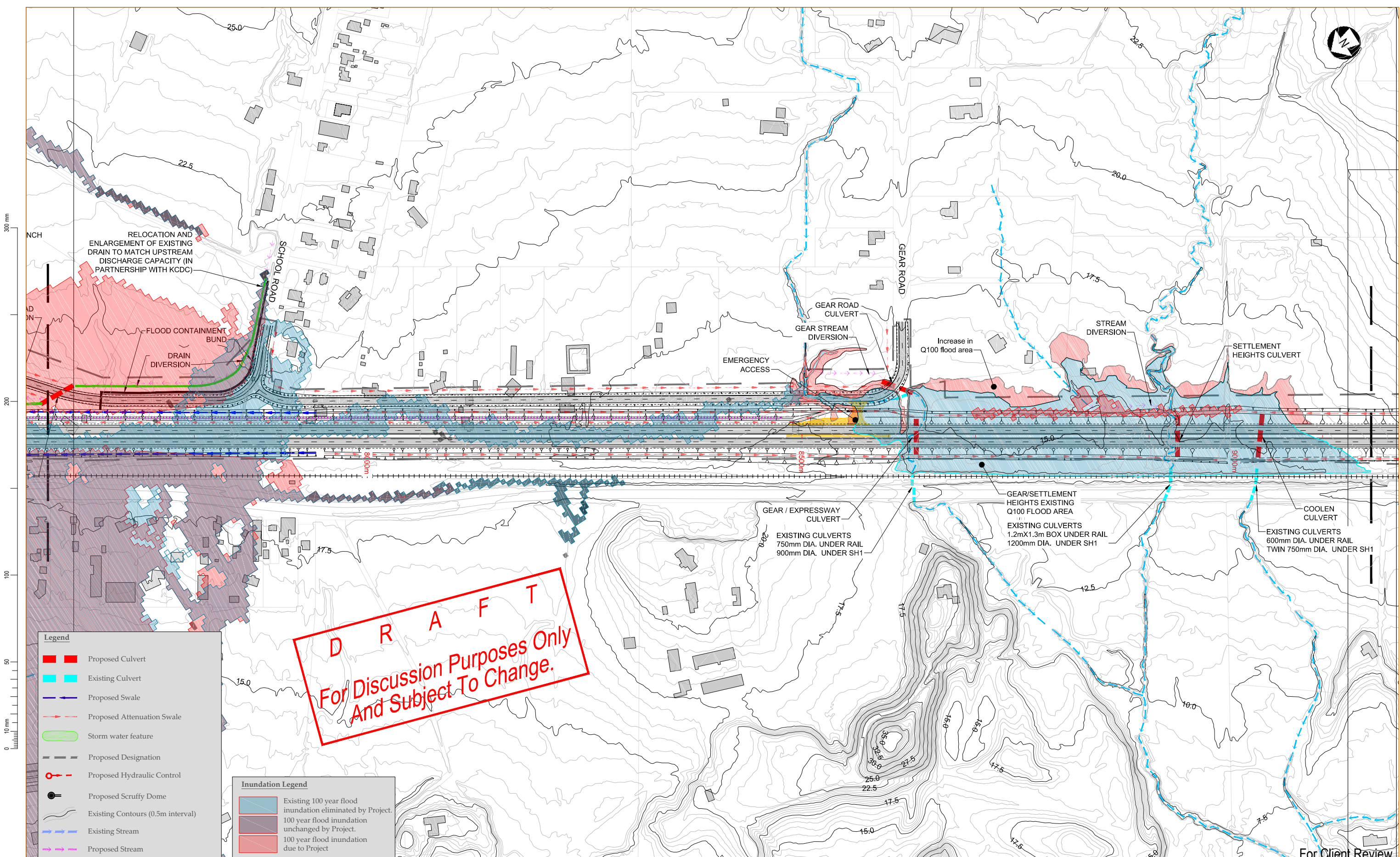


Revision	Amendment	Approved	Revision Date
R1	For Client Review	R.C.	Sept. 2012
R2	Draft for comment	R.C.	18/9/2012
R3	Inundation areas altered, draft for comment	G.W.	7/02/2013



Drawn R.QUINEY	Designed R.COLES	Approved T.COULMAN
Project No. 5C1814.00		Revision Date 09/2011
Scale 1:2000(A1), 1:4000(A3)		Sheet No. 5/2664/1/6504

Project NEW ZEALAND TRANSPORT AGENCY PEKA PEKA TO NORTH OTAKI EXPRESSWAY FOR CONSENTING	
Sheet DRAINAGE PLAN SHEET 5 OF 8	
Sheet No. DR05	Revision R3



- Legend**
- █ Proposed Culvert
 - █ Existing Culvert
 - Proposed Swale
 - - - Proposed Attenuation Swale
 - Storm water feature
 - - - Proposed Designation
 - ⊗ Proposed Hydraulic Control
 - Proposed Scruffy Dome
 - Existing Contours (0.5m interval)
 - Existing Stream
 - Proposed Stream

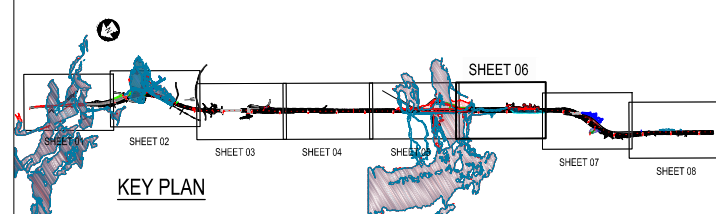
- Inundation Legend**
- █ Existing 100 year flood inundation eliminated by Project.
 - █ 100 year flood inundation unchanged by Project.
 - █ 100 year flood inundation due to Project

D R A F T
 For Discussion Purposes Only
 And Subject To Change.

NOTE:
ESTIMATED EXTENT OF FLOOD
INUNDATION NOT SHOWN

0 40 80 120 160 200 (m)

SCALE: 1:4000 @ A3

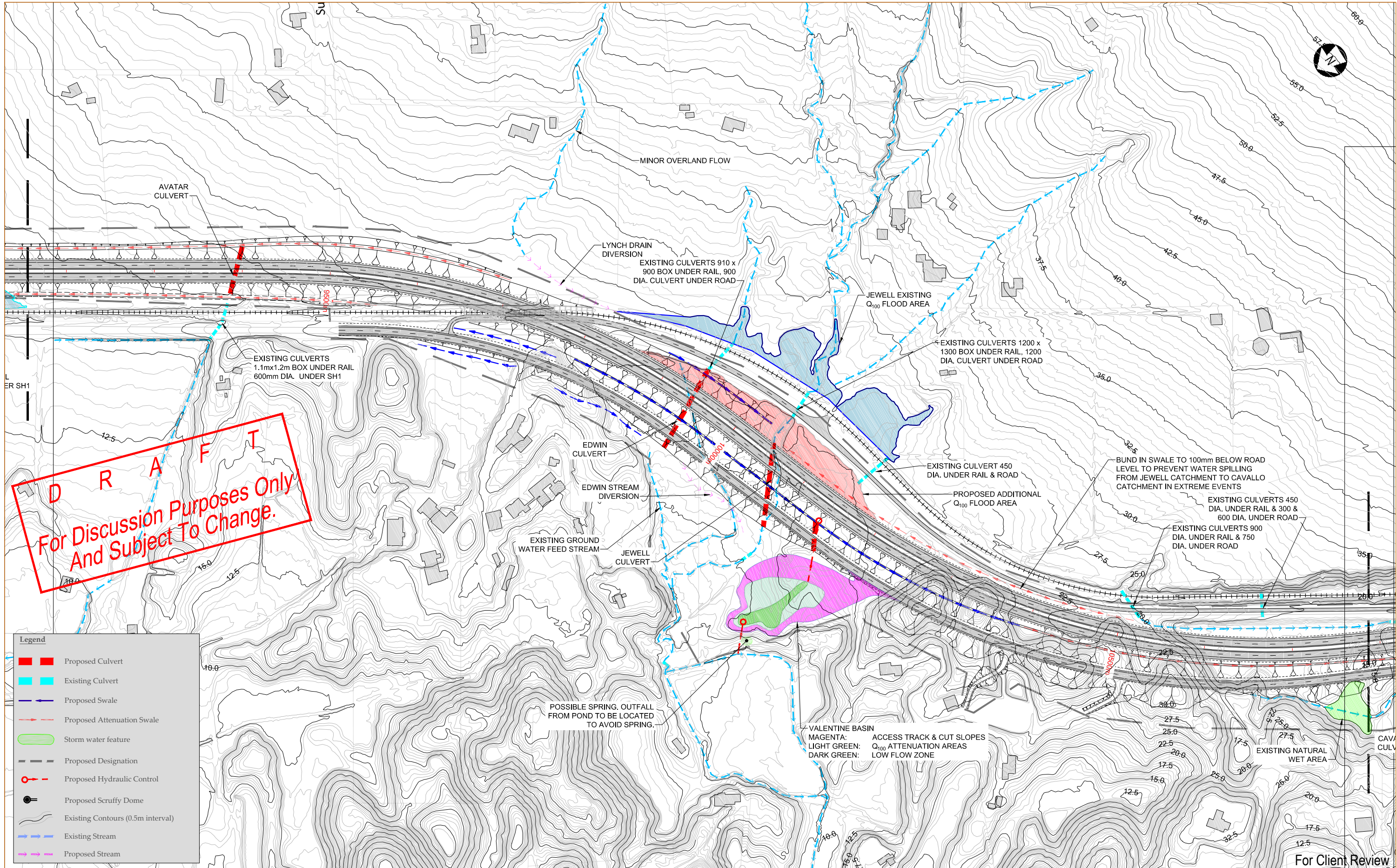


Revision	Amendment	Approved	Revision Date
R1	For Client Review	R.C.	Sept. 2012
R2	Draft for comment	R.C.	18/9/2012
R3	Inundation areas altered, draft for comment	G.W.	7/02/2013



Drawn	Designed	Approved	Revision Date
R.QUINEY	R.COLES	T.COULMAN	09/2011
Project No:	Scale:	Drawing No:	
5C1814.00	1:2000(A1), 1:4000(A3)	5/2664/1/6504	

Project	
NEW ZEALAND TRANSPORT AGENCY PEKA PEKA TO NORTH OTAKI EXPRESSWAY FOR CONSENTING	
Sheet	
DRAINAGE PLAN SHEET 6 OF 8	
Sheet No.	Revision
DR06	R3



DRAFT

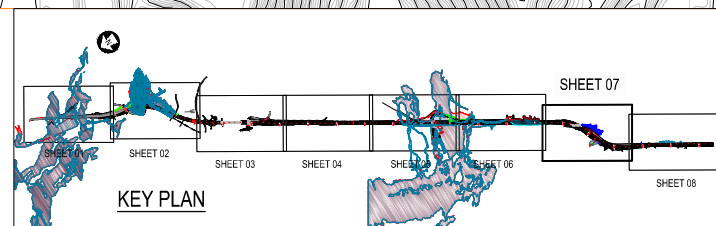
For Discussion Purposes Only
And Subject To Change.

