1 ESCP-04 - CONSTRUCTION NOTES

1.1 Scope

This Erosion and Sediment Control Plan (ESCP) covers the earthworks and civil works associated with the O2NL earthworks between CH11600 and CH12050.

The earthworks activities undertaken as part of this ESCP include:

- Installation of the erosion and sediment control measures.
- General earthworks and civil works generally comprising material borrow site, roading and drainage.
- Site stabilisation.

The proposed erosion and sediment control (ESC) measures have been designed in accordance with the Projects ESCP.

This ESCP is supported by the following reference drawings provided in Appendix B:

ESCP-004

1.2 Construction Methodology

- Prior to the commencement of any works the Project Engineer will inspect the site to confirm the suitability of the proposed controls and methodology..
- At the approximate location, as detailed in the attached drawings, the erosion and sediment control will be constructed.
- Two Sediment Retention Ponds (SRP's) and silt fences will be the main treatment devices installed on the site, refer to the design details and schedule in Appendix A.
- Perimeter bunds will be installed to ensure all work areas are directed to the SRP's. The perimeter bunds have been designed to convey the 5% Annual Exceedance Probability (AEP) rain event.
- The perimeter bunds that are not turfed will be stabilised immediately upon completion.
- An as-built will be completed immediately following construction of each sediment control device to confirm that they have been constructed in accordance with the SSESCP and the Guidelines. The as-built will be submitted to Horizons prior to the commencement of earthworks in the respective catchment of the device.

<u>Earthworks</u>

- Earthworks are to take place over an approximate area of 9.5ha,
- Two Sediment Retention Ponds (SRP's) are to be constructed at the approximate locations shown on the attached drawings and have been sized to provide treatment for each section of works.
- Topsoil will be used to construct the perimeter bunds which are a minimum of 0.55m in height.
- The bulk earthworks will be conducted as a standard cut to fill, and cut to waste operation.
- As batters are completed, they will be progressively trimmed, topsoiled and seeded. Note sediment control will remain in place until an 80% grass strike has been achieved.

<u>Material Supply Site 34A Koputaroa</u>

- The earthworks are to ensure that there is always a 0.55m high bund on the outside edge of the extent of works. This will progressively move and lowered as the earthworks progress.
- Earthworks should be undertaken to ensure that all runoff is directed into the site and towards SRP12100.
- Progressive and rapid stabilisation of exposed surfaces should be undertaken as the site is lowered to its final profile.

1.3 Operation and Maintenance

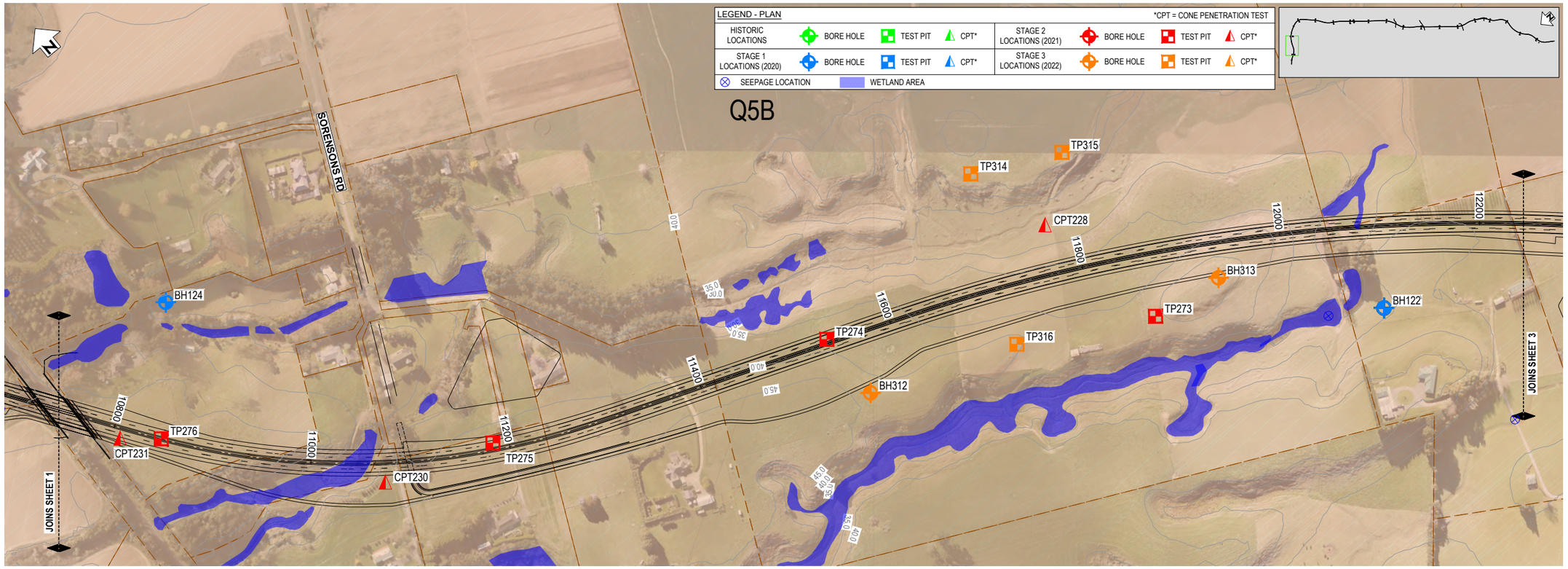
- The ESC measures will be inspected and signed off by the Environmental Advisor prior to commencement of earthworks.
- The monitoring and maintenance requirements for the ESC measures will be in accordance with the ESCMP.
- The ESC monitoring and maintenance requirements will include, but are not limited to:
    - all ESC structures will be internally inspected on a weekly basis and within 24 hours of each rainstorm event that is likely to impair the function of performance of the controls.
    - any required maintenance or improvements to control measures will be undertaken immediately;
    - the SRP's will be cleaned of sediment before accumulated sediment volume reaches 20% of the total volume of the structure;
    - all erosion and sediment control measures will be maintained in accordance with the ESCP; and
    - weather forecasts will be monitored on a daily basis.
- A record will be maintained of the date and time of inspections undertaken, any maintenance requirements identified, and any maintenance undertaken.
- All ESC measures are to be monitored and maintained throughout the works in accordance with the Projects ESCMP until the site is stabilised.

1.4 Dust Management

- The emphasis of the site's dust management strategy will be one of prevention.
- Vehicle movements on site will be governed by speed restrictions (30km) which will, among other things, assist in preventing dust generation.
- Dampening of dry / dusty areas will be undertaken, when required.
- The Construction Manager will obtain daily forecasts and circulate to all appropriate staff to ensure that during dry weather everyone knows the probability of dust creation. Dust control measures will be put on standby if dry, windy conditions are forecast.
- If dusty conditions are encountered a watercart will be allocated to the project to dampen surfaces.

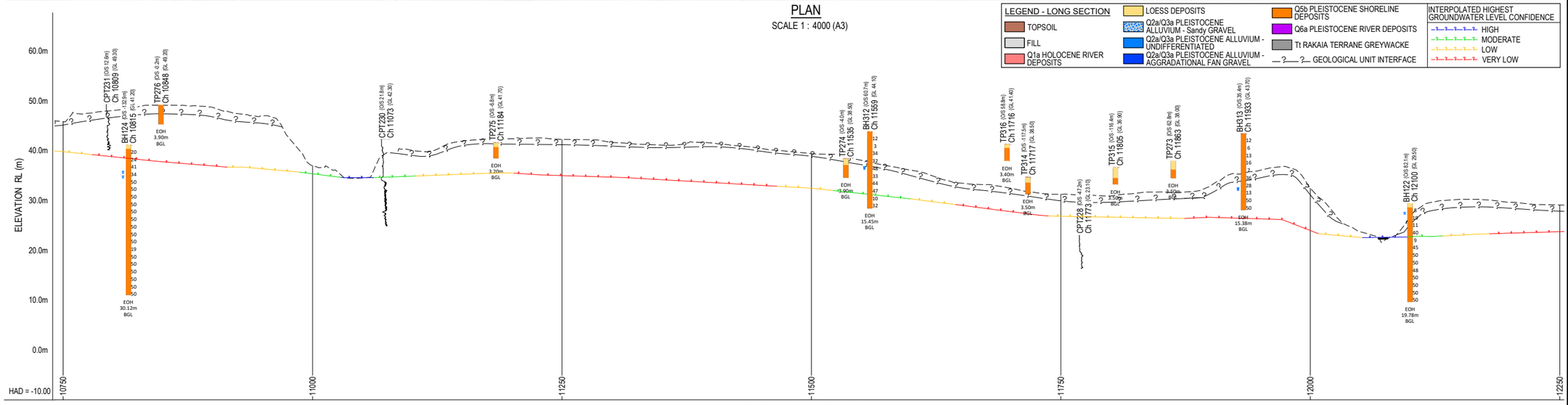
1.5 Chemical Treatment

- Chemical treatment will be undertaken in accordance the site's Chemical Treatment Management Plan (CTMP).
- SRP 12000 and 12050 will be chemically treated by way of a rainfall activated chemical dosing system (floc shed, floc box or similar)
- Batch dosing will be undertaken as required in accordance with the CTMP.
- Ongoing monitoring and maintenance will be undertaken in accordance with the CTMP.



