

INDICATIVE SITE SPECIFIC ENVIRONMENTAL MANAGEMENT PLAN (SSEMP)

SH58 Focus Area
(from Chainage 17200m to 17800m)

This Document, that is in the form of an SSEMP, is one of a number that have been developed for key focus areas along the Transmission Gully project alignment. The focus areas were chosen to be representative of the range of sites along the route and to have between them the full range of environmental management issues likely to be encountered during construction of the route.

The aims in producing these documents are to:

- Provide confidence in design;
- Provide an indication as to how works can be staged and programmed;
- Assist in assessing effects;
- Assist in developing mitigation strategies; and
- Assist in consultation with stakeholders regarding construction management issues.

The SSEMP for SH58 specifically explores the following issues:

- Constructability of the road which includes;
- Construction of Interchange;
- Traffic Management works on existing State Highway 58;
- Bridge construction; and
- Erosion and sediment control.

The SSEMPs have been prepared using the best information available and are not intended to be final. They will be refined further during the specimen and detailed design stages and will be to relevant local authority as required by conditions.

July 2011
Version 5 FINAL

1 INTRODUCTION

This SSEMP relates to those construction matters that have potential or actual effects on aspects of the local natural and human environment.

It covers the formation of a two-lane highway and interchange with SH58, while retaining traffic flow on SH58, diversion of the Pauatahanui Stream and a number of small drains, installation of three culverts, installation of a wetland and pre and post construction landscape mitigation along the Pauatahanui Stream corridor. This SSEMP covers a length of alignment of approximately 0.6 kilometres.

Note that the CEMP contains generic details common to the route standard details and methodologies for a range of activities such as diversions, culvert installation, sediment and erosion control, monitoring and mitigation which are not repeated in this SSEMP.

This site specific management plan relates to those matters that are unique to this section of the alignment.

1.1 Consents

The following consents are relevant to this SSEMP:

CONSENT	CONDITION
Greater Wellington Regional Council	
xxx	xxx
xxx	xxx
Porirua City Council	
xxx	xxx

The following activities relevant to this SSEMP are permitted.

ACTIVITY	RULE
Greater Wellington Regional Council	
Xxx	xxxx
Porirua City Council	
Xxx	xxx

1.2 Key Considerations

Special attention needs to be paid to:

- Diversion of the Pauatahanui Stream
- Traffic management on SH58

2 PREPARATION OF DOCUMENT

The draft SSEMP has been prepared by the following people:

Peter Ward	NZTA	Project Manager
Mark Edwards	Opus	Civil Engineering design

Lucie Desrosiers	Beca	Urban design inputs
Stephen Chiles	URS	Noise inputs
Mathew Noonan	Beca	Air quality inputs
Nic Conland	SKM	Environmental management inputs
Wade Robertson	Isthmus	Landscape Architecture

3 CONTACT DETAILS

NZTA

POSITION	NAME	ORGANISATION	CONTACT DETAILS
Project Engineer			
Project Manager			
Site Supervision			
Environmental Management Auditor			
Project Ecologist			

CONTRACTOR

POSITION	NAME	ORGANISATION	CONTACT DETAILS
Contractors Representative			
Site Supervisor			
Site Safety Supervisor			

4 PLANS

Drawings relevant to this SSEMP are contained in volume 5 of the document set. These show:

- SSEMP/C1 General Arrangement Plan
- SSEMP/C2 Construction Access Plan
- SSEMP/C3 Landscape Plan
- SSEMP/C4-5 Erosion and Sediment Control – Sheet 1 and 2
- SSEMP/C6 Conceptual Main Site Compound.

5 ENVIRONMENTAL CONSIDERATIONS

5.1 Erosion & Sediment Control and Stormwater

The area covered by this SSEMP falls within the wider watershed of Pauatahanui Inlet, the northern arm of Porirua Harbour. This harbour is recognised as nationally significant. It is the ultimate receiving environment for any discharges from site. Considerable care is therefore essential in the management of sediment and contaminants.

5.2 Stream Works

Work in the stream is required for the diversion of the Pauatahanui Stream, construction of new culverts for smaller watercourses and construction of a wetland, which will discharge to the stream.

5.3 Indigenous Fish

Special attentions needs to be paid to the protection of native fish within Pauatahanui Stream where it is being diverted and bridged.

5.4 Habitats / Flora / At Risk - threatened plant species

No threatened plant species have been identified for this SSEMP.

5.5 Terrestrial Fauna / At Risk or Threatened fauna species

No threatened fauna species have been identified for this SSEMP.

5.6 Landscape

The area adjacent to the SH58 interchange has a number of landscape issues, and is one of the more critical parts of the route in landscape terms:

- The alluvial flats (Lanes Flat) at the head of Pauatahanui Inlet are a relatively rare landscape type in the area;
- The area has high visibility as a node between the route and SH58;
- The area is close to Pauatahanui Village;
- The area is also close to the head of Pauatahanui Inlet which is regarded as an Outstanding Natural Feature;
- The small size and flatness of the floodplain mean Lanes Flat could be easily overwhelmed;
- The works, including the interchange and adjacent site compound, will encroach across the valley and reduce the extent of Lanes Flat;
- The interchange will sever St Josephs Church from Pauatahanui Village

The area, however, also represents significant opportunity to remedy earlier drainage and modification of Lanes Flat, by restoring a wetland on the balance of the flood plain and restoring riparian vegetation along Pauatahanui Stream. A stormwater detention pond would be incorporated within part of the wetland. Such works would have both visual and natural character benefits, and could also incorporate recreational use.

5.7 Visual

There are a number of residences and private land in close proximity and/or overlooking the SH58/Lanes Flat area.

The interchange and new highway will result in adverse visual amenity effects from a number of such properties both during construction and following construction. The retention of existing vegetation and proposed planting are significant mitigating measures for such effects. The rehabilitation of Lanes Flat will also provide an offset visual mitigation.

Likewise site compound will have adverse visual amenity effects during construction. The proposed planting at the east and west ends of the compound, and around the southern perimeter, is a significant mitigating measure for such effects.

5.8 Social & Amenity

No communities are directly affected by the works within this SSEMP. However, it will be important to retain connectivity along SH58 during construction including for the local community who use St Joseph's Church and local facilities and for who want to access Pauatahanui Village.

5.9 Historical & Cultural Sites

There are no known sites of cultural significance within the area covered by this SSEMP. Accidental discovery protocols are contained within the CEMP.

St Josephs church is an historical building close to the construction site and therefore particular attention will be required in relation to potential dust and vibration effects. Conditions of consent are proposed that will require dust monitoring. Vibration is not anticipated to be an issue but this aspect will need to be reviewed as part of the development of a detailed construction methodology.