Legend	
█	Proposed Culvert
█	Existing Culvert
→	Proposed Swale
- - -	Proposed Attenuation Swale
█	Storm water feature
- - -	Proposed Designation
○	Proposed Hydraulic Control
●	Proposed Scruffy Dome
~	Existing Contours (0.5m interval)
→	Existing Stream
→	Proposed Stream

NOTE:
ESTIMATED EXTENT OF FLOOD
INUNDATION NOT SHOWN

0 40 80 120 160 200 (m)

SCALE: 1:4000 @ A3

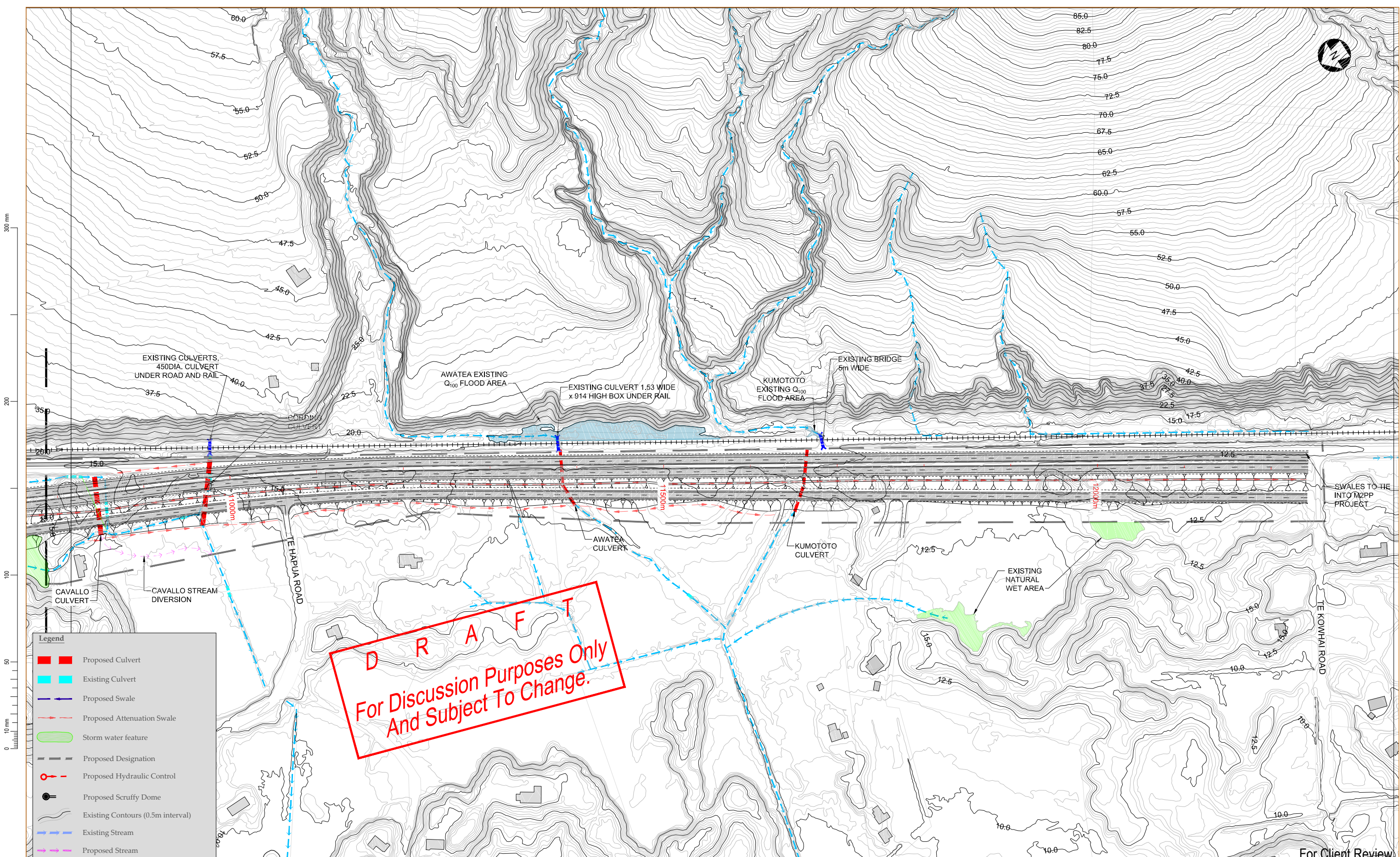


Revision	Amendment	Approved	Revision Date
R1	For Client Review	R.C.	Sept. 2012
R2	Draft for comment	R.C.	18/9/2012
R3	Inundation areas altered, draft for comment	G.W.	7/02/2013



Drawn	Designed	Approved	Revision Date
R.QUINEY	R.COLES	T.COULMAN	09/2011

Project		NEW ZEALAND TRANSPORT AGENCY PEKA PEKA TO NORTH OTAKI EXPRESSWAY FOR CONSENTING	
Sheet		DRAINAGE PLAN SHEET 7 OF 8	
Project No.	Scale	Revision No.	Sheet No.
5C1814.00	1:2000(A1), 1:4000(A3)	5/2664/1/6504	DR07
			Revision
			R3



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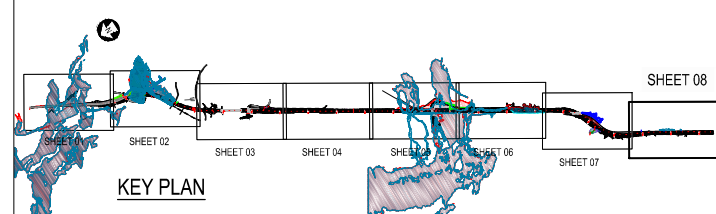
- █ Proposed Culvert
- █ Existing Culvert
- Proposed Swale
- - - Proposed Attenuation Swale
- █ Storm water feature
- - - Proposed Designation
- ⊗ Proposed Hydraulic Control
- ⊙ Proposed Scruffy Dome
- Existing Contours (0.5m interval)
- Existing Stream
- Proposed Stream

DRAFT
 For Discussion Purposes Only
 And Subject To Change.

NOTE: ESTIMATED EXTENT OF FLOOD INUNDATION NOT SHOWN

0 40 80 120 160 200 (m)