PLAN

SCALE 1 : 4000 (A3)



SCALE 1:4000 (A3)

SCALE 1:800 (A3)

NOTE:
THE EXISTING GROUND LEVEL SHOWN IS ALONG THE DESIGN CENTRE LINE

LONGITUDINAL SECTION

SCALES - H 1 : 4000 (A3)
V 1 : 800 (A3)

FOR INFORMATION ONLY

REV	REVISIONS	DRN	CHK	APP	DATE
C	INCLUDES STAGE 3 (2022) INVESTIGATIONS AND GROUNDWATER INTERPRETATION	SS			
B	ISSUED IN CONJUNCTION WITH GEOTECHNICAL INTERPRETIVE REPORT REVISION C	SS	EG	KC	16.12.21
A	WORKING PLOT FOR DISCUSSION	SS	JG	KC	16.08.21

SURVEYED		
DESIGNED	Jayden Gesche	09.07.21
DRAWN	Steve Sutton	09.07.21
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

Stantec

Client: WAKA KOTAHI NZ TRANSPORT AGENCY

WAKA KOTAHI
OTAKI TO NORTH OF LEVIN

GEOLOGICAL MODEL PLAN AND LONG SECTION
SHEET 2

Status Stamp: **WORKING PLOT**
Date Stamp: **16.08.21**
Scales: AS SHOWN
Drawing No.: 310203848-01-200-C1001
Rev: C

pw:\\stantec-ap-pw.bentley.com:stantec-ap-pw-01\Documents\New Zealand Clients\NZTA (New Zealand Transport Agency)\310203848 - Otaki to North of Levin DBC\01\200 - Geotech\310203848-01-200-C1001

Appendix A – Erosion and Sediment Control Details

Diversion Bund Design Details

In accordance with the Greater Wellington Council's ESC Guidelines all diversion bunds are sized to have sufficient capacity to safely carry the flow from a 5% AEP storm, plus a freeboard of 300mm. As no catchments exceed 5ha the standard details can be implemented. A minimum bund height of 550mm will be installed across the site.

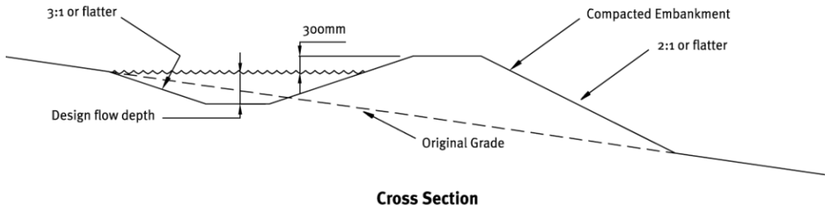


Figure 1: Cross section of a dirty water diversion.

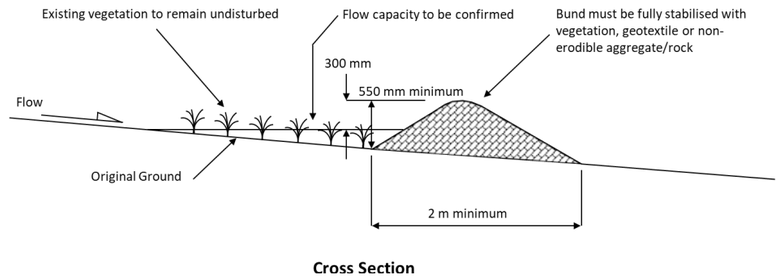


Figure 2: Cross section of a clean water diversion.

.

Sediment Retention Pond Sizing

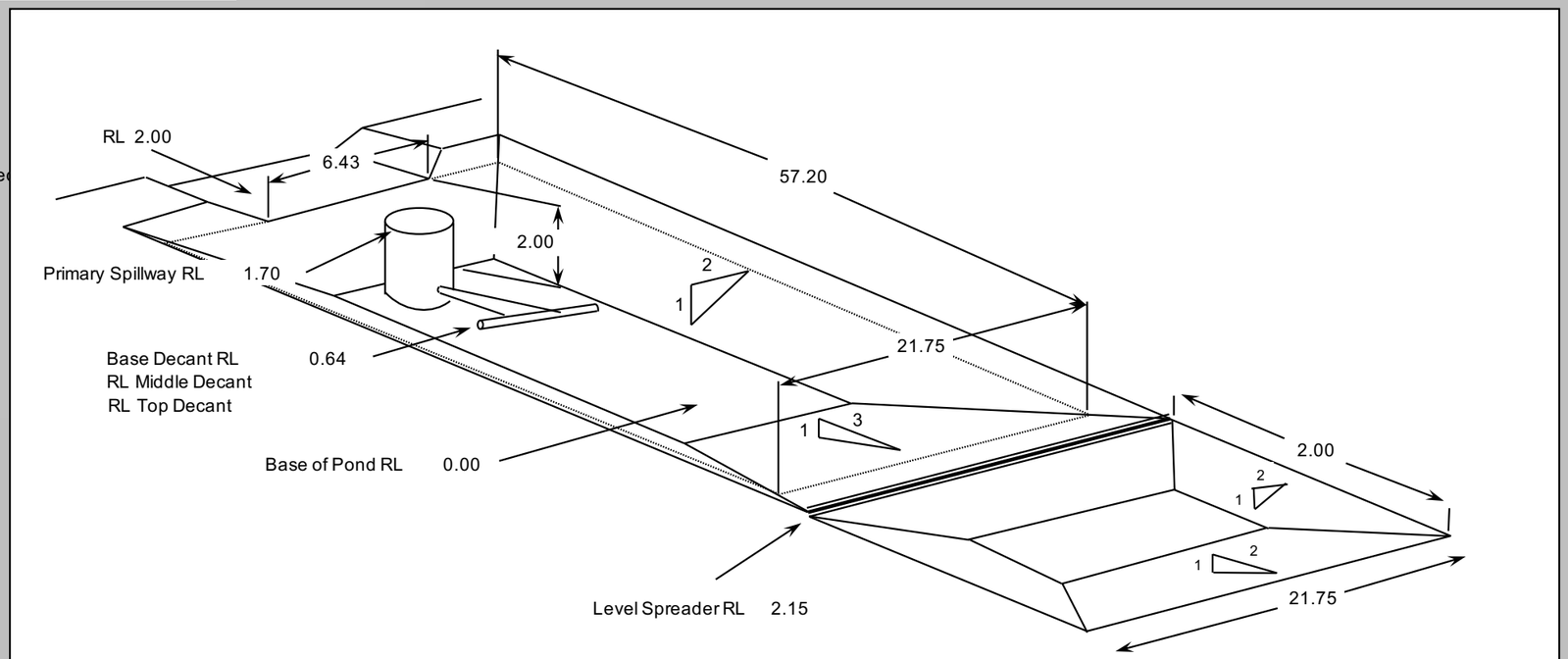
Size criteria	Length Ratio	Side slopes	Depth from Emergency Spillway	R.L. of Pond Base
3%	3:1	2:1	2.00	0.00

5.00 ha SRP 12000

Storage Volume Criteria	3%
Contributing Catchment (ha)	5.00
Minimum Storage Volume (m3)	1500
Length at Spillway Level	57.20
Width at Spillway Level	21.75
Spillway base width (300mm deep)	6.43
Primary Spillway diameter (min)	Manhole Require
Number of decants	3
Number of holes per decant	222
Minimum outlet diameter	300mm
RL Emergency Spillway	2.00
RL Primary Spillway	1.70
RL Level Spreader (min)	2.15
RL Base Decant	0.64
RL Middle Decant	
RL Top Decant	