5.10 Dust

Dust control is necessary to assist with sediment management and to protect residential and commercial areas and SH58, that lie in close proximity to the area covered by this SSEMP. Dust generation will occur through bulk earthworks, transportation, and any vegetation clearance that is carried out as part of enabling works.

5.11 Noise & Vibration

Management of noise will be an important environmental consideration for this SSEMP given its close proximity to residential areas. A Construction Noise and Vibration Management Plan (CNVMP) forms part of the CEMP.

5.12 Traffic

Management of traffic will not be an issue for this SSEMP as all access is off SH58. A Construction Traffic Management Plan (CTMP) forms part of the CEMP.

5.13 Forestry

There is no exotic forestry within this SSEMP.

5.14 Restricted 'NO GO' Areas

There are no restricted areas within this SSEMP.

5.15 Water Abstraction

Water abstraction from the Pauatahanui Stream may be required for concrete batching in this work area. Harvesting of treated water from sediment ponds for dust management may occur. Water for dust control may be imported to the site by truck. If needed consents for water abstraction from streams will be obtained at a later stage.

6 WORK PROGRAMME

6.1 Staging

The exact timing and construction staging is still to be confirmed however generally the earthworks process includes:

- Site establishment.
- Establishment of Erosion and Sediment Control measures.
- Earthworks.
- Bridge construction.
- Re-vegetation of exposed earthworks areas (to be undertaken as work areas are completed).
- Pavement Works.
- Removal of Erosion and Sediment Control measures after agreement with GWRC.

6.2 Programme

The works will be undertaken in a sequential manner. All stream works will be completed prior to commencement of bulk earth works to form the proposed road and fill areas. The road works will be divided into three sections.

A detailed work programme will be prepared in due course by the contractor but may be undertaken in the following sequence:

STAGE 1 – Enabling works

- Establish site compound and related landscape mitigation measures
- 1 Install clean water diversion bunds and silt fences
- 2 Install access way to the new stream bed
- 3 Construction new stream bed for the Pauatahanui Stream
- 4 Remove temporary dams and divert water through the new stream bed
- 5 Install access way to the existing stream bed, and clean water diversion bunds around the area
- 6 Install new earth dams on the old stream bed
- 7 Move sediment fences to protect the new water course
- 8 Remove redundant bund on the north side of the stream
- 9 Clean out and fill in old stream bed

PHASE 2 - CONSTRUCTION WORKS

- 10 Install culvert at Paramata-Haywards Road
- 11 Install erosion and sediment controls for this phase
- 12 Open site and undertake construction works including bridges
- 13 Shift traffic onto the new SH58 to allow Phase 3 to progress

PHASE 3 – CONSTRUCTION WORKS

- 14 Install culverts under new alignment
- 15 Install erosion and sediment controls for this phase
- 16 Open site and complete construction works

POST CONSTRUCTION WORKS

- 17 Landscaping of the Pauatahanui Stream corridor
- 18 Monitor and maintain planting

7 ENABLING WORKS

The Contractor's working/establishment areas will involve site clearance, stripping of topsoil (if any), localised contouring and placement of hardfill. The exact locations of the Contractor's working/establishment areas are unknown at this stage but will result in establishment of a compound located to the south of the exiting SH58 opposite the existing sub station.

7.1 Site Access

The SH58 focus area is in front 1 of the proposed construction staging programme for the Transmission Gully Project. The SH58 focus area is a very important part of the project in terms of site access at it will be used as a base for construction to commence in the north and south directions along the alignment.

The main site compound for the project will be located adjacent and to the south of the existing SH58 opposite the electricity sub station. Access to this compound will be from the existing SH58 which ultimately will be realigned as part of the Project. As the focus area covers only a short section of the alignment no temporary access tracks will be required in the area.

However temporary access tracks will be constructed from the focus area to provide access to other sections of the alignment (north and south of this location).

7.2 Traffic

Traffic will be managed according to standards described in the Construction Traffic Management Plan.

7.3 Noise

Noise will be managed according to standards described in the CNVMP.

7.4 Site Clearance / Forestry

The removal of the eastern end of the existing kanuka adjacent to the Pauatahanui Stream will be required, along with other minor vegetation clearance in order to provide for construction and other enabling works.

Such clearance should be limited as much as possible. The area of kanuka vegetation to be cleared should be surveyed beforehand and fenced in order to avoid unnecessary encroachment. Edges should be replanted to protect the vegetation from wind damage and weed encroachment.

Seed (and possibly seedlings) shall be collected from this area and used to propagate plants for revegetation. Extensive additional kanuka planting to be undertaken in the vicinity of Lanes Flat will outweigh the extent of vegetation to be removed, and is a significant visual and natural character mitigation measure.

7.5 Laydown Areas

A laydown area is proposed to the northwest of the SH58 interchange. The concept plan is outlined in SSEMP/C6.

7.6 Stockpile Areas

None are proposed within this SSEMP

7.7 Utilities

A restricted work area will be established underneath existing power lines and associated pylons. Potential dust effects on the substation and pylons will be carefully monitored.

7.8 Fencing

The workers compound and working areas will be fenced so as to prevent access to the construction site from public areas.

7.9 Species translocations

Immediately prior to any stream reclamation or diversion process, the section of stream to be reclaimed will be isolated by coffer dams or bunds, and any fish present will be safely captured for translocation by accepted methods as provided in the CEMP (specifically the Ecological Mitigation Plan).

All fish that are captured will be transferred upstream to the nearest equivalent habitat to limit their exposure to any increased turbidity that is caused during the diversion or culvert installation process.

7.10 Stream Works

In-stream works are required for the diversion of the Pauatahanui Stream and smaller tributaries, construction of new culverts for the smaller watercourses and construction of a wetland outfall structure into the Pauatahanui stream.

7.10.1 Culverts

The following culverts are in the SH58 SSEMP area and will be built according to specifications contained within the EMP:

Chainage	Pipe reference	Pipe diameter (mm)	Indicative gradient (m/m)	Catchment (ha)	Q10 Design Flow (m ³ /s)	Height below pipe soffit in Q10 (m)	Q100 Design Flow (m ³ /s)
Ch17350	Pa5	600	1 in 9	2.7	0.27	0	0.49
Ch17475	Pa6	1050	1 in 100	11.1	0.80	0.55	1.5
Ch17475	Pa6A	1050	1 in 11	11.1	0.80	0.55	1.5

Fish passage requirements for the culverts are as follows:

CHAINAGE	CULVERT NUMBER	TYPE OF FISH PASSAGE TREATMENT
Ch17350	Pa5	None required
Ch17475	Pa6	Standard fish passage required
Ch17475	Pa6a	None required

7.10.2 Diversions

There will be a major diversion of the Pauatahanui Stream (PAD3) required in the SH58 section of works to realign the stream beneath the new highway overpass. In addition, a number of small tributaries require smaller diversions into new culverts.