SCALE: 1:4000 @ A3

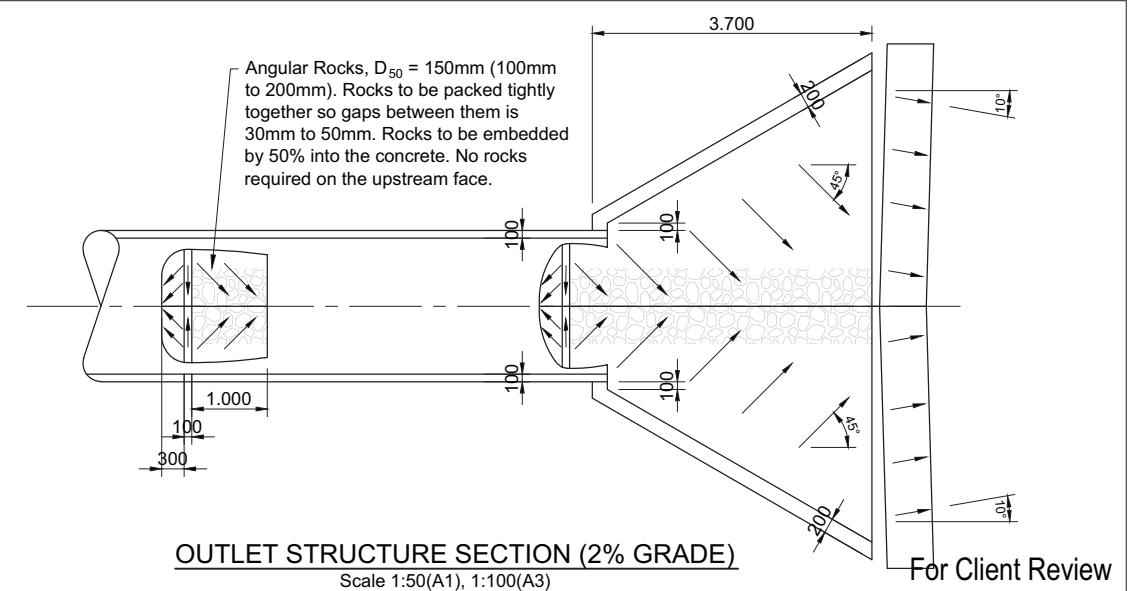
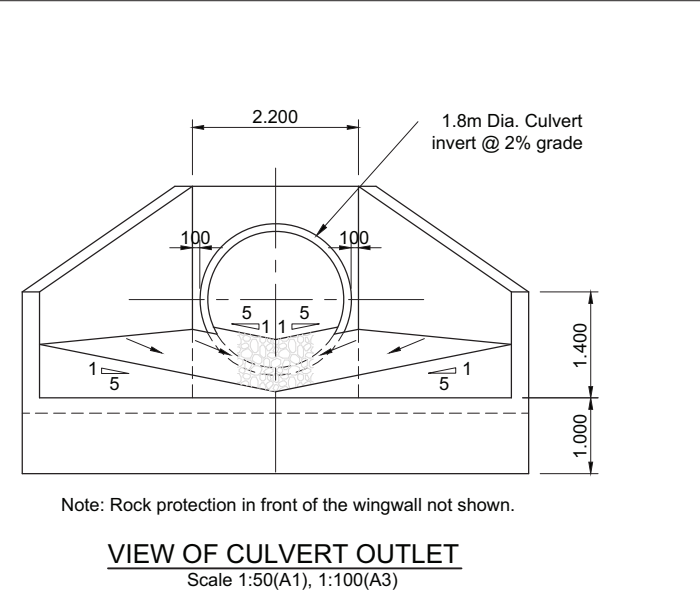
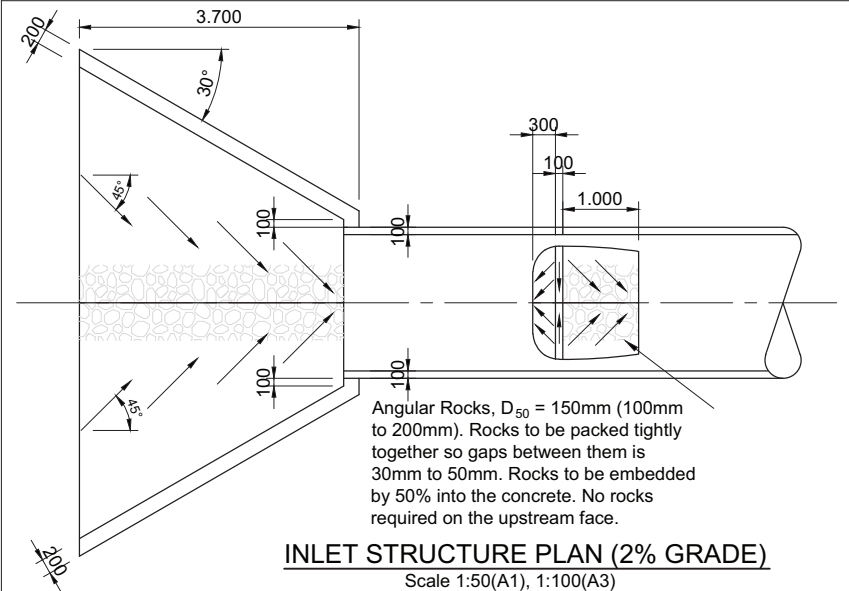
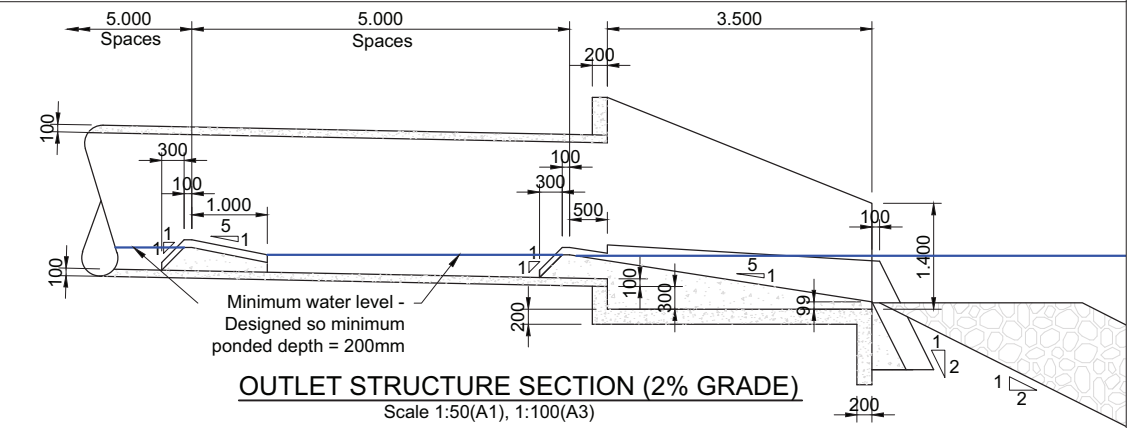
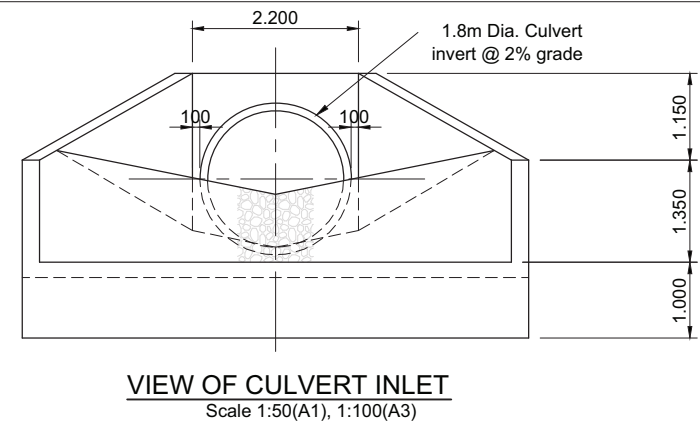
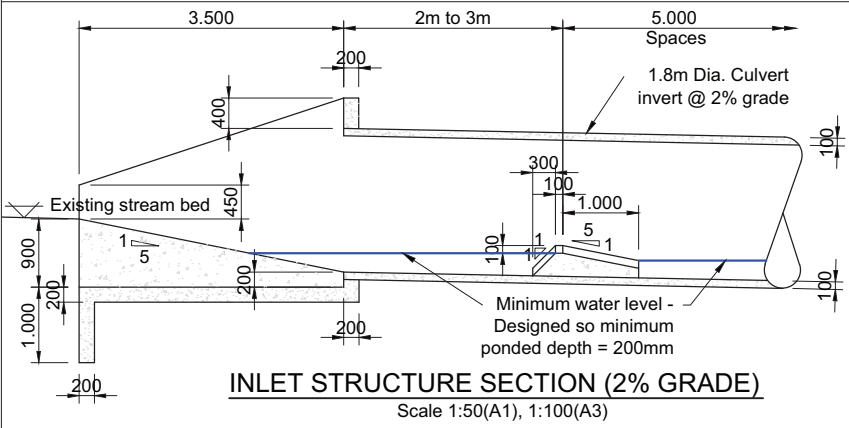
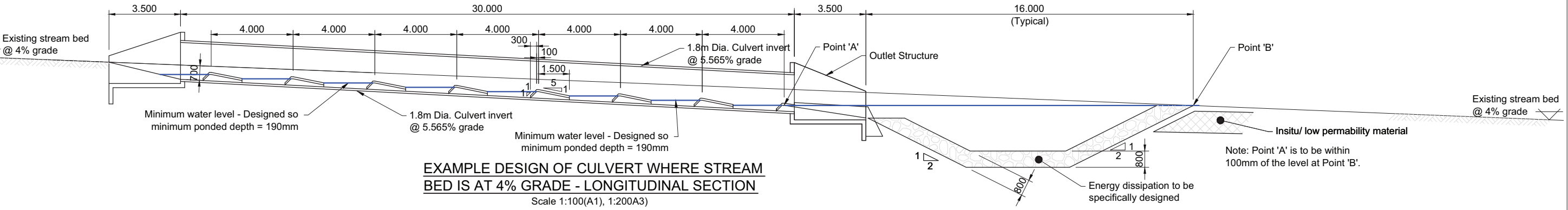
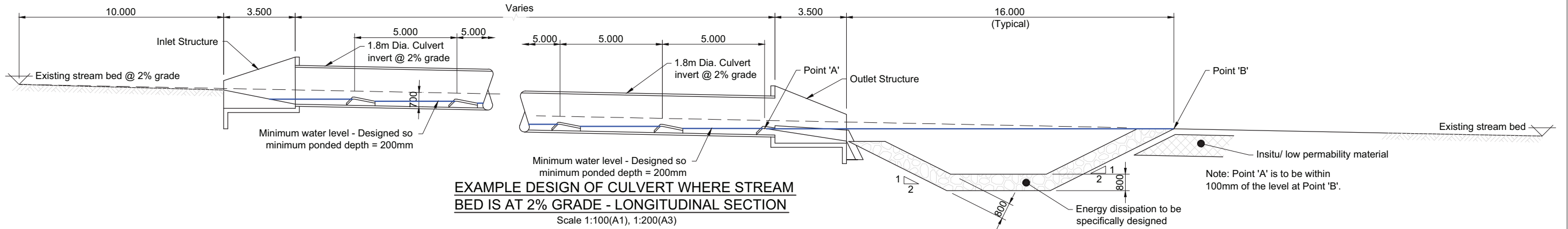


Revision	Amendment	Approved	Revision Date
R1	For Client Review	R.C.	Sept. 2012
R2	Draft for comment	R.C.	18/9/2012
R3	Inundation areas altered, draft for comment	G.W.	7/02/2013



Drawn	Designed	Approved	Revision Date
R.QUINEY	R.COLES	T.COULMAN	09/2011
Project No. 5C1814.00		Scale: 1:2000(A1), 1:4000(A3)	Drawing No. 5/2664/1/6504