Forebay

Depth	1 m	min. depth
Width	21.75 m	full width of pond
Length	2.00 m	



Sediment Retention Pond Sizing

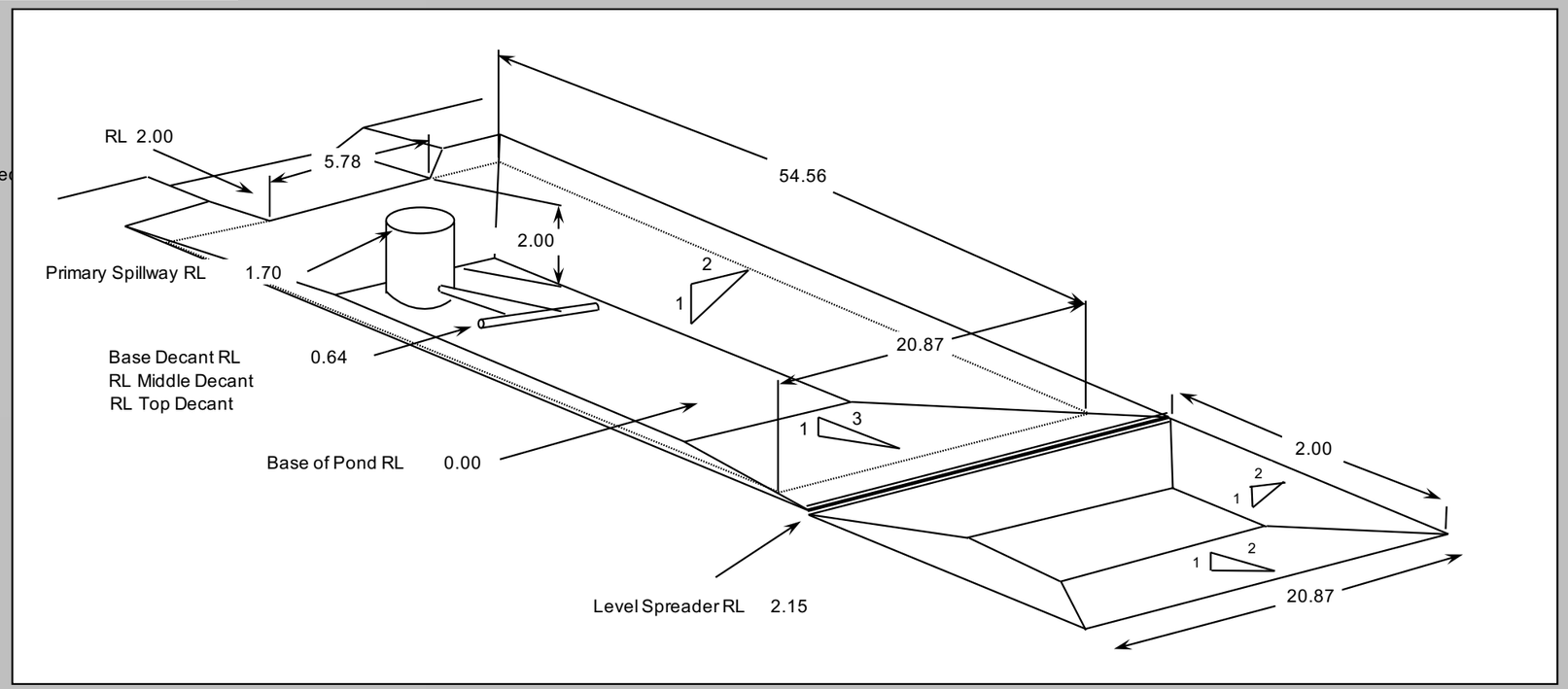
Size criteria	Length Ratio	Side slopes	Depth from Emergency Spillway	R.L. of Pond Base
3%	3:1	2:1	2.00	0.00

4.50 ha SRP 12050

Storage Volume Criteria	3%
Contributing Catchment (ha)	4.50
Minimum Storage Volume (m3)	1350
Length at Spillway Level	54.56
Width at Spillway Level	20.87
Spillway base width (300mm deep)	5.78
Primary Spillway diameter (min)	Manhole Require
Number of decants	3
Number of holes per decant	200
Minimum outlet diameter	300mm
RL Emergency Spillway	2.00
RL Primary Spillway	1.70
RL Level Spreader (min)	2.15
RL Base Decant	0.64
RL Middle Decant	
RL Top Decant	