7.11 Erosion Control

Relevant drawings: SSEMP C4, C5

This SSEMP area is relatively flat with no significant cut required. Erosion control will focus on the diversion of the Pauatahanui Stream and the installation of three new culverts on small tributaries, as well as the protection of exposed soils during earthworks.

The diversion of the stream will first involve the installation of coffer dams across the mouth and outlet of the new diversion. This will prevent the ingress of water until the diversion route is

complete, which will reduce the potential for erosion. A small culvert under the site access will be provided to divert an existing tributary of the stream to upstream of the earthworks. A clean water diversion bund will direct runoff from outside the construction area around the new stream diversion route.

Once the new stream diversion route is in place the existing channel will be dammed. The existing channel will be cleaned out and infilled, and the new channel will be silt fenced.

During the first stages of bulk earthworks the existing SH58 will act as a clean water diversion bund. When traffic is diverted onto the new route, clean water diversion bunds will be constructed around the upgradient extent of the earthworks to direct runoff to existing watercourses (either small drains or the Pauatahanui Stream).

The following table summarises the erosion control measures in the SH58 work area.

CHAINAGE	MATERIAL	ACTION
17690	Damming of existing Pauatahanui Stream section	To divert water into the new channel and prevent erosion while the old channel is being backfilled cofferdams will be constructed across the mouth and outlet of the old channel.
17200 to 17800	Clean water diversion bunds	<ul style="list-style-type: none"> - In the early phases to the north of the new Pauatahanui Stream diversion, then once the stream has been diverted, around the south of the old stream route - From undisturbed areas around the wetland into the Pauatahanui Stream - Around the south of the main construction area and alongside SH58 while the new culverts are installed and construction works commence

8 CONSTRUCTION WORKS

8.1 Earthworks

Initial earthworks in the focus area will involve the importation of fill material to establish a small site office in the first stages of the Projects construction (probably early 2016).

Earthworks will then be completed along with the construction of bridge 14 to allow a haul road to be constructed that will link with SH58. It is necessary to construct bridge 14 so that it can be used to transport the imported fill required to construct the roundabout and roundabout ramps at the interchange. In the northern approach to the interchange there are small cuts required to form slopes for the roundabout approaches, material from these cuts will be used within the focus area. Material from the focus area is unlikely to need to be transported to an external site.

Earthworks will commence on the southern approach to the roundabout so that bridge 14 can be constructed along with the roundabout so that traffic on the existing SH58 can be transferred to the new alignment. Earthworks will then commence on the eastern approach and eastern side of the roundabout, alongside the construction of bridge 12. The roundabout can be constructed offline. Earthworks are likely to be completed within 2 years of starting.

8.2 Cut & Fill Treatments

The final form and treatment of cut and fill batters has a significant bearing on both landscape and visual effects. In order to reduce the degree of these effects the following actions will be undertaken:

- Both cut and fill batters to receive final revegetation treatment (see 9.5.2 – Revegetation below) at earliest possible time following completion of construction *provided* this timing is conducive to vegetation growth. If the Site Environmental Management Auditor finds that conditions are not acceptable an interim treatment (hydroseeded grass) will be applied prior and the final landscape treatment carried out at an appropriate time within the following year.
- Benches where practical will be spaced evenly *except* for the first bench which will be a minimum of 15m above finished road level.
- Benches near the top of cut batters will be avoided by grading back the top batters at a shallower angle
- Faces will be left with a rough surface to facilitate vegetation growth.
- Tops of cuts and ends of cut/ fills rounded off to reduce hard edges.
- Soil material will be left on benches to aid revegetation.
- Benches shaped to retain water and facilitate vegetation growth.

8.3 Proposed Fill Sites

There are no proposed fill sites within this SSEMP.

8.4 Erosion Control

The primary construction methodology for mitigation against sediment release to the environment is targeted erosion control. In the Pauatahanui SSEMP area this will involved the development of stepped slopes during earthworks, roughing up the soil, importing and laying topsoil, mulch or compost blankets, use of sprayed and bound straw mulch or hydro seeding. On steeper slopes rolled erosion control blankets or netting may be used, and if any particularly steep vulnerable slopes are worked wire blankets or cellular confinement will be used to provide sufficient control.

8.5 Sediment Control Measures

Relevant drawings: SSEMP C4, C5

Sediment control will be necessary for areas of exposed earthworks. This will include the new diverted course of the Pauatahanui, the existing stream, the excess fill sites and the bulk earthworks themselves.

Stabilised construction entrances and metalled access ways will reduce the tracking of sediment across the earthworks site and also out of the site onto public roads. Two stabilised entrances are envisaged for the SH58 work area.

Runoff from earthworks areas will be directed to diversion bunds and contour drains, which will lead to one of six sediment ponds. One smaller catchment will instead have an earth decanting bund. Chemical treatment will be used within the ponds to assist with settlement of sediments.

During the final phase the sediment ponds and tanks will be repositioned to suit the new contours and changing construction catchments. The sediment controls will remain in place until all earthworks are complete and all areas are stabilised.

The following summarises the sediment control measures in the SH58 work area.

CHAINAGE	MEASURE	COMMENT
17650 & 17710	Stabilised construction entrances & metalled access	Two, both from Bradey Road. The first will be required to construct the Pauatahanui Stream diversion and the second to fill the old stream course. The first will remain to be used during the main construction stage.
17400 - 17750	Silt fences	Adjacent to Pauatahanui Stream whilst the stream diversion is under construction - Along both banks of the new stream course while the old course is being backfilled and until stabilised - Along the north bank of the new stream course during the main construction phase - Around the excess spoil disposal area until stabilised
17300 - 17750	Diversion bunds	Various places within the site to divert potentially silt-laden water to the sediment retention ponds or earth decanting bund
17470 - 17690	Six sediment ponds	Installed to accept runoff from the diversion bunds and sized according to their catchments. Positioned to discharge to existing watercourses.
17450	Decanting earth bund	To service a small area
17470 - 17690	Chemical treatment	Sheds will be installed adjacent to each pond and decanting bund to provide chemical treatment to assist with the settlement of sediment

Design details of the sediment ponds can be found in the appendix.

8.6 Retention and Revegetation

CHAINAGE	CURRENT VEGETATION	PROPOSED VEGETATION	METHOD
17200 - 17450	Pasture and exotic shelter belts	Native riparian planting	Hand planting of native trees and shrubs. Application of compost blanket.
		Kanuka belt	Hand planting of native trees
		Grass hydroseeding on cut/ fill batters	Hydroseeding on cut/fill batters and fill areas
17400 (Schofield Property)	Pasture	Exotic shelter belt/ visual mitigation planting (2-3 rows of Pb40 trees)	Hand planting of exotic trees. Application of wool mats for each tree.
17300 – 17800 (Central median and slip lane margins)	Pasture, kanuka belt and exotic shelter belts/ stands	Amenity planting	Spreading of topsoil. Hand planting of native shrubs and perennials. Application of straw mulch.