Project	
NEW ZEALAND TRANSPORT AGENCY PEKA PEKA TO NORTH OTAKI EXPRESSWAY FOR CONSENTING	
Sheet	
DRAINAGE PLAN SHEET 8 OF 8	
Sheet No. DR08	Revision R3

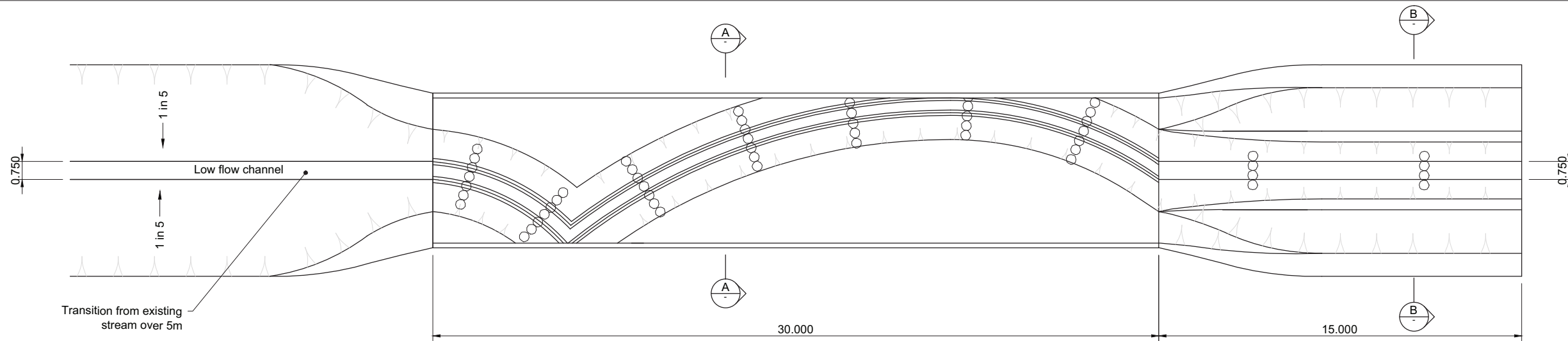


Revision	Amendment	Approved	Revision Date
R1	For Client Review	R.C.	Sept. 2012

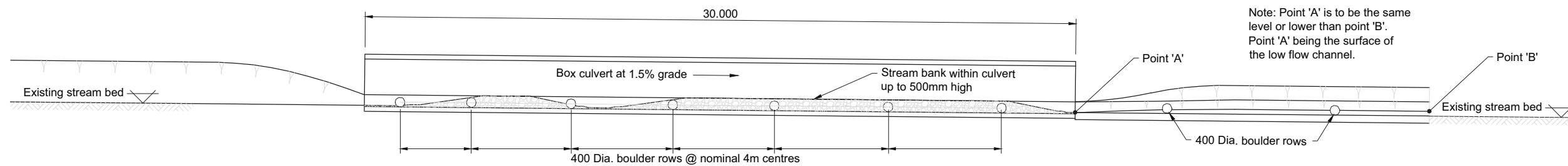


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Project		NEW ZEALAND TRANSPORT AGENCY PEKA PEKA TO NORTH OTAKI EXPRESSWAY FOR CONSENTING	
Drawn		Revision Date	
K. MERCER	R. COLES	24/7/2012	
Project No.		Drawing No.	
5C1814.00		5/2664/1/6504	
Scale		Sheet No.	
AS SHOWN		DR10	
Revision		R1	

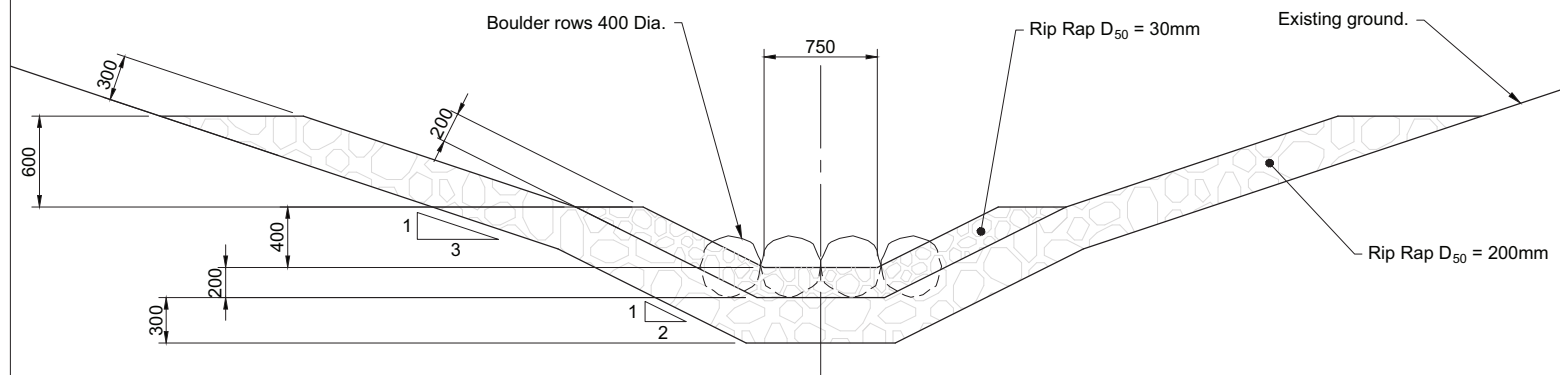


PLAN
Scale 1:100(A1), 1:200A3

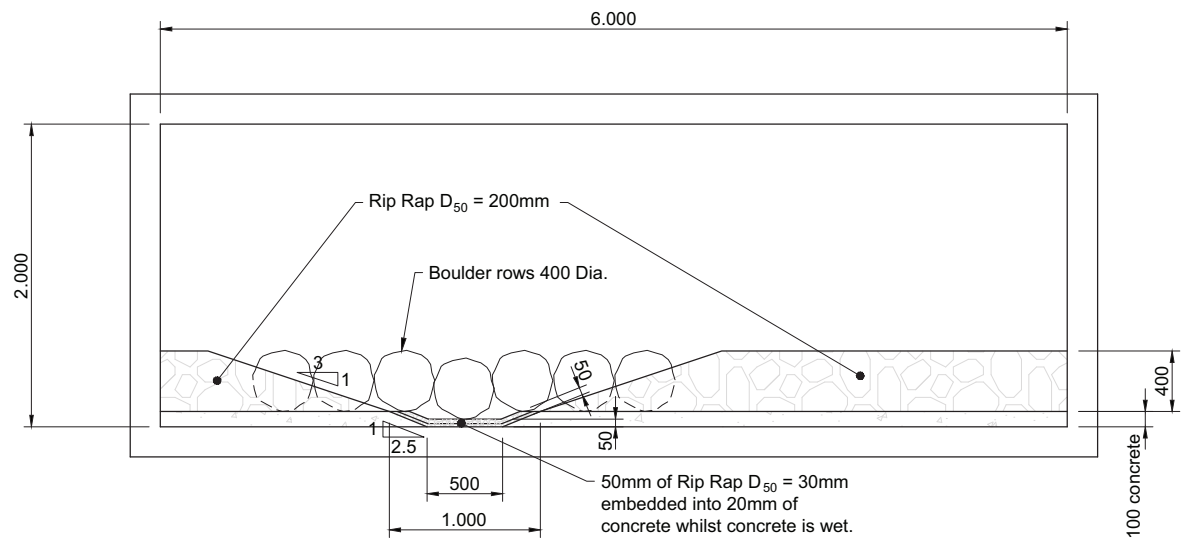


EXAMPLE DESIGN OF BOX CULVERT WHERE STREAM BED IS AT 1% GRADE
Scale 1:100(A1), 1:200A3

Note: Point 'A' is to be the same level or lower than point 'B'. Point 'A' being the surface of the low flow channel.



SECTION B
Scale 1:25(A1), 1:50A3



SECTION A
Scale 1:25(A1), 1:50A3

1:25 @ A1
1:50 @ A3

1:100 @ A1
1:200 @ A3

Revision	Amendment	Approved	Revision Date
R1	For Client Review	R.C.	Sept. 2012



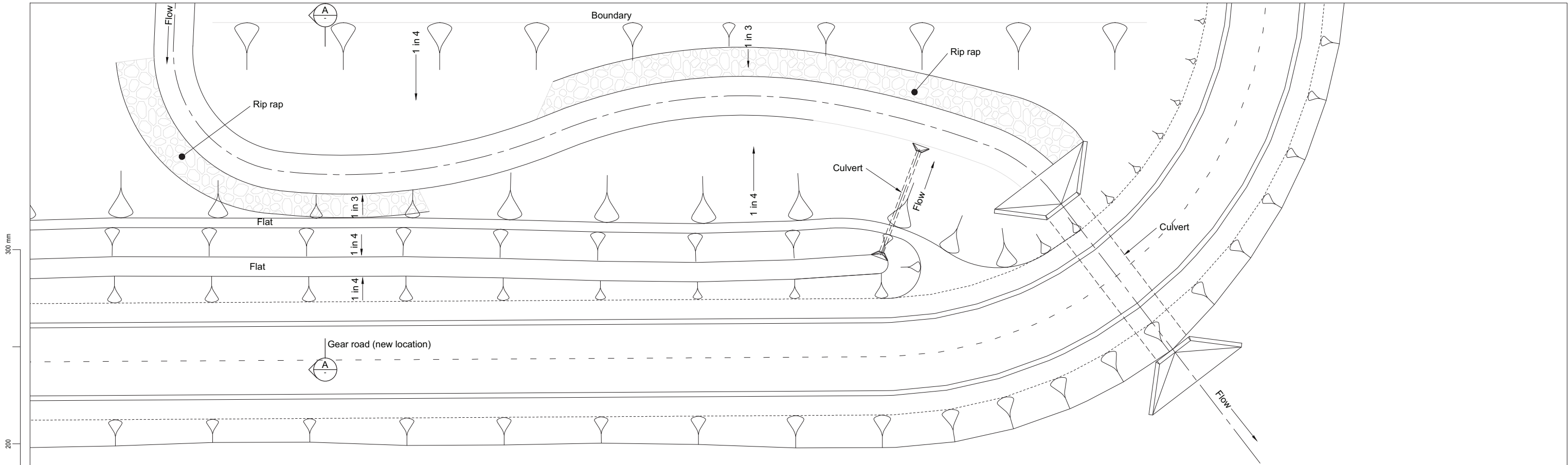
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Drawn: K. MERCER, Designed: R. COLES, Approved: [Signature], Revision Date: 24/7/2012