Forebay

Depth	1 m	min. depth
Width	20.87 m	full width of pond
Length	2.00 m	



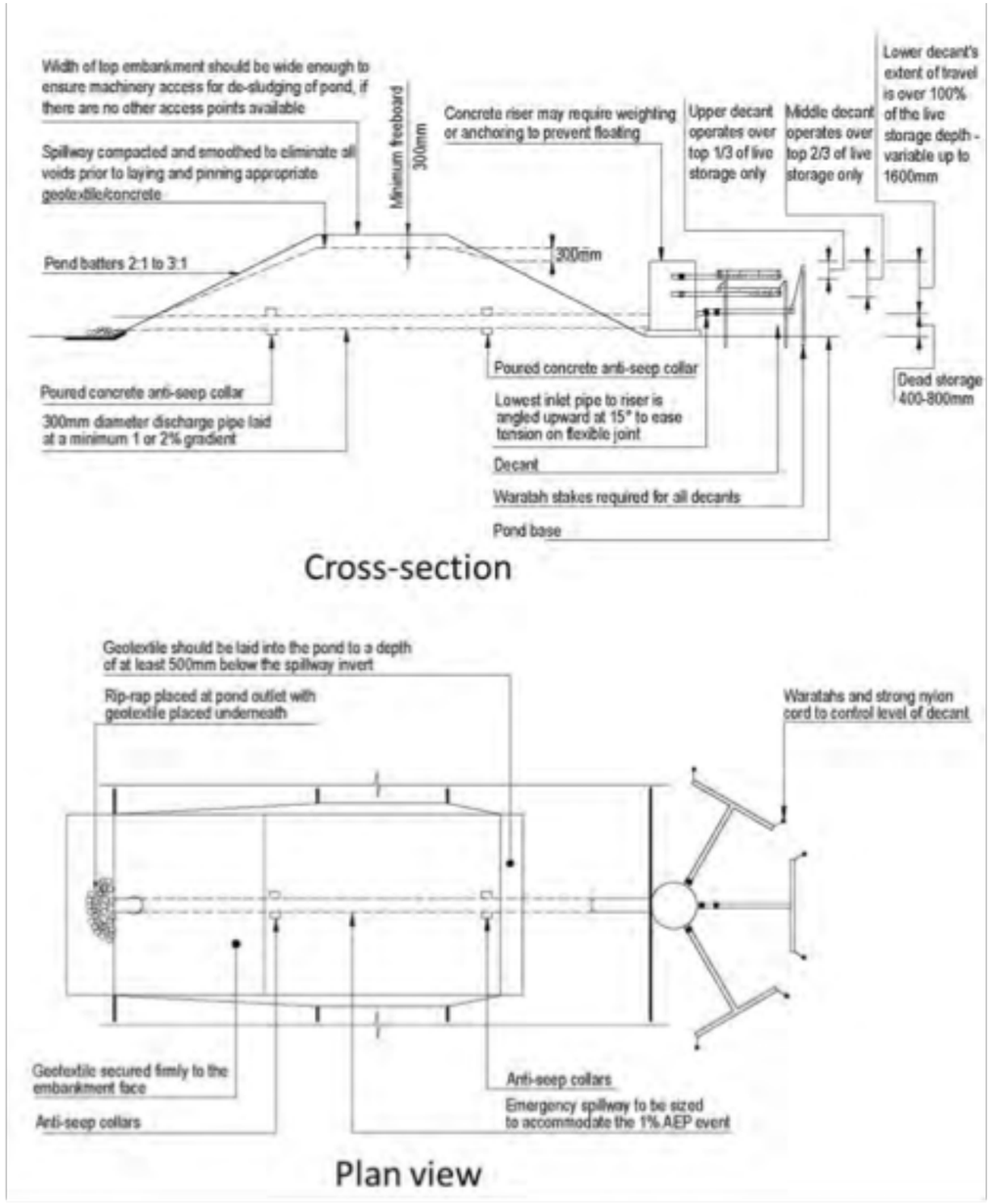


Figure 3: Typical detail SRP 3ha – 5ha

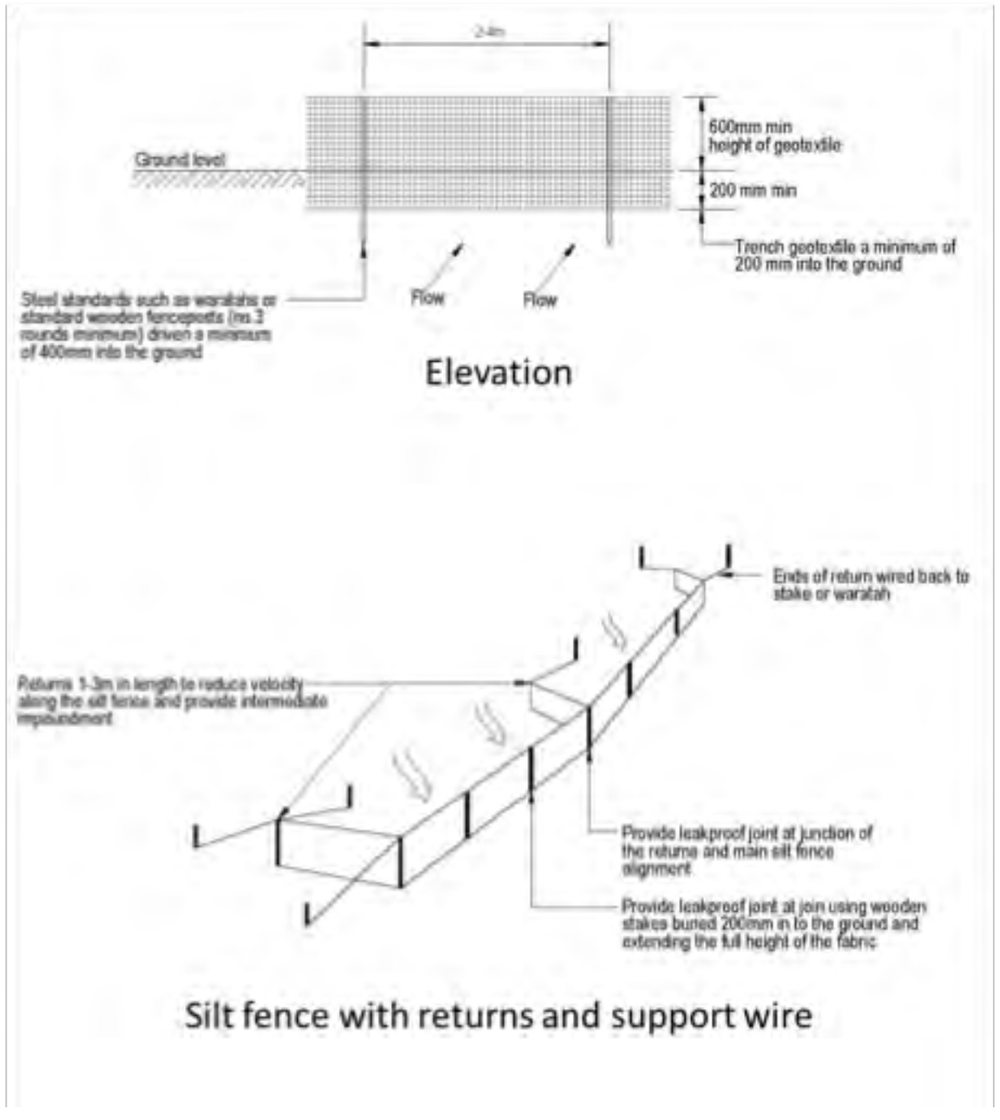


Figure 4: Schematic Silt Fence.

Appendix B – ESC Drawings

Title	Drawing No.	Sheet No.	Revision	Date
Erosion & Sediment Control Plan – O2NL	ESCP-004	1	A	August 22

1 ESCP-021 - CONSTRUCTION NOTES

1.1 Scope

This Erosion and Sediment Control Plan (ESCP) covers the earthworks and civil works associated with the O2NL earthworks between CH23800 and CH24300.

The earthworks activities undertaken as part of this ESCP include:

- Installation of the erosion and sediment control measures.
- General earthworks and civil works generally comprising, site laydown, roading and drainage.
- Site stabilisation.

The proposed erosion and sediment control (ESC) measures have been designed in accordance with the Projects ESCP.

This ESCP is supported by the following reference drawings provided in Appendix B:

ESCP-021

1.2 Construction Methodology

- Prior to the commencement of any works the Project Engineer will inspect the site to confirm the suitability of the proposed controls and methodology..
- At the approximate location, as detailed in the attached drawings, the erosion and sediment control will be constructed.
- Two Sediment Retention Ponds (SRP's) and silt fences will be the main treatment devices installed on the site for the construction of the road, refer to the design details and schedule in Appendix A.
- Perimeter bunds will be installed to ensure all work areas are directed to the SRP's. The perimeter bunds have been designed to convey the 5% Annual Exceedance Probability (AEP) rain event.
- The perimeter bunds that are not turfed will be stabilised immediately upon completion.
- The site will be accessed from Kuku Road.
- An as-built will be completed immediately following construction of each sediment control device to confirm that they have been constructed in accordance with the SSESCP and the Guidelines. The as-built will be submitted to Horizons prior to the commencement of earthworks in the respective catchment of the device.

<u>Earthworks</u>

- Earthworks are to take place over an approximate area of 6.5ha,
- Two Sediment Retention Ponds (SRP's) are to be constructed at the approximate locations shown on the attached drawings and have been sized to provide treatment for each section of works.
- Topsoil will be used to construct the perimeter bunds which are a minimum of 0.55m in height and a screening bund around the laydown area..
- The bulk earthworks will be conducted as a standard cut to fill, and cut to waste operation.
- As batters are completed, they will be progressively trimmed, topsoiled and seeded. Note sediment control will remain in place until an 80% grass strike has been achieved.

1.3 Operation and Maintenance

- The ESC measures will be inspected and signed off by the Environmental Advisor prior to commencement of earthworks.
- The monitoring and maintenance requirements for the ESC measures will be in accordance with the ESCMP.
- The ESC monitoring and maintenance requirements will include, but are not limited to:
    - all ESC structures will be internally inspected on a weekly basis and within 24 hours of each rainstorm event that is likely to impair the function of performance of the controls.
    - any required maintenance or improvements to control measures will be undertaken immediately;
    - the SRP's will be cleaned of sediment before accumulated sediment volume reaches 20% of the total volume of the structure;
    - all erosion and sediment control measures will be maintained in accordance with the ESCP; and
    - weather forecasts will be monitored on a daily basis.
- A record will be maintained of the date and time of inspections undertaken, any maintenance requirements identified, and any maintenance undertaken.
- All ESC measures are to be monitored and maintained throughout the works in accordance with the Projects ESCMP until the site is stabilised.

1.4 Dust Management

- The emphasis of the site's dust management strategy will be one of prevention.
- Vehicle movements on site will be governed by speed restrictions (30km) which will, among other things, assist in preventing dust generation.
- Dampening of dry / dusty areas will be undertaken, when required.
- The Construction Manager will obtain daily forecasts and circulate to all appropriate staff to ensure that during dry weather everyone knows the probability of dust creation. Dust control measures will be put on standby if dry, windy conditions are forecast.
- If dusty conditions are encountered a watercart will be allocated to the project to dampen surfaces.

1.5 Chemical Treatment

- Chemical treatment will be undertaken in accordance the site's Chemical Treatment Management Plan (CTMP).
- SRP Wetland 12 and SRP1 will be chemically treated by way of a rainfall activated chemical dosing system (floc shed, floc box or similar)
- Batch dosing will be undertaken as required in accordance with the CTMP.
- Ongoing monitoring and maintenance will be undertaken in accordance with the CTMP.

Appendix A – Erosion and Sediment Control Details

Diversion Bund Design Details

In accordance with the Greater Wellington Council's ESC Guidelines all diversion bunds are sized to have sufficient capacity to safely carry the flow from a 5% AEP storm, plus a freeboard of 300mm. As no catchments exceed 5ha the standard details can be implemented. A minimum bund height of 550mm will be installed across the site.

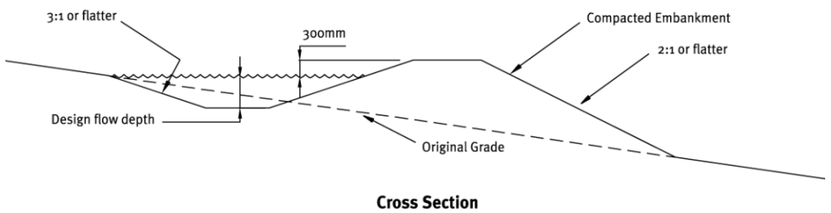


Figure 1: Cross section of a dirty water diversion.