17400 – 17600 (Site Compound; new SH58 margin; roundabout; SH58/Bradey Rd intersection)	Pasture	Kahikatea Grid/ visual mitigation planting	Spreading of topsoil. Hand planting of kahikatea trees and native shrubs. Application of compost mulch.
17550 – 17700 (Lanes Flat)	Pasture	Wetland planting	Hand planting of suitable wetland plants.
Pauatahanui Stream	Pasture, riparian vegetation and kanuka belt	Native riparian planting	Retention of existing kanuka trees.
17700 - 17800	Pasture, kanuka belt, pine trees and invasive weeds	Kanuka belt	Retention of existing kanuka trees. Hydroseed on cut/ fill batters moss/lichen/kanuka/grass in gel Hand planting of native trees Release spraying.

8.7 Water Abstraction

Water abstraction from the Pauatahanui Stream may be required for concrete batching in this work area. Harvesting from sediment ponds for dust management may also occur.

8.8 Quarrying

No aggregate sourcing will occur outside the road footprint within this SSEMP.

8.9 Dust Control

Where dust control is identified as a specific issue, an investigation by the Construction Supervisor into the cause will be required. When the cause has been identified the specific controls can be applied to the problem area(s). The following controls are to be deployed on the construction sites as required.

- Water (water cart irrigation), provides good short term solution. Caution is required to avoid erosion from the over application of water. All areas identified as dust sources including roads are to be kept dampened during dry weather periods to minimise public nuisance from windborne dust.
- Chemical adhesive sprays, provide longer term solutions to small areas which aren't able to be treated by water such as hill slopes or long term stock piles. Need to check use is a permitted activity in terms of the district and regional plans and over spray risks are managed.
- Wind fences, are good for small areas and may be appropriate to be used in this location.
- Mechanical treatment, such as slopes rolled with mulch or aggregate provide effective control for wind erosion. However, these can't be used in active work areas, so require careful planning for installation.
- Cover blankets for stock piles.

8.10 Transporting of Materials

All materials transported to and from the sites will need to be assessed for the risk of dust release during transit. Where the load is identified as being a potential dust nuisance such as crushed concrete or topsoil, etc., then the load will need to be covered or dampened down prior to transporting. The Construction Supervisor will be responsible for keeping a record of:

- Date and time of movement;
- Transport provider;

- Material moved on and off site;
- Potential for dust release; and,
- Actions taken to control the material.

9 TRAINING

Within this SSEMP site, all contractors will receive a full briefing on the Environmental Considerations including avoidance of NO-GO sites, recognition of habitats of significant species, timing of ecological and water quality monitoring.

10 MONITORING

Performance monitoring of the proposed ESC devices is intended to ensure that they operate as designed and that their performance is maintained over the lifespan of their use on the project. The discharges from the site works and the proposed treatment devices will enter watercourses throughout the catchments. The following monitoring of the receiving environment is proposed to check whether the effects of the discharges are as anticipated.

Monitoring of erosion and sediment control measures sediment will be as follows:

Control Measure	Routine Inspection	Wet Weather And Incident Inspections	Inspect For	Performance Measures	Management Action	Reporting
Control and retention of disturbed soil at earthwork sites (Improve Soil Health)	Weekly	During heavy rain (Q10 event) and after all rain	Soil loss Rill erosion Surface water flow pathways	Retention of soil	Rectify any erosion or channel formation Re-grade surface as required	Inspection, outcomes and management action in site log
Provide Short Term Soil Cover	Weekly	When rainfall predicted through weather monitoring. After all rain	Surface water pathways / erosion	Design specifications	Undertake straw mulching Hydro seeding	Inspection, outcomes and management action in site log
Provide Long Term Soil Cover	Weekly	During heavy rain (Q10 event) and after heavy rain (Q10 event)	Damage / erosion Growth of plantings (including gaps)	90% cover or stabilised	Rectify and repair damage to blankets/netting Replant gaps/dieback	Inspection, outcomes and management action in site log
Steep Slope Techniques	Weekly till 90% stabilised (i.e. 90% gassed or equivalent)	During heavy rain (Q10 event) and after heavy rain (Q10 event)	Damage / erosion Growth of plantings (including gaps)	Design specifications	Rectify and repair damage to blankets/netting Replant gaps/dieback	Inspection, outcomes and management action in site log
Clean water diversion	Weekly	During heavy rain (Q10)	Damage / erosion	Design specifications	Rectify any damage /	Inspection, outcomes and

Control Measure	Routine Inspection	Wet Weather And Incident Inspections	Inspect For	Performance Measures	Management Action	Reporting
bund		event) and after all rain	Blockages Sediment build-up		erosion or blockages Remove accumulated sediment in diversion channel.	management action in site log
Rock check dam	Weekly	After all rain	Damage / erosion Blockages Sediment build-up	Design specifications	Rectify any damage / erosion or blockages Remove accumulated sediment behind dams when 50% full	Inspection, outcomes and management action in site log
Pipe drop structure/ flume	Weekly	After all rain	Damage / erosion Blockages	Design specifications	Rectify any damage / erosion or blockages	Inspection, outcomes and management action in site log
'Pinned' Silt socks or gravel check dams	Weekly	During heavy rain (Q10 event) and after heavy rain (Q10 event)	Damage / erosion Sediment build-up	Design specifications	Rectify and damage / erosion or blockages Replace/ repair gaps	Inspection, outcomes and management action in site log
Sediment Retention Pond	Daily	After all rain. During heavy rain (Q10)	Sediment build up	Measure depth of sediment versus pond volume	Remove sediment when 20% full	Inspection, outcomes and management action in site log
			Damage/ Function of the decants/ Level Spreaders / Fore bay	Design Specifications	Rectify any damage / blockages to fore bay	Inspection, outcomes and management action in site log Advise GWRC within 24hrs of significant damage and management actions
Chemical treatment System	Weekly	After all rain. During heavy rain (Q10)	Damage, low dosing supply	Design Specifications	Rectify any damage or blockages. Replace flocculent	Inspection, outcomes and management action in site log
Sediment Fence / Silt Socks	Weekly	After all storm events (Q2-Q10)	Sediment build-up	Measure depth of sediment versus fence height	Remove sediment when 20% of height occupied	Inspection, outcomes and management action in site log