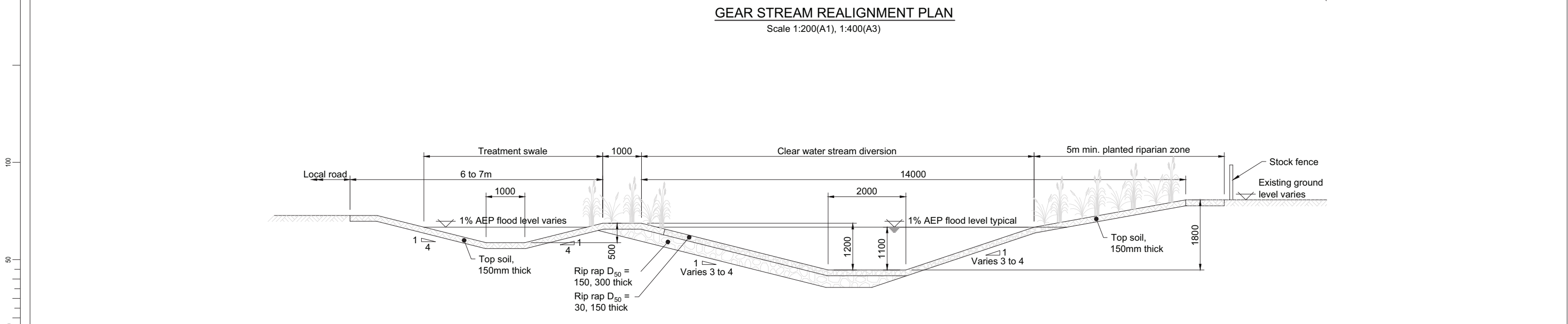
Project No: 5C1814.00, Scale: AS SHOWN

Project	
NEW ZEALAND TRANSPORT AGENCY PEKA PEKA TO NORTH OTAKI EXPRESSWAY FOR CONSENTING	
Sheet	
DRAINAGE DETAILS SHEET 2 OF 7 - EXAMPLE FISHPASS DETAILS	
Project No.	Revision
5/2664/1/6504	DR11 R1

For Client Review

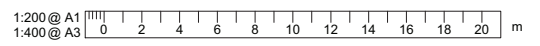
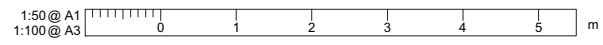


GEAR STREAM REALIGNMENT PLAN
Scale 1:200(A1), 1:400(A3)



GEAR STREAM TYPICAL SECTION (BASED ON SECTION A - A)
Scale 1:50(A1), 1:100(A3)

For Client Review



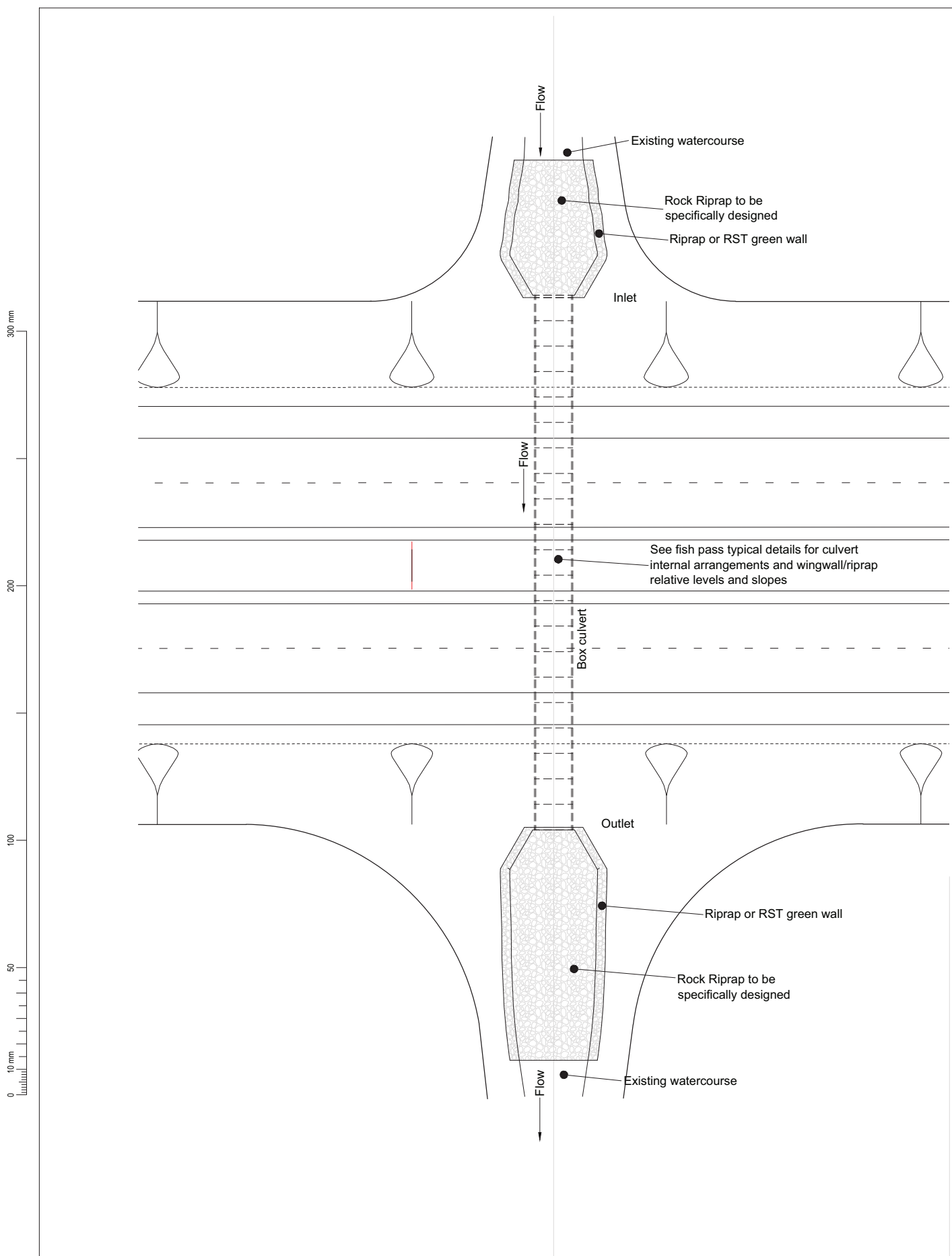
Revision	Amendment	Approved	Revision Date
R1	For Client Review	R.C.	Sept. 2012



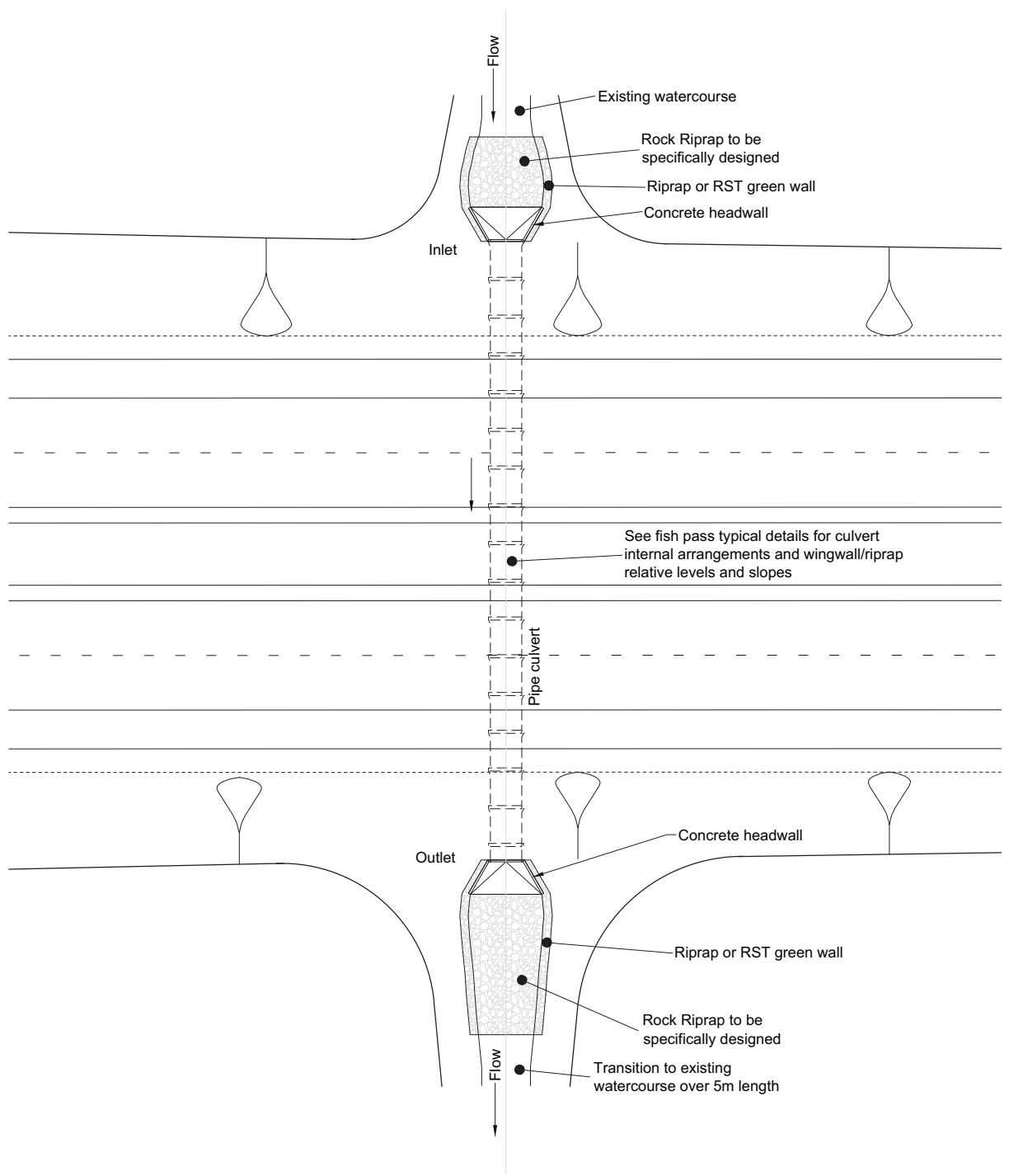
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Drawn	Designed	Approved	Revision Date
K. MERCER	R. COLES		24/7/2012
Project No.	Scale		
5C1814.00	AS SHOWN		