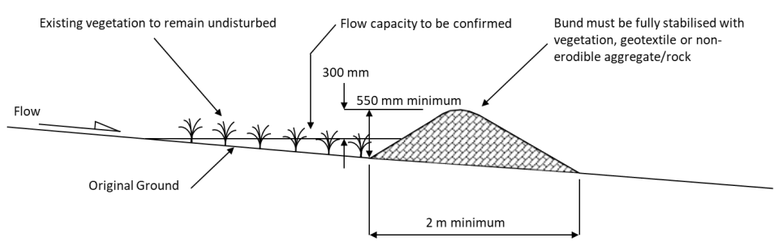
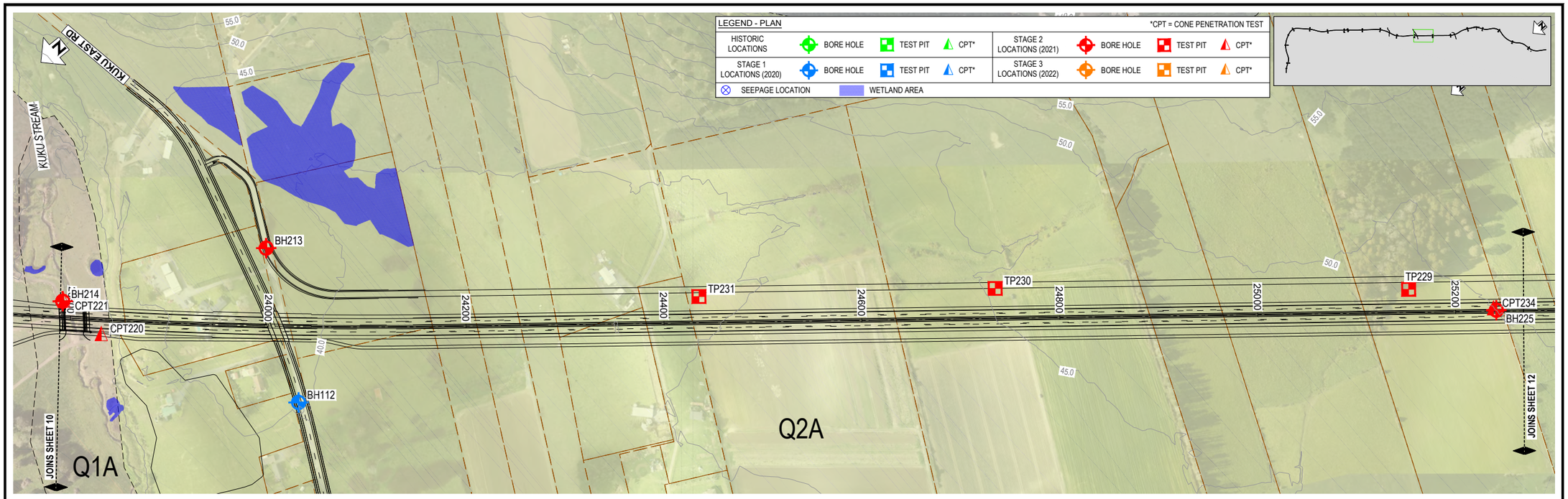


Figure 2: Cross section of a clean water diversion.

.



PLAN

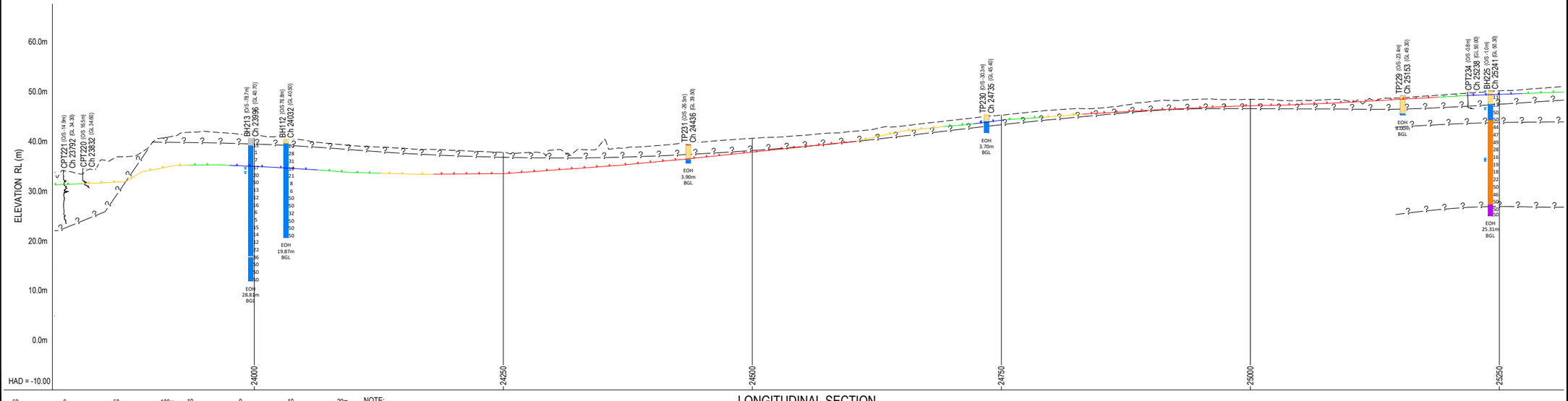
SCALE 1 : 4000 (A3)

LEGEND - LONG SECTION

- TOPSOIL
- FILL
- Q1a HOLOCENE RIVER DEPOSITS
- LOESS DEPOSITS
- Q2a/Q3a PLEISTOCENE ALLUVIUM - Sandy GRAVEL
- Q2a/Q3a PLEISTOCENE ALLUVIUM - UNDIFFERENTIATED
- Q2a/Q3a PLEISTOCENE ALLUVIUM - AGGRADATIONAL FAN GRAVEL
- Q5b PLEISTOCENE SHORELINE DEPOSITS
- Q6a PLEISTOCENE RIVER DEPOSITS
- Tt RAKAIA TERRANE GREYWACKE
- GEOLOGICAL UNIT INTERFACE

INTERPOLATED HIGHEST GROUNDWATER LEVEL CONFIDENCE

- HIGH
- MODERATE
- LOW
- VERY LOW



SCALE 1:4000 (A3)

SCALE 1:800 (A3)

NOTE:
THE EXISTING GROUND LEVEL SHOWN IS ALONG THE DESIGN CENTRE LINE

LONGITUDINAL SECTION

SCALES - H 1 : 4000 (A3)
V 1 : 800 (A3)

FOR INFORMATION ONLY

REV	REVISIONS	DRN	CHK	APP	DATE
C	INCLUDES STAGE 3 (2022) INVESTIGATIONS AND GROUNDWATER INTERPRETATION	SS			
B	ISSUED IN CONJUNCTION WITH GEOTECHNICAL INTERPRETIVE REPORT REVISION C	SS	EG	KC	16.12.21
A	WORKING PLOT FOR DISCUSSION	SS	JG	KC	16.08.21

SURVEYED		
DESIGNED	Jayden Gesche	09.07.21
DRAWN	Steve Sutton	09.07.21
CAD REVIEW		
DESIGN CHECK		
DESIGN REVIEW		
APPROVED		
PROF REGISTRATION:		

Stantec

Client: WAKA KOTAHI NZ TRANSPORT AGENCY

WAKA KOTAHI
OTAKI TO NORTH OF LEVIN

GEOLOGICAL MODEL PLAN AND LONG SECTION
SHEET 11

Status Stamp: **WORKING PLOT**
Date Stamp: **16.08.21**
Scales: AS SHOWN
Drawing No: 310203848-01-200-C1010
Rev: C

pw:\\stantec-ap-pw.bentley.com:stantec-ap-pw-01\Documents\New Zealand Clients\NZTA (New Zealand Transport Agency)\310203848 - Otaki to North of Levin DBC\01200 - Geotech\310203848-01-200-C1010

Sediment Retention Pond Design Details

1. Determine project duration > **6 months**
2. Using HIRDS or local data select the 1-hour storm using the appropriate frequency storm event risk factor for the receiving environments. (2-year, 5-year, 10-year, 20-year or **100-year** from Table 6-4)
3. Determine site soils and slope to select the C Factor – **Flat gravel 0.15 (<10%),** sloping gravel 0.25 (>10%).
4. Determine the site area that would drain to a storage practice - **Refer below**

	C	I	A	Volume
SRP Wetland	0.15	41.2	5	309m^3
SRP1	0.25	41.2	1.5	93m^3

Soil Type	Holes/hectare	Hectares/decant
Flat gravel	27	7.4
Flat – moderately sloping silt loam (0-20%)	72	2.8
Steep silt loam (>20%)	90	2.2
Flat Clay (<20%)	72	2.5
Steep clay (>20%)	72	2.0