Control Measure	Routine Inspection	Wet Weather And Incident Inspections	Inspect For	Performance Measures	Management Action	Reporting
			Damage/ erosion/ water bypass	Design Specifications	Rectify any damage / erosion. Relocate devices to deal with bypass	Inspection, outcomes and management action in site log
Decanting Earth Bund	Weekly	After all rain events During heavy rain (Q10)	Sediment build-up	Measure depth of sediment versus pond volume	Remove sediment when 20% full	Inspection, outcomes and management action in site log
			Damage/ erosion Blockages	Design Specifications	Rectify any damage / erosion or blockages	Inspection, outcomes and management action in site log Advise GWRC within 24hrs of significant damage and management actions
Stormwater Inlet Protection	Weekly	After all rain	Damage/ erosion Blockages	Design Specifications	Rectify any damage / erosion or blockages	Inspection, outcomes and management action in site log
Works in watercourses	Weekly	After all rain	Visual release of sediment into the water above that envisaged for works	Documented method for works	Investigate source of sediment and rectify works/modify method	Inspection, outcomes and management action in site log

11 REPORTING (AS ABOVE)

No reporting above and beyond the requirements of the CEMP are required for this SSEMP section.

12 APPENDIX - CALCULATIONS

12.1 Quantities

All works and Erosion and Sediment Control measures will be contained within the designation. The indicative earthworks quantities for the SH58 SEMP are summarised in the table below.

EARTHWORKS CATEGORY	AREA (m ²)	QUANTITY (m ³)
TOTALS		
Earthworks Cut from 17200m to 17800m	2,100	36,000
Earthworks Fill from 17200m to 17800m	2,300	357,000
BREAKDOWN		
Cut to Waste	TBA	11,000
Cut to Fill	TBA	25,000
Imported Fill (from outside SH58 area)	TBA	322,000

12.2 Chemically Treated Sediment Retention Ponds

There are proposed to be six sediment ponds used during construction. The catchment size and size of proposed ponds are as follows:

CHAINAGE	CATCHMENT AREA (ha)	POND SIZE (m)	POND REFERENCE	COMMENTS
17690		48 x 18 x 1.5	A	Replaced by wetland
17500		49.5 x 80 x 1.9	B	
17510		24 x 10 x 1.9	C	
17680		48 x 13 x 1.9	D	Within existing Pauatahanui streambed after diversion
17680		32.5 x 12.5 x 1.9	E	
17470		45 x 16.5 x 1.9	F	

The sediment retention pond sizes have been calculated on the basis of 3% of the contributing catchment.

12.3 Culverts

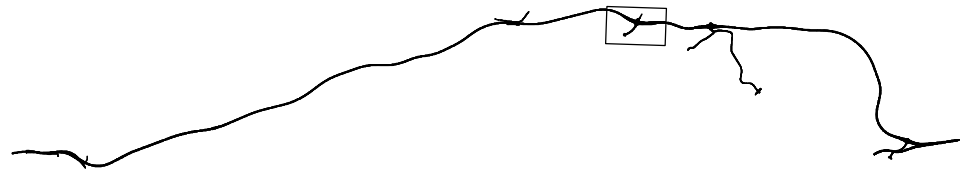
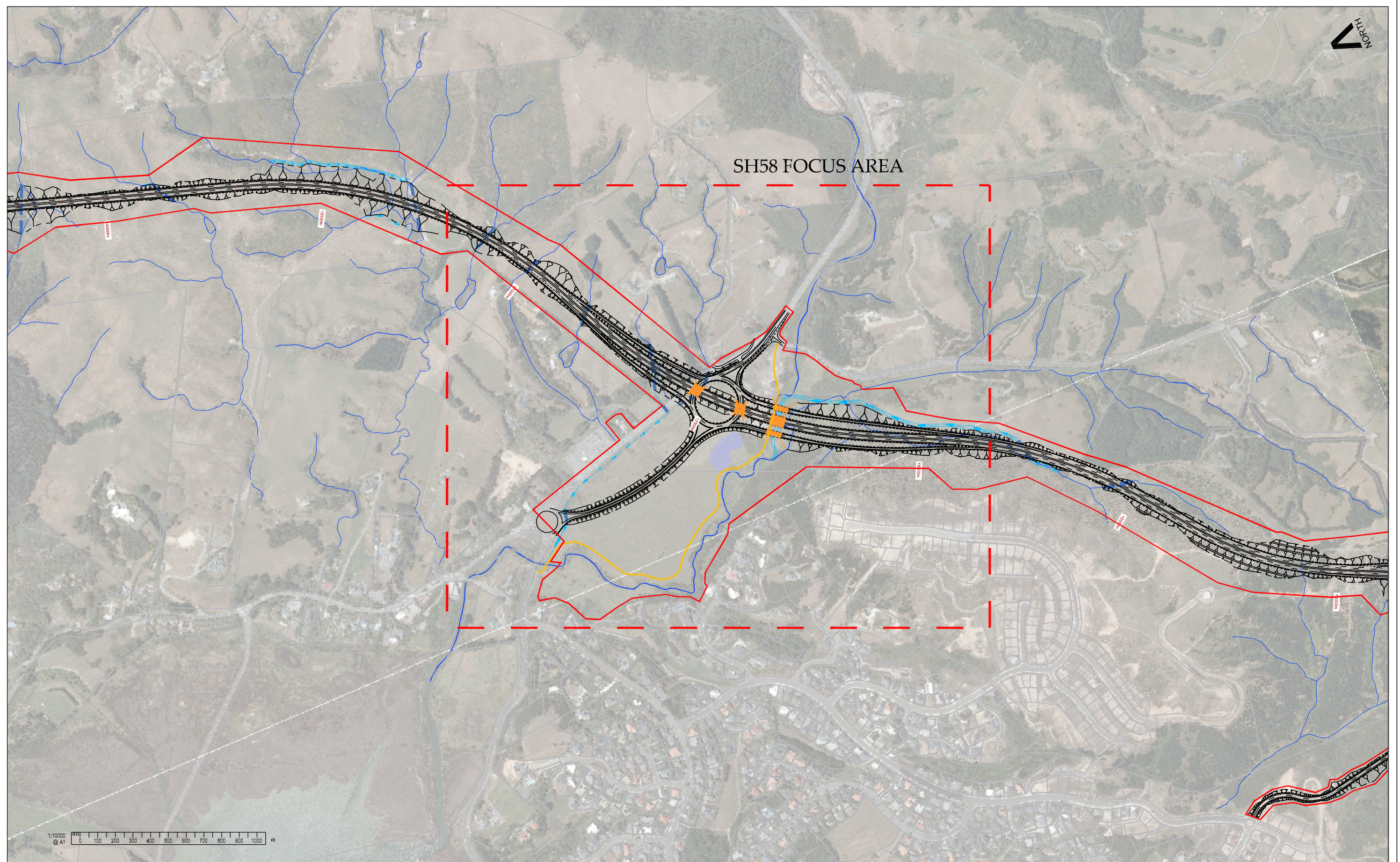
Calculation summary for culverts are as follows.