Project	
NEW ZEALAND TRANSPORT AGENCY PEKA PEKA TO NORTH OTAKI EXPRESSWAY FOR CONSENTING	
Sheet	
DRAINAGE DETAILS SHEET 3 OF 7 - GEAR STREAM DIVERSION	
Project No.	Drawing No.
5C1814.00	5/2664/1/6504
Sheet No.	Revision
DR12	R1



TYPICAL BOX CULVERT PLAN
Scale 1:200(A1), 1:400(A3)



TYPICAL PIPE CULVERT PLAN
Scale 1:200(A1), 1:400(A3)

For Client Review

1:200 @ A1
1:400 @ A3

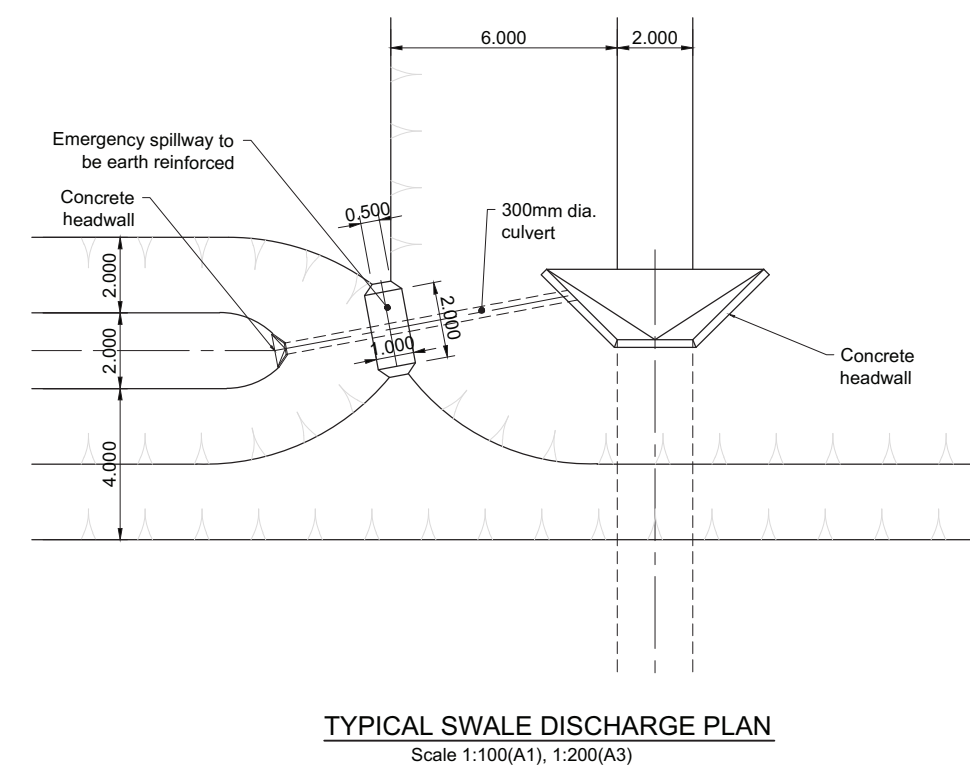
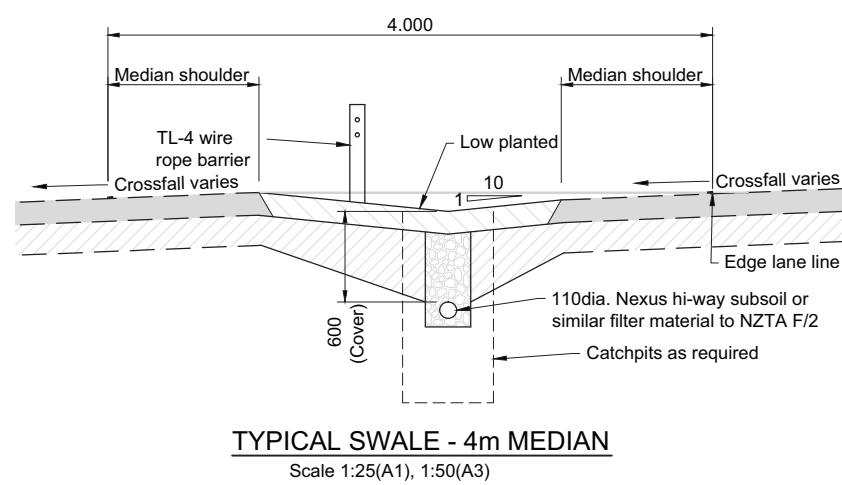
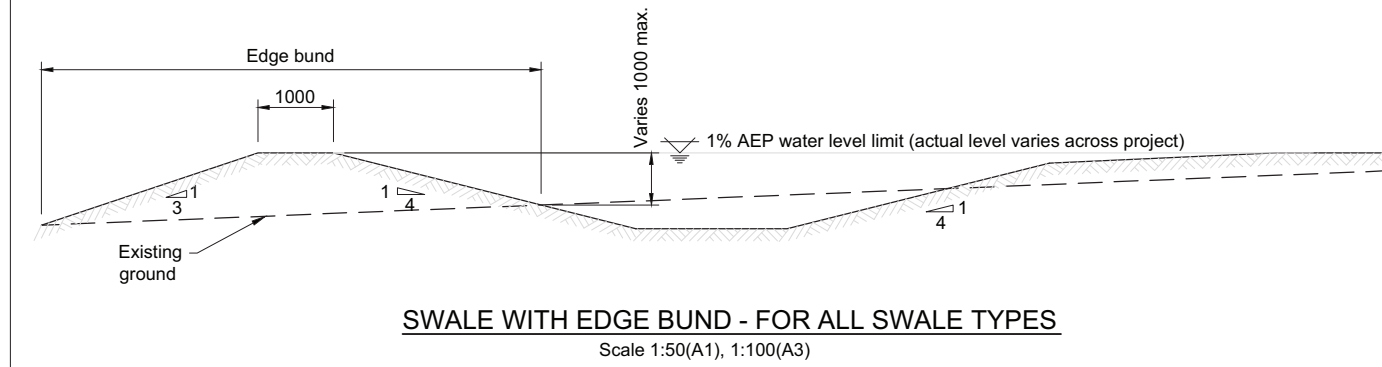
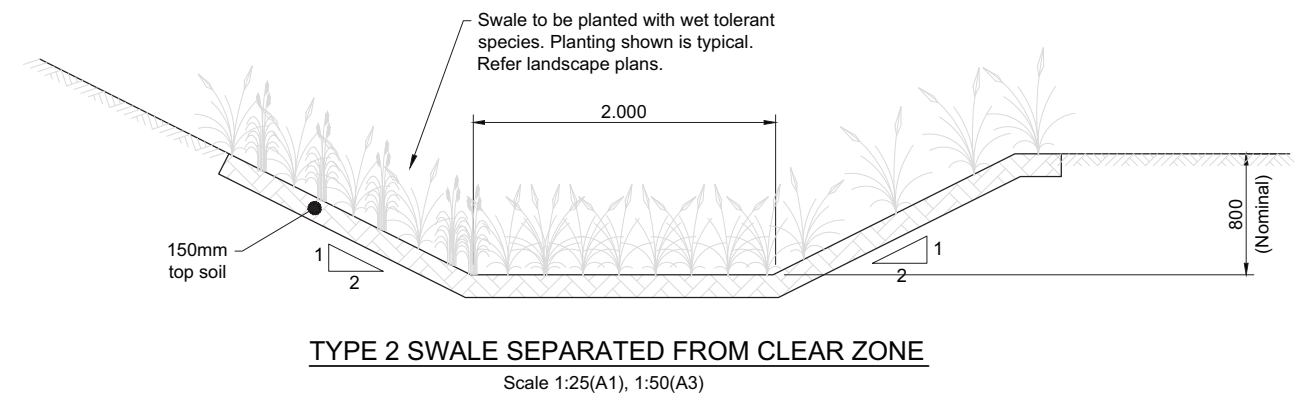
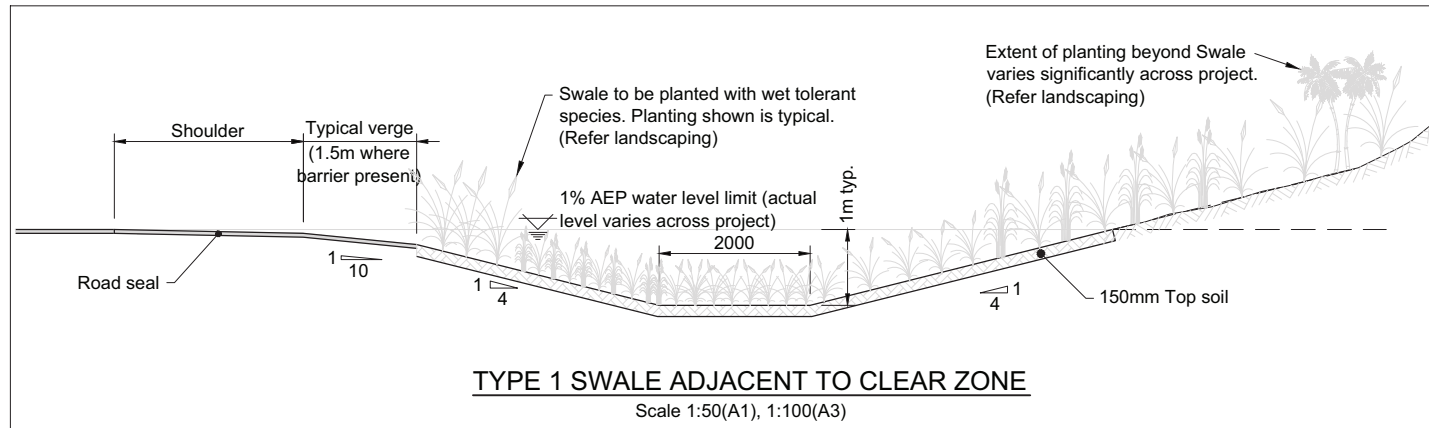
Revision	Amendment	Approved	Revision Date
R1	For Client Review	R.C.	Sept. 2012