Sediment Retention Pond Sizing

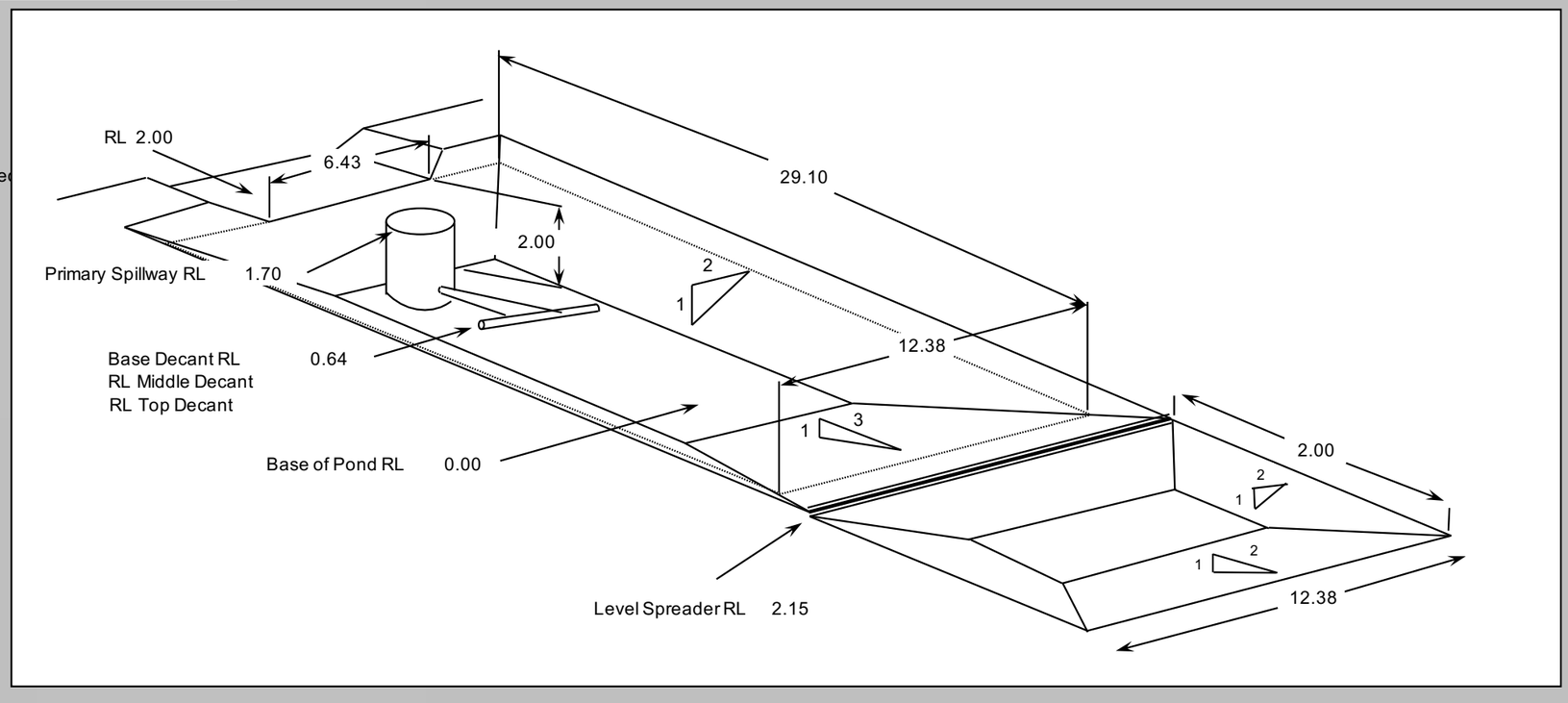
Size criteria	Length Ratio	Side slopes	Depth from Emergency Spillway	R.L. of Pond Base
Auto	3:1	2:1	2.00	0.00

5.00 ha SRP Wetland

Storage Volume Criteria	2%
Contributing Catchment (ha)	5.00
Minimum Storage Volume (m3)	309
Length at Spillway Level	29.10
Width at Spillway Level	12.38
Spillway base width (300mm deep)	6.43
Primary Spillway diameter (min)	Manhole Require
Number of decants	3
Number of holes per decant	45
Minimum outlet diameter	300mm
RL Emergency Spillway	2.00
RL Primary Spillway	1.70
RL Level Spreader (min)	2.15
RL Base Decant	0.64
RL Middle Decant	
RL Top Decant	

Forebay

Depth	1 m	min. depth
Width	12.38 m	full width of pond
Length	2.00 m	

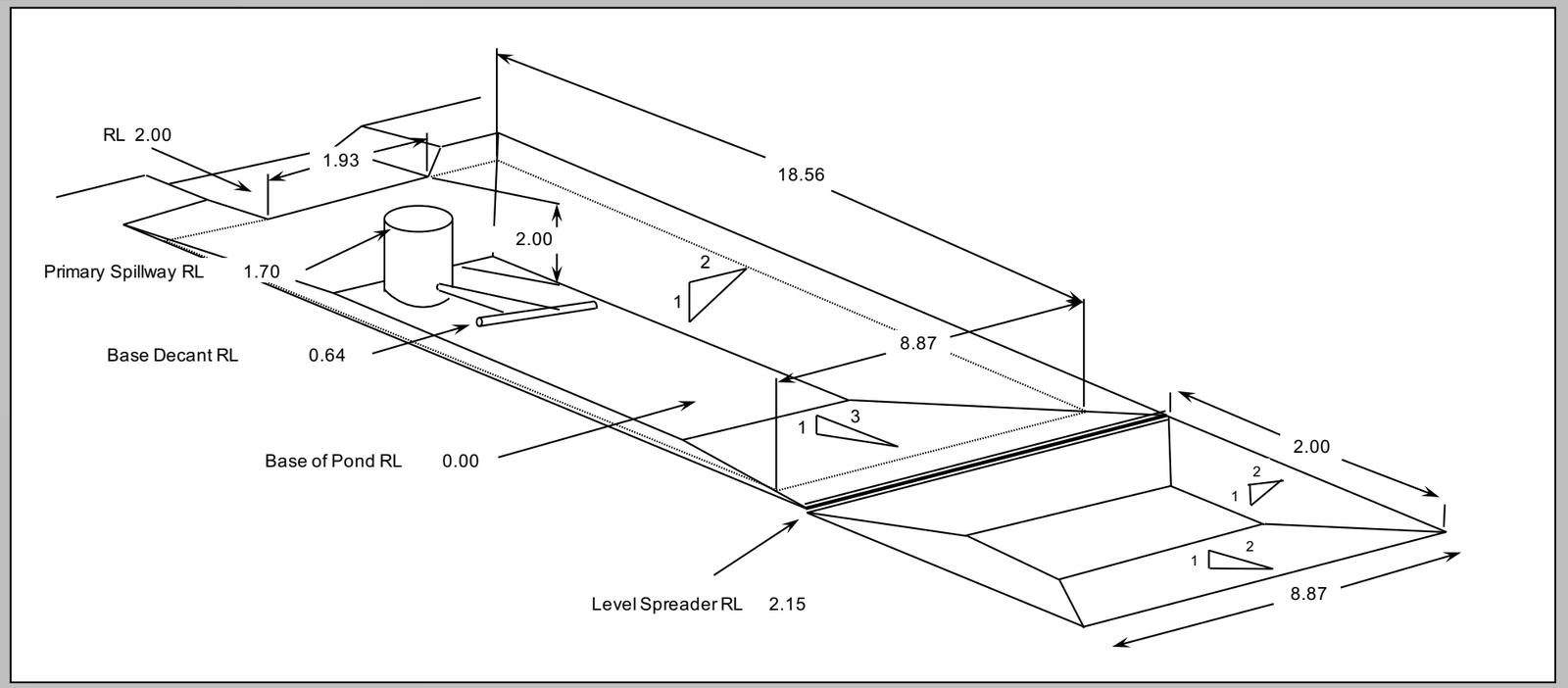


Sediment Retention Pond Sizing

1.50 ha SRP1

Size criteria	Length Ratio	Side slopes	Depth from Emergency Spillway	R.L. of Pond Base
Auto	3:1	2:1	2.00	0.00

Storage Volume Criteria	2%
Contributing Catchment (ha)	1.50
Minimum Storage Volume (m3)	93
Length at Spillway Level	18.56
Width at Spillway Level	8.87
Spillway base width (300mm deep)	1.93
Primary Spillway diameter (min)	150mm
Number of decants	1
Number of holes per decant	41
Minimum outlet diameter	150mm
RL Emergency Spillway	2.00
RL Primary Spillway	1.70
RL Level Spreader (min)	2.15
RL Base Decant	0.64