Chainage	Pipe reference	Pipe diameter (mm)	Indicative gradient (m/m)	Catchment (ha)	Q10 Design Flow (m ³ /s)	Height below pipe soffit in Q10 (m)	Q100 Design Flow (m ³ /s)	Height below road level in Q100 (m)
Ch17300	Pa5	600	1 in 9	2.74	0.27	0	0.49	1.9
Ch17500	Pa6	1050	1 in 100	11.1	0.80	0.55	1.5	3.5
Ch17500	Pa6a	1050	1 in 11	11.1	0.80	0.55	1.5	3.5

12.4 Stormwater Treatment Devices

There is a swale and wetland proposed for the capture and treatment of road runoff within this work area. The catchment size and size of proposed stormwater treatment devised is as follows:

CHAINAGE	CATCHMENT AREA (ha)	TYPE OF TREATMENT	SIZE	COMMENTS
Ch15600-16600	25,000 m ²	Swale (SW6)	1,000m length	
Ch17400	40,000 m ²	Wetland (W5)	1650 m ² (23m x 72m)	



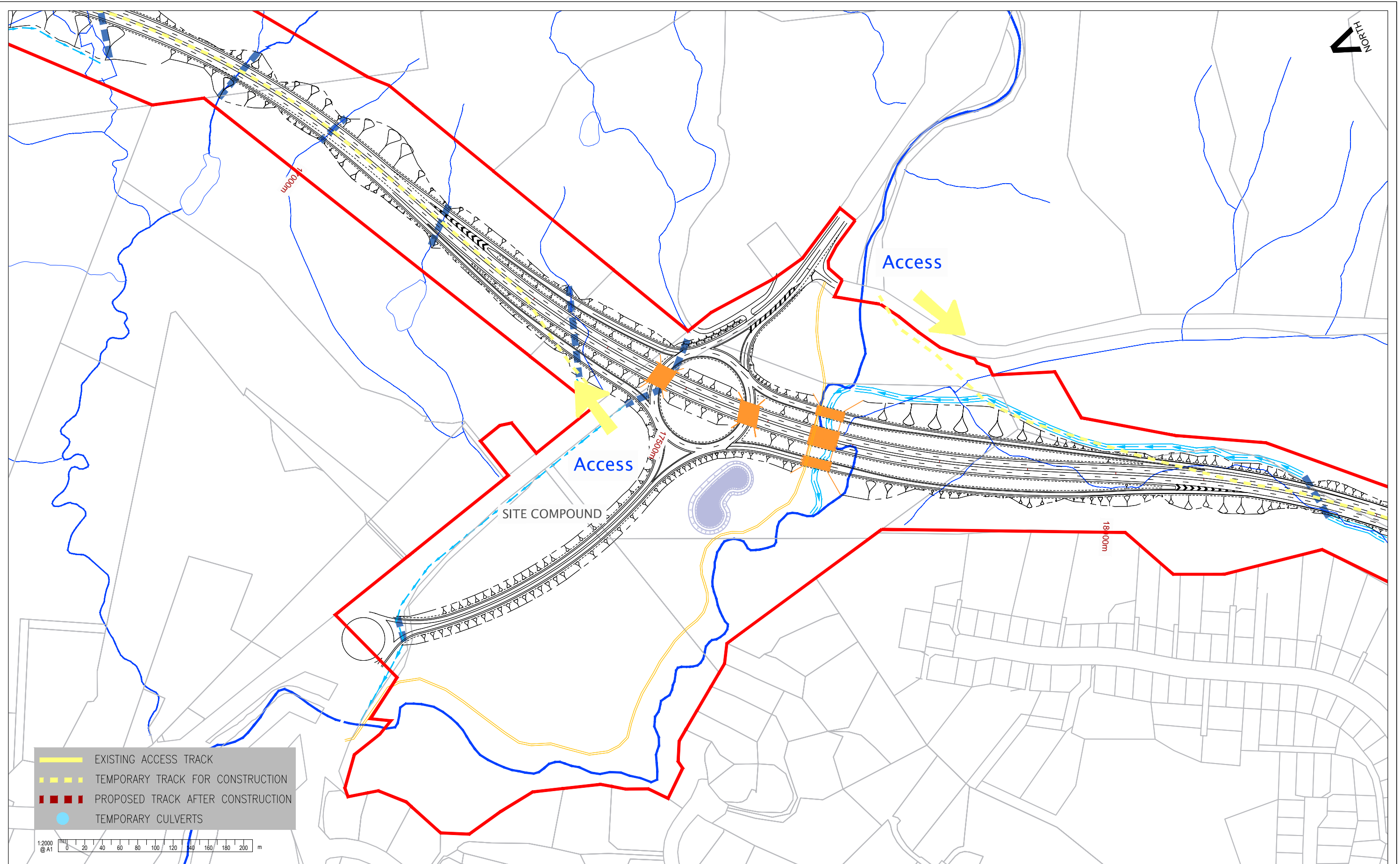
Revision	Amendment	Approved	Date



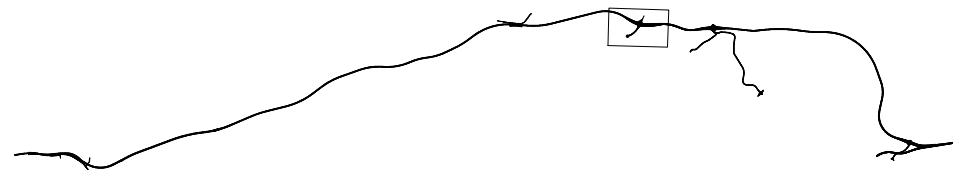
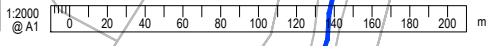
Project: **TRANSMISSION GULLY PROJECT**

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SH58 Interchange
General Arrangement Plan**

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Version No.	A



- EXISTING ACCESS TRACK
- TEMPORARY TRACK FOR CONSTRUCTION
- PROPOSED TRACK AFTER CONSTRUCTION
- TEMPORARY CULVERTS



Revision	Amendment	Approved	Date



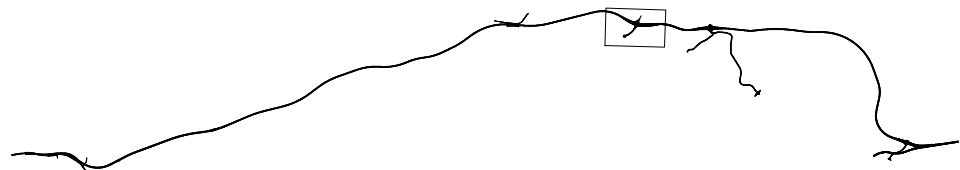
Project: TRANSMISSION GULLY PROJECT	
Title: Site Environmental Management Plan SH58 Interchange Construction Access Plan	Status: For Consenting
Sheet No. SSEMP/C2	Version No. A