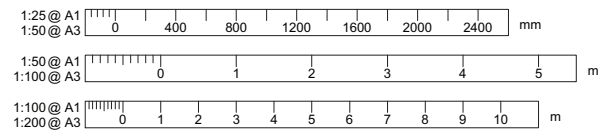
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Drawn	Designed	Approved	Revision Date
K. MERCER	R. COLES		24/7/2012
Project No.	Scale		
5C1814.00	1:200(A1), 1:400(A3)		

Project	
NEW ZEALAND TRANSPORT AGENCY PEKA PEKA TO NORTH OTAKI EXPRESSWAY FOR CONSENTING	
Sheet	
DRAINAGE DETAILS SHEET 4 OF 7 - TYPICAL CULVERT LAYOUT	
Sheet No.	Revision
5/2664/1/6504	DR13 R1



300 mm
200
100
50
10 mm
0



Revision	Amendment	Approved	Revision Date
R1	For Client Review	R.C.	Sept. 2012



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Drawn	Designed	Approved	Revision Date
K. MERCER	R. COLES		24/7/2012

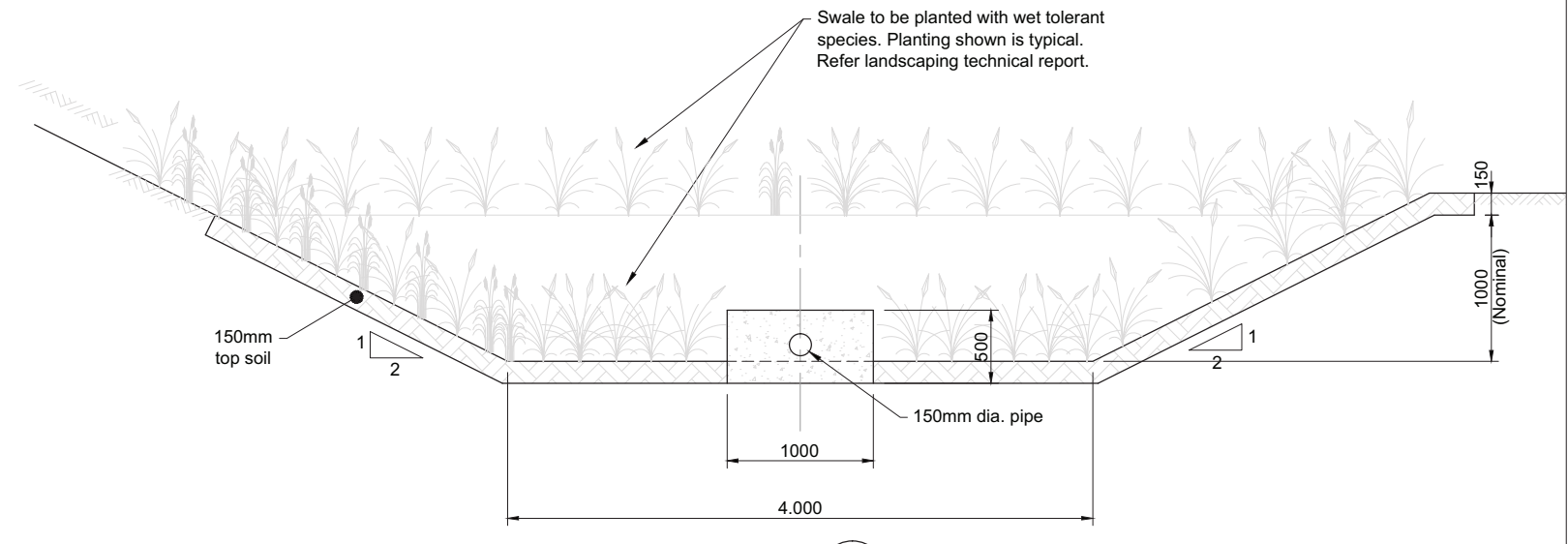
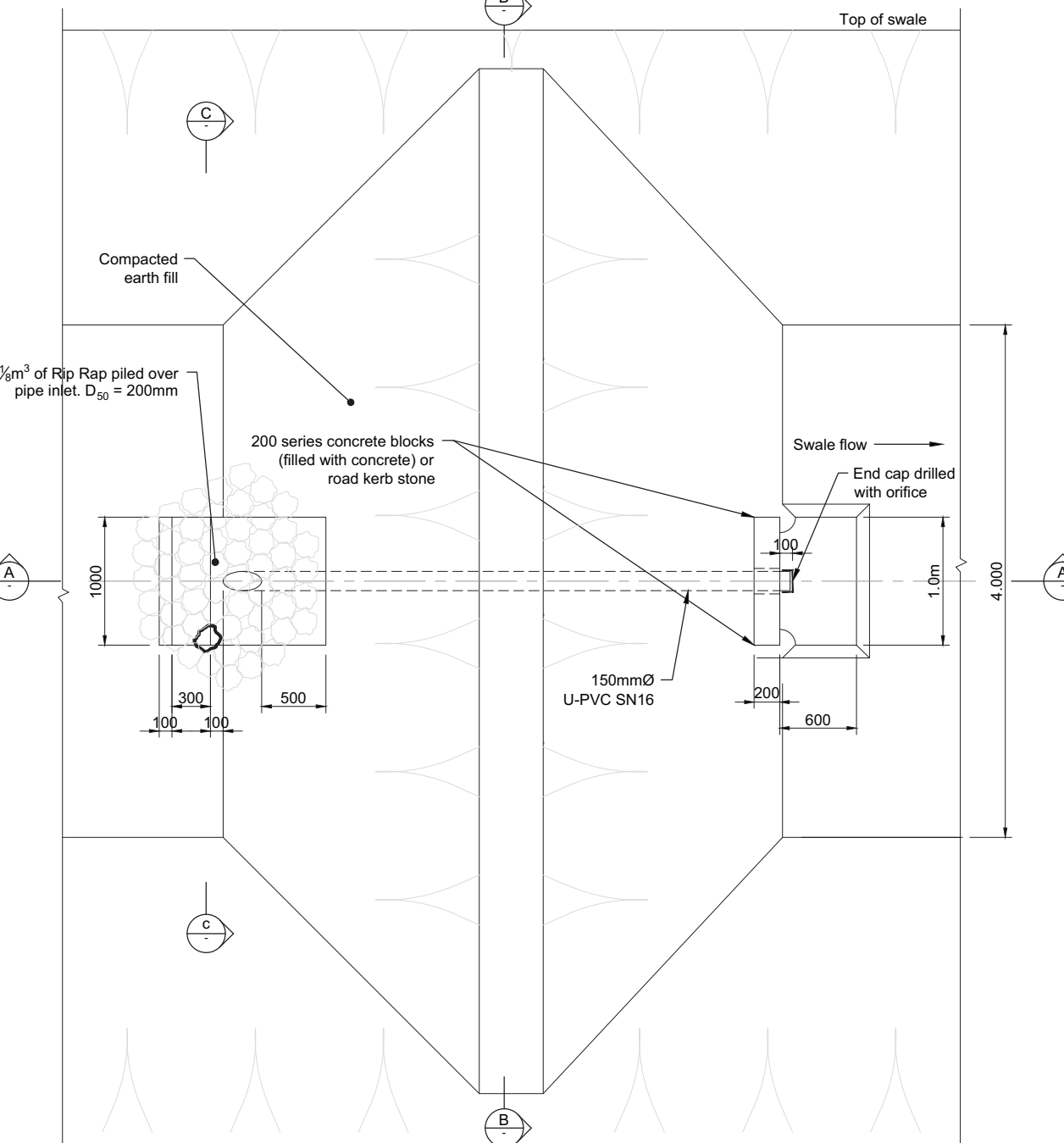
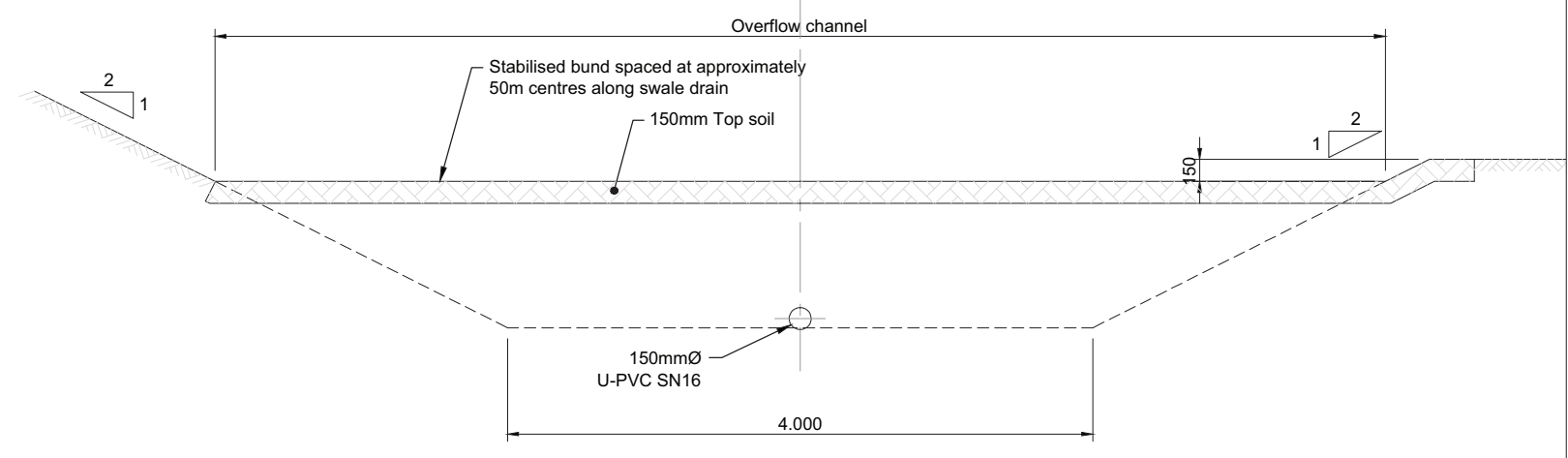
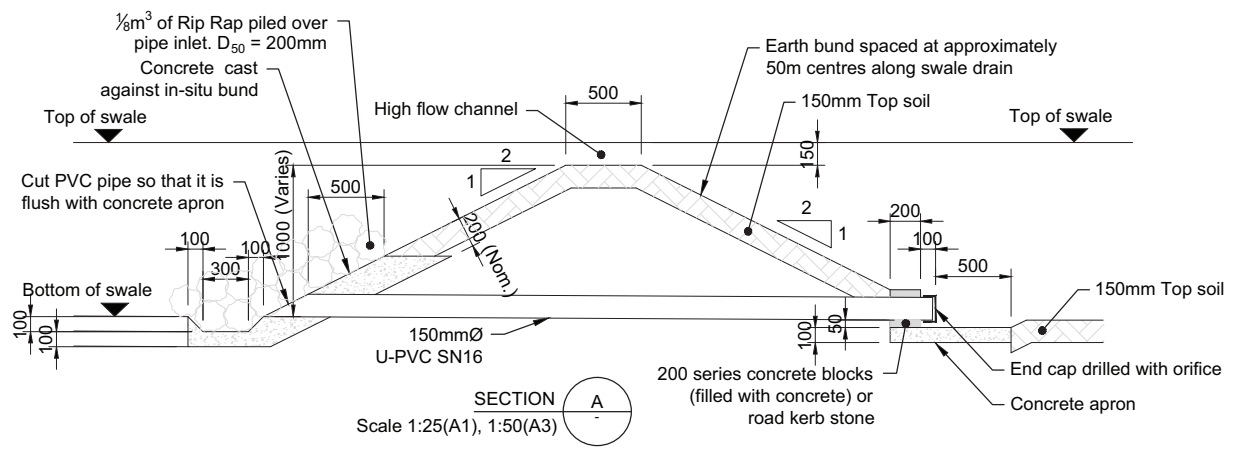
Project No. 5C1814.00 Scale AS SHOWN