Forebay

Depth	1 m	min. depth
Width	8.87 m	full width of pond
Length	2.00 m	

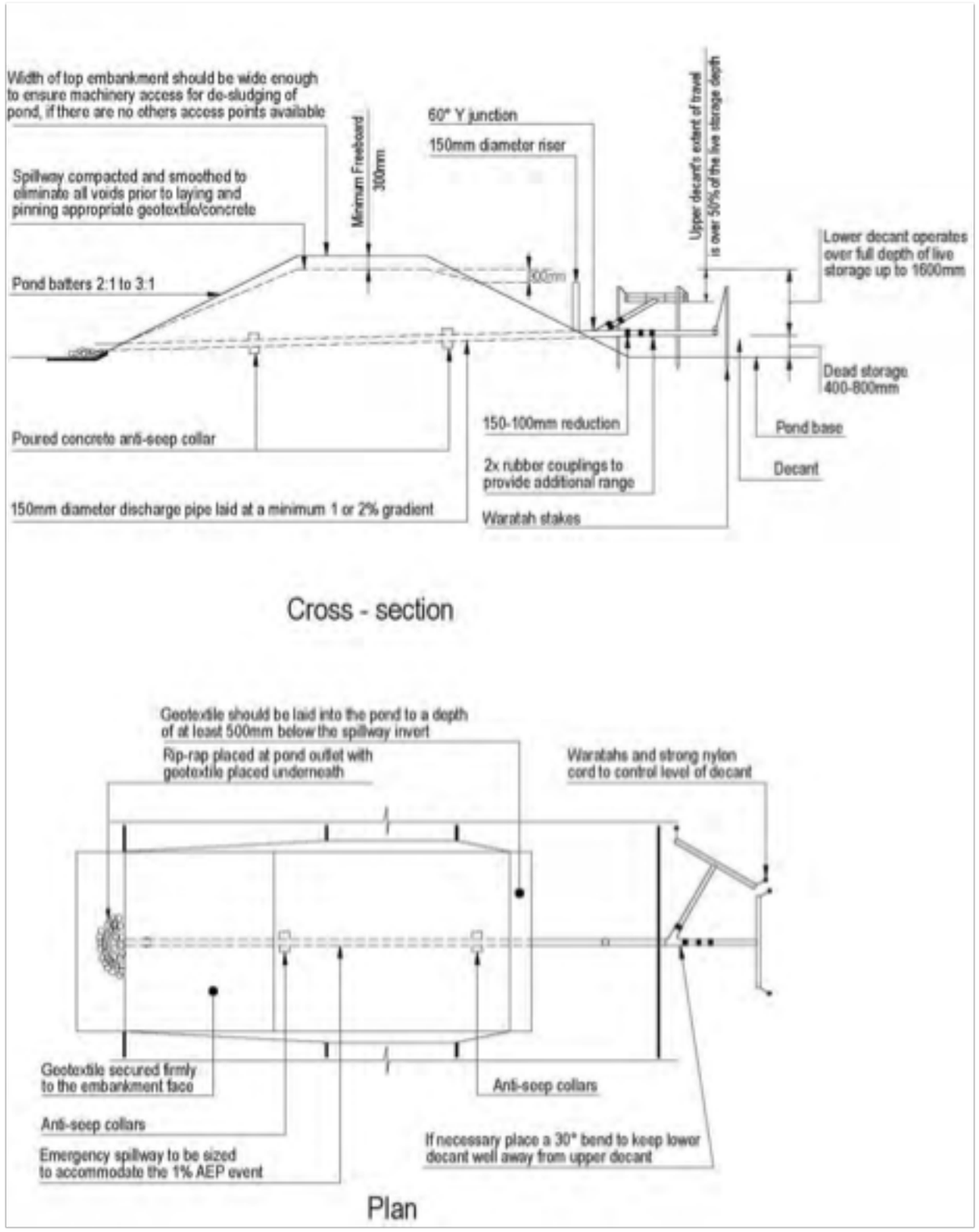


Figure 3: Typical detail SRP 1.50ha – 3ha

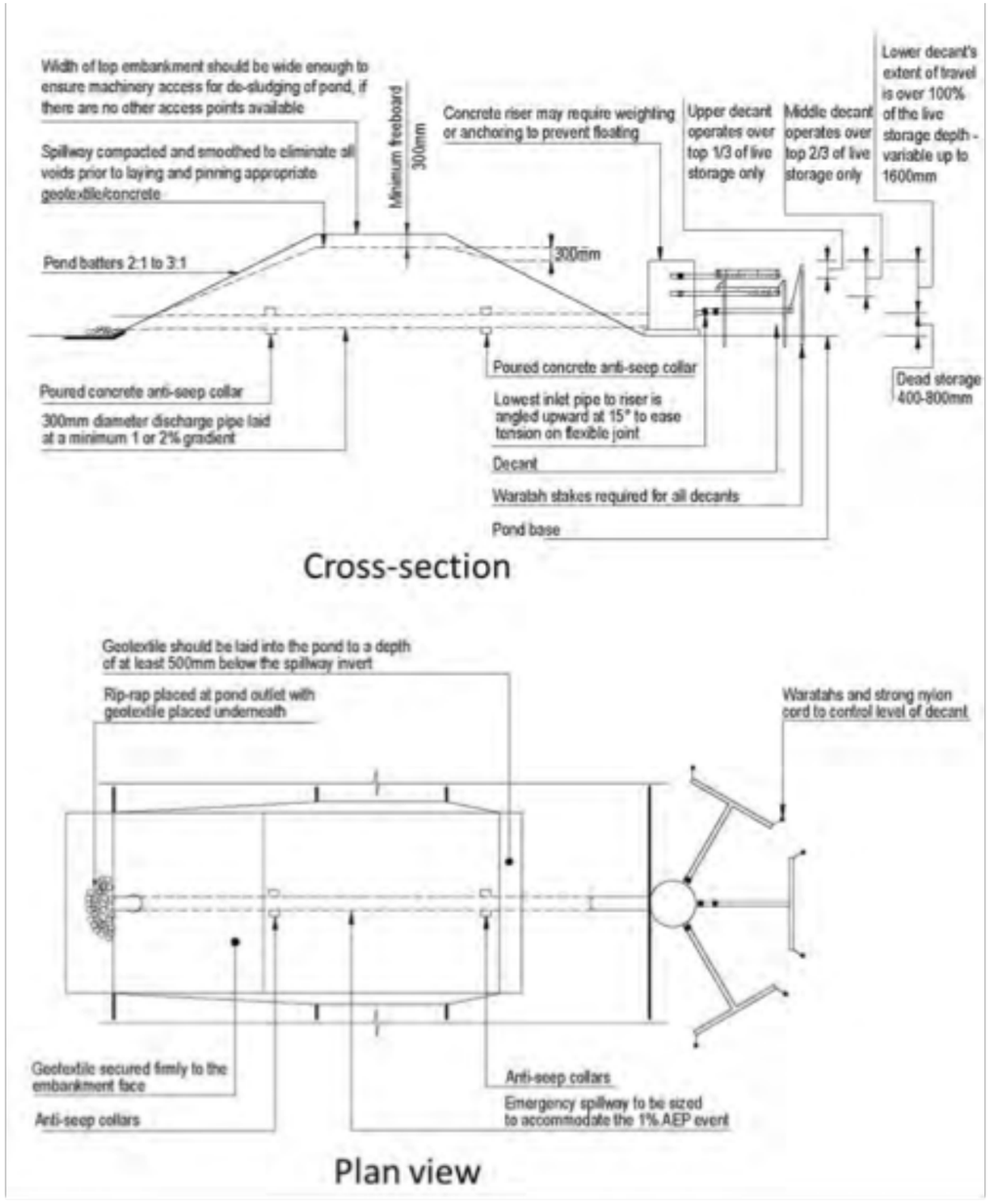


Figure 3: Typical detail SRP 3ha – 5ha

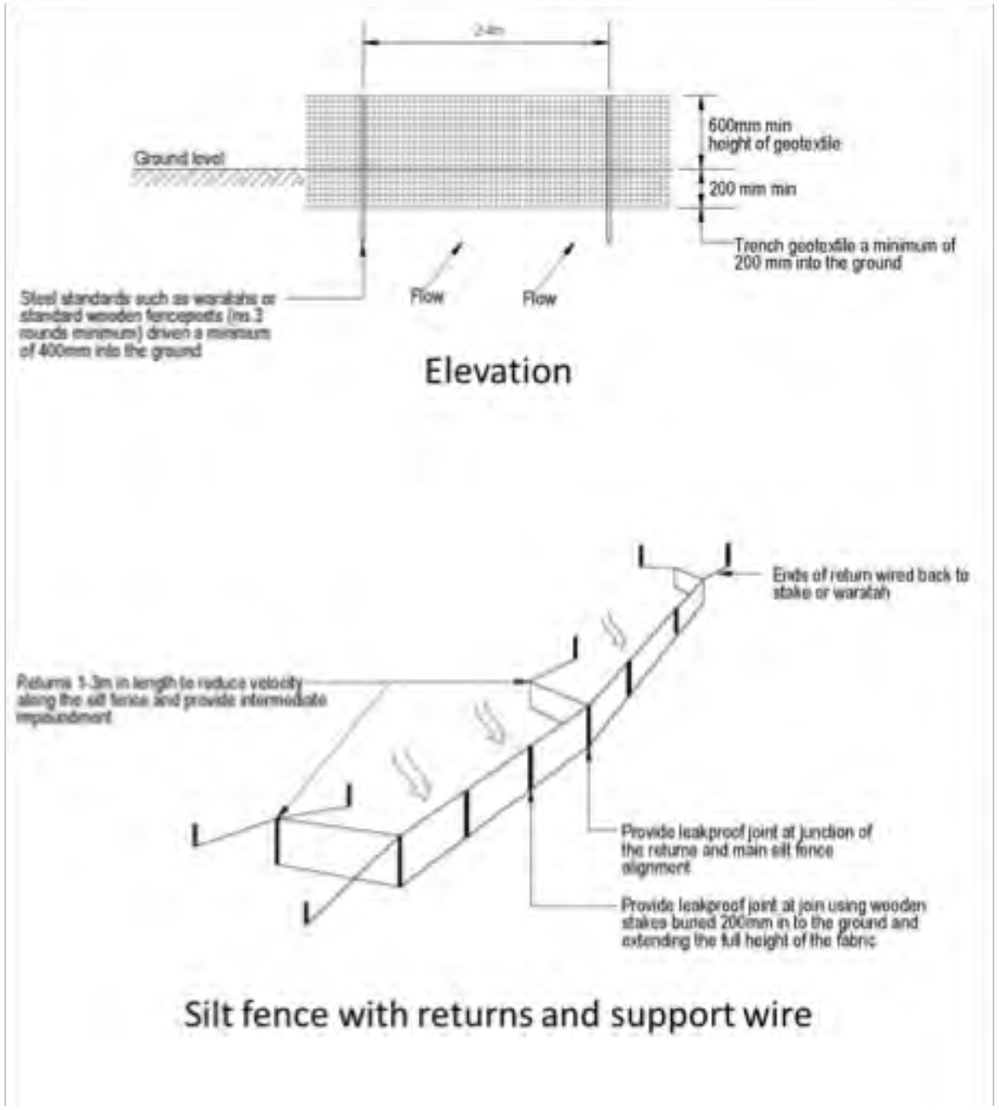


Figure 5: Schematic Silt Fence.

Appendix B – ESC Drawings

Title	Drawing No.	Sheet No.	Revision	Date
Erosion & Sediment Control Plan – O2NL	ESCP-021	1	A	August 22

SRP 12050
Catchment area 45ha
Total volume 1350m^3
Dead storage 405m^3
Live storage 945m^3

Refer to specific methodology

SRP 12000
Catchment area 5ha
Total volume 1500m^3
Dead storage 450m^3
Live storage 1050m^3

SITE 34A
KOPUTAROA

Site 34A – refer specific notes regarding maintaining outside edge to provide for diversion to SRP 12000.
Ensure direction of cut is into the site with perimeter on outside edge at all times

LEGEND

- EXISTING PROPERTY BOUNDARY
- PROPOSED DESIGNATION BOUNDARY
- EXISTING STREAM
- IMPACTED STREAM
- REALIGNED STREAM
- CLEAN OPEN CHANNEL
- CLEAN LINED CHANNEL
- ROAD RUNOFF CHANNEL
- SWALE
- CULVERT
- SW STORMWATER PIPE
- HEADWALL WITH RIP RAP
- SCRUFFY DOME
- MANHOLE
- CATCH PIT
- MANHOLE CATCH PIT