PLANTING KEY

- AMENITY PLANTING
- TREE GRID - KAHIKATEA
- KANUKA CORRIDOR
- STREAM RESTORATION
- CUT / FILL FACE + FILL SITE VEGETATED
- CUT / FILL FACE + FILL SITE GRASSED
- ENRICHMENT
- RETIREMENT/PROTECTION
- EXISTING DESIGNATION
- MITIGATION PLANTING
- VISUAL MITIGATION PLANTING

1:2000
@ A1
0 20 40 60 80 100 120 140 160 180 200 m



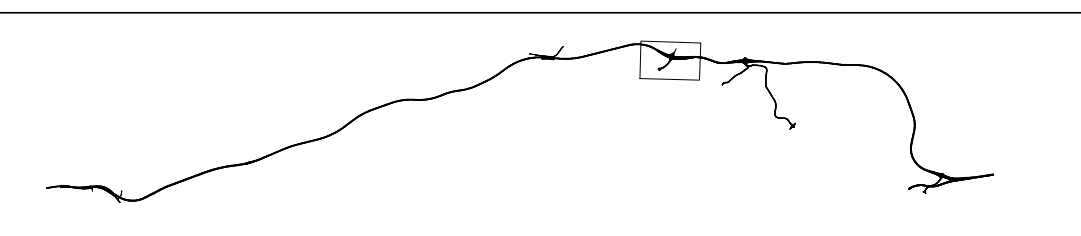
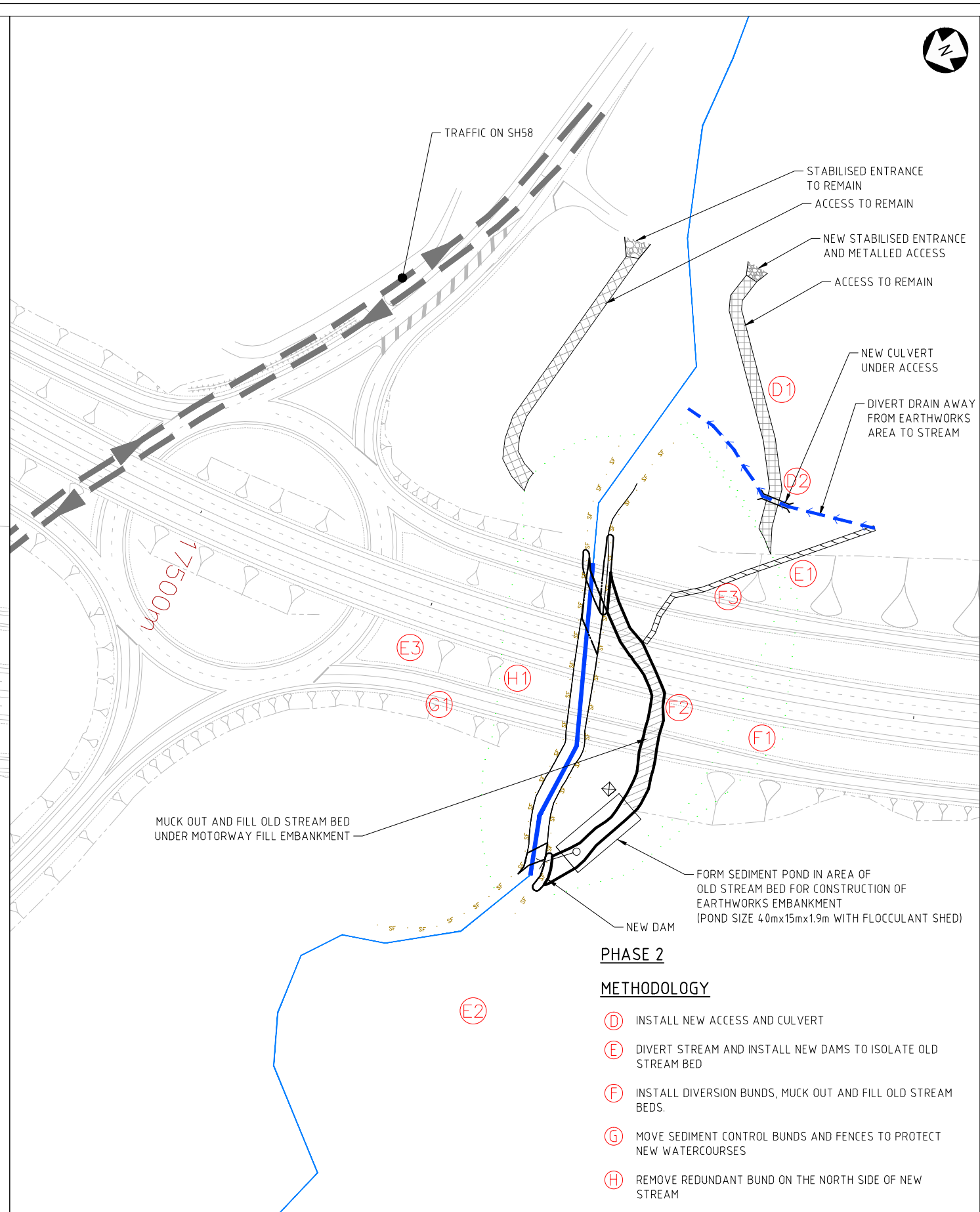
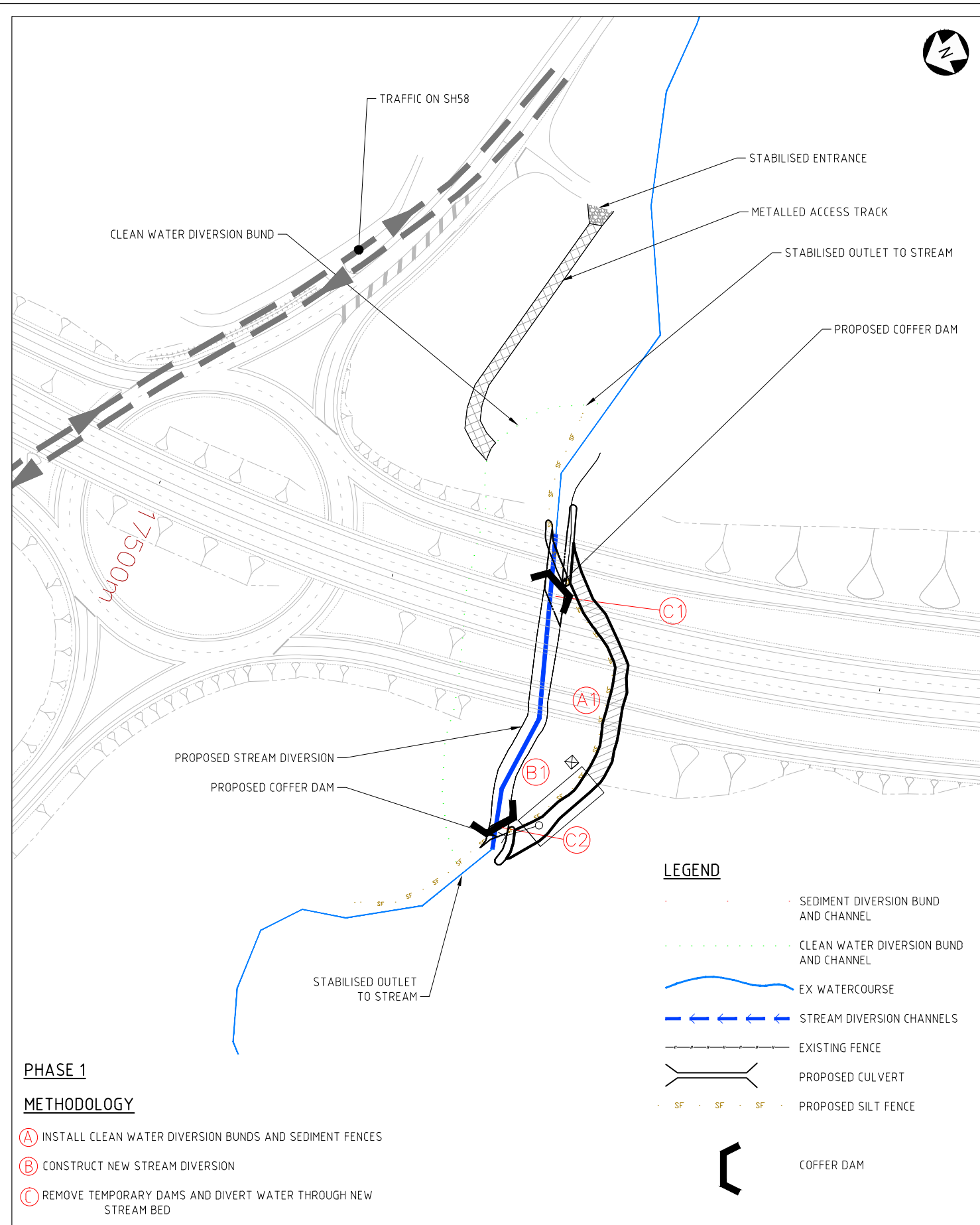
Revision	Amendment	Approved	Date



Project: **TRANSMISSION GULLY PROJECT**

Title: **Site Environmental Management Plan
SH58 Interchange
Landscape Plan**

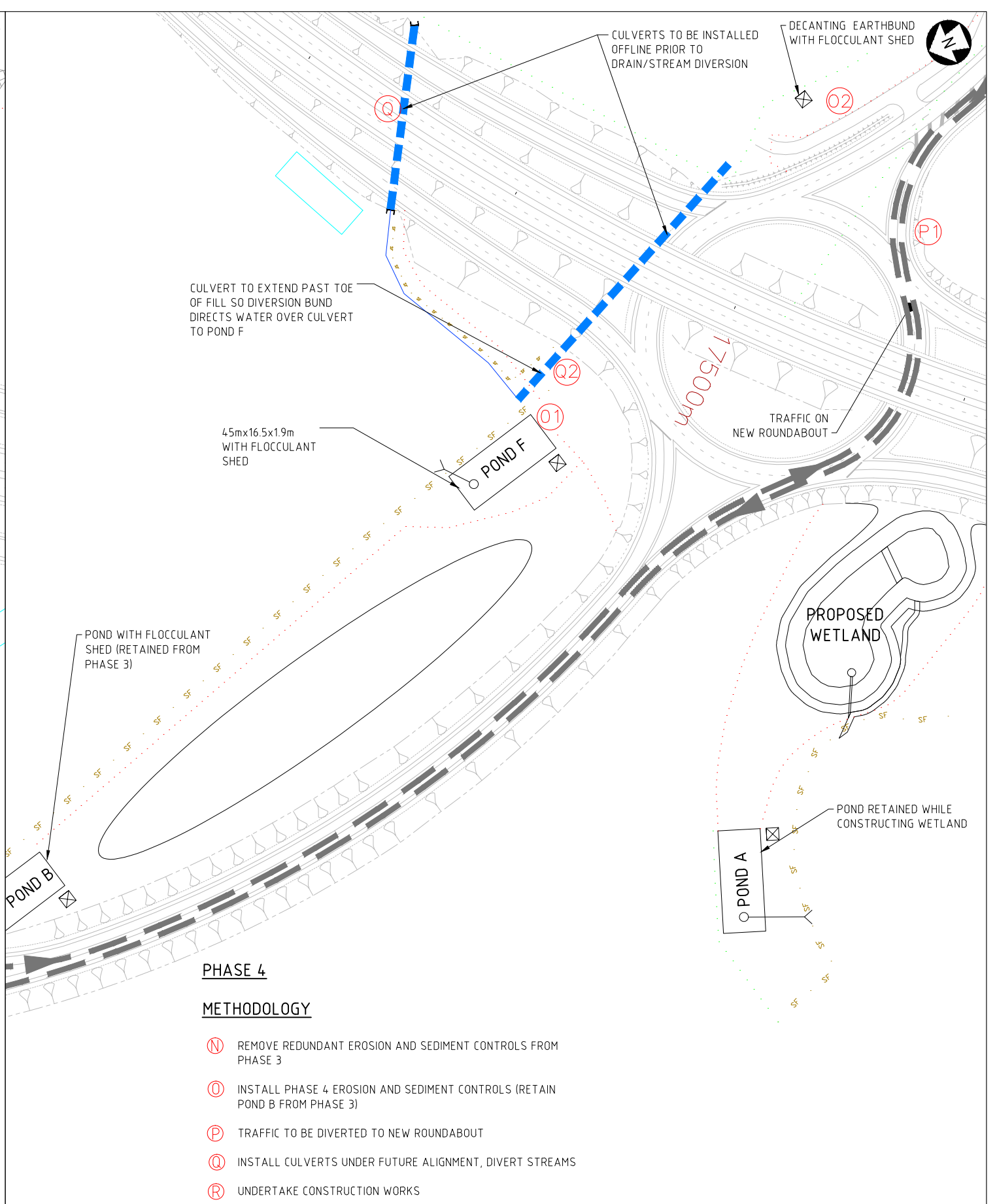