Project
**NEW ZEALAND TRANSPORT AGENCY
PEKA PEKA TO NORTH OTAKI EXPRESSWAY
FOR CONSENTING**

Sheet
**DRAINAGE DETAILS
SHEET 5 OF 7 - TYPICAL SWALE DETAILS**

Sheet No.	Revision
DR14	R1

For Client Review



TYPICAL ATTENUATION SWALE SECTION

For Client Review

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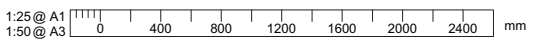
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NEW ZEALAND TRANSPORT AGENCY
PEKA PEKA TO NORTH OTAKI EXPRESSWAY
FOR CONSENTING

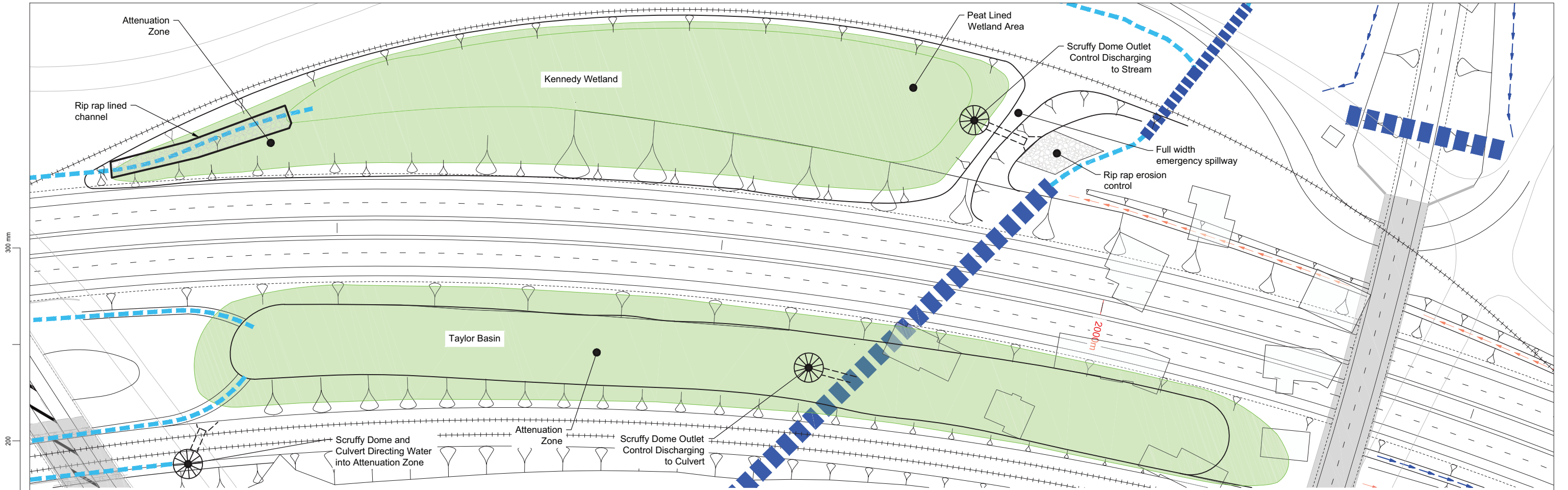
Drawn: K. MERCER
Designed: R. COLES
Approved: [Signature]
Revision Date: 24/7/2012

Sheet
DRAINAGE DETAILS
SHEET 6 OF 7 - TYPICAL ATTENUATION SWALE DETAILS

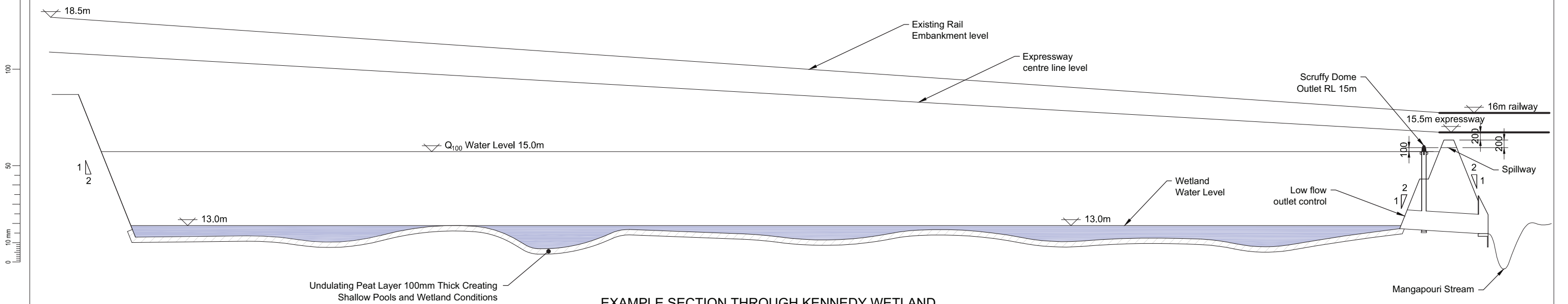
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Drawing No: 5/2664/1/6504
Sheet No: DR15
Revision: R1



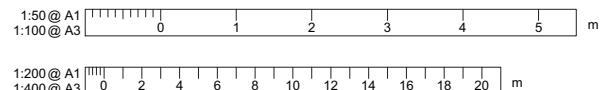


**EXAMPLE PLAN OF ATTENUATION BASIN
BASED ON THE KENNEDY WETLAND**
Scale 1:500(A1), 1:1000(A3)



EXAMPLE SECTION THROUGH KENNEDY WETLAND
Scale Horizontal 1:250(A1), 1:500(A3)
Scale Vertical 1:50(A1), 1:100(A3)

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5C1814.00	1:500(A1), 1:1000(A3)	5/2664/1/6504	

Project	
NEW ZEALAND TRANSPORT AGENCY PEKA PEKA TO NORTH OTAKI EXPRESSWAY FOR CONSENTING	
Sheet	
DRAINAGE DETAILS SHEET 7 OF 7 - EXAMPLE ATTENUATION BASIN	
Sheet No.	Revision
DR16	R1