- SCOUR PROTECTION
- SPOIL SITE (INDICATIVE EXTENT)
- MATERIAL SUPPLY SITE (INDICATIVE EXTENT)
- CUT AREA
- FILL AREA

KEY
Erosion and Sediment Control

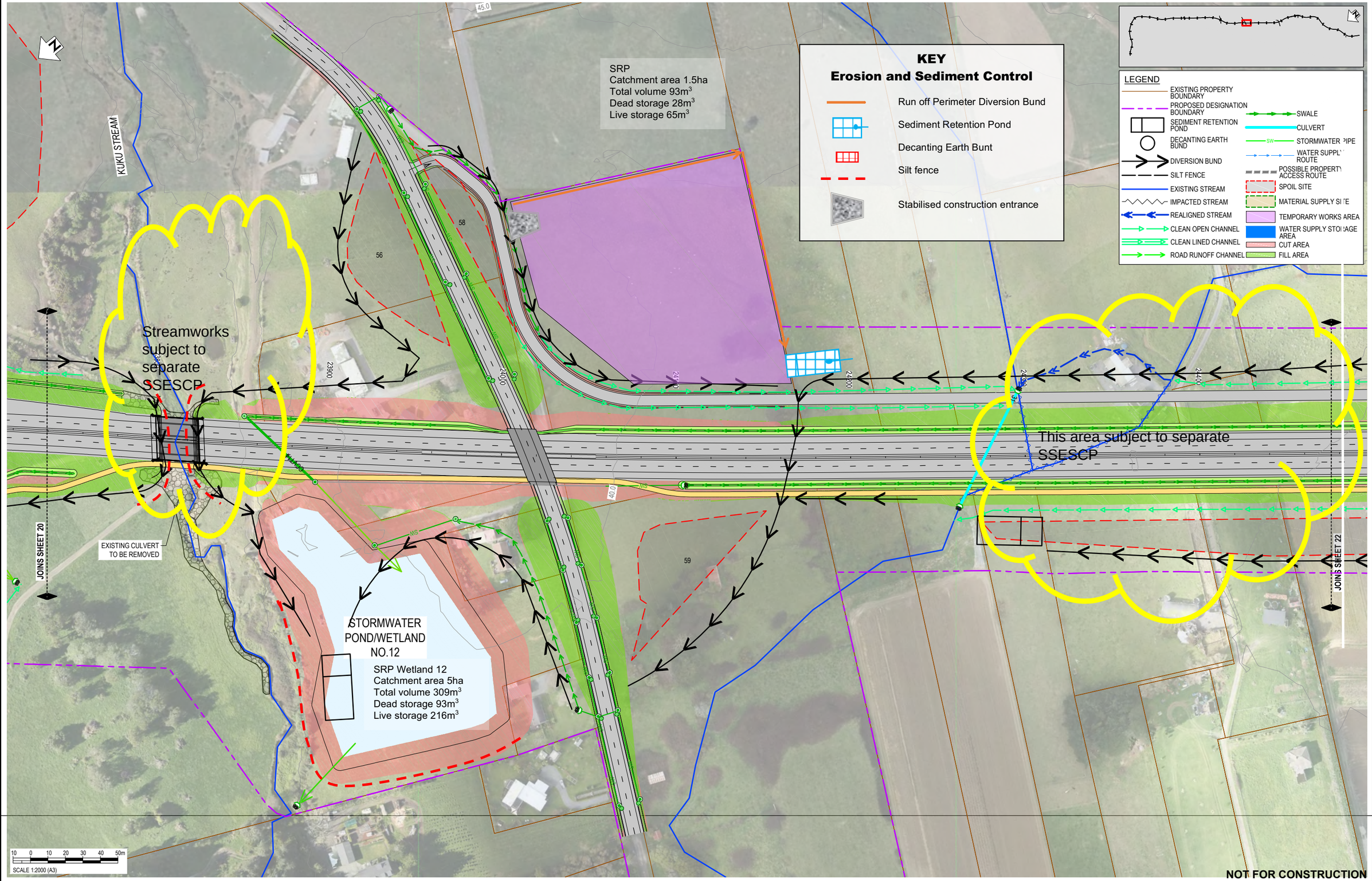
- Run off Perimeter Diversion Bund
- Sediment Retention Pond
- Decanting Earth Bunt
- Silt fence
- Stabilised construction entrance

JOINS SHEET 3

JOINS SHEET 5

10 0 10 20 30 40 50m
SCALE 1:2000 (A3)

FOR INFORMATION ONLY



REV	REVISIONS	DRN	CHK	APP	DATE
A	ISSUED FOR RMA CONSENT	SS			

SURVEYED		
DESIGNED	Gregor McLean	04.05.22
DRAWN	Steve Sutton	04.05.22
CAD REVIEW	Steve Sutton	21.07.22
DESIGN CHECK	Gregor McLean	21.07.22
DESIGN REVIEW	Jamie Povall	21.07.22
APPROVED	Jamie Povall	21.07.22
PROF REGISTRATION:		

Stantec

Client: WAKA KOTAHI NZ TRANSPORT AGENCY

WAKA KOTAHI
ŌTAKI TO NORTH OF LEVIN HIGHWAY PROJECT

EROSION AND SEDIMENT CONTROL PLAN
SHEET 21

Status Stamp: FOR CONSENT
Date Stamp: 22.07.22
Scales: AS SHOWN
Drawing No.: 310203848-01-600-C1020
Rev.: A

pw:\\stantec-ap-pw.bentley.com:stantec-ap-pw-01\Documents\New Zealand Clients\NZTA (New Zealand Transport Agency)\310203848 - Otaki to North of Levin DBC\01 - O2NL\600 - Erosion and Sedimentation\310203848-01-600-C1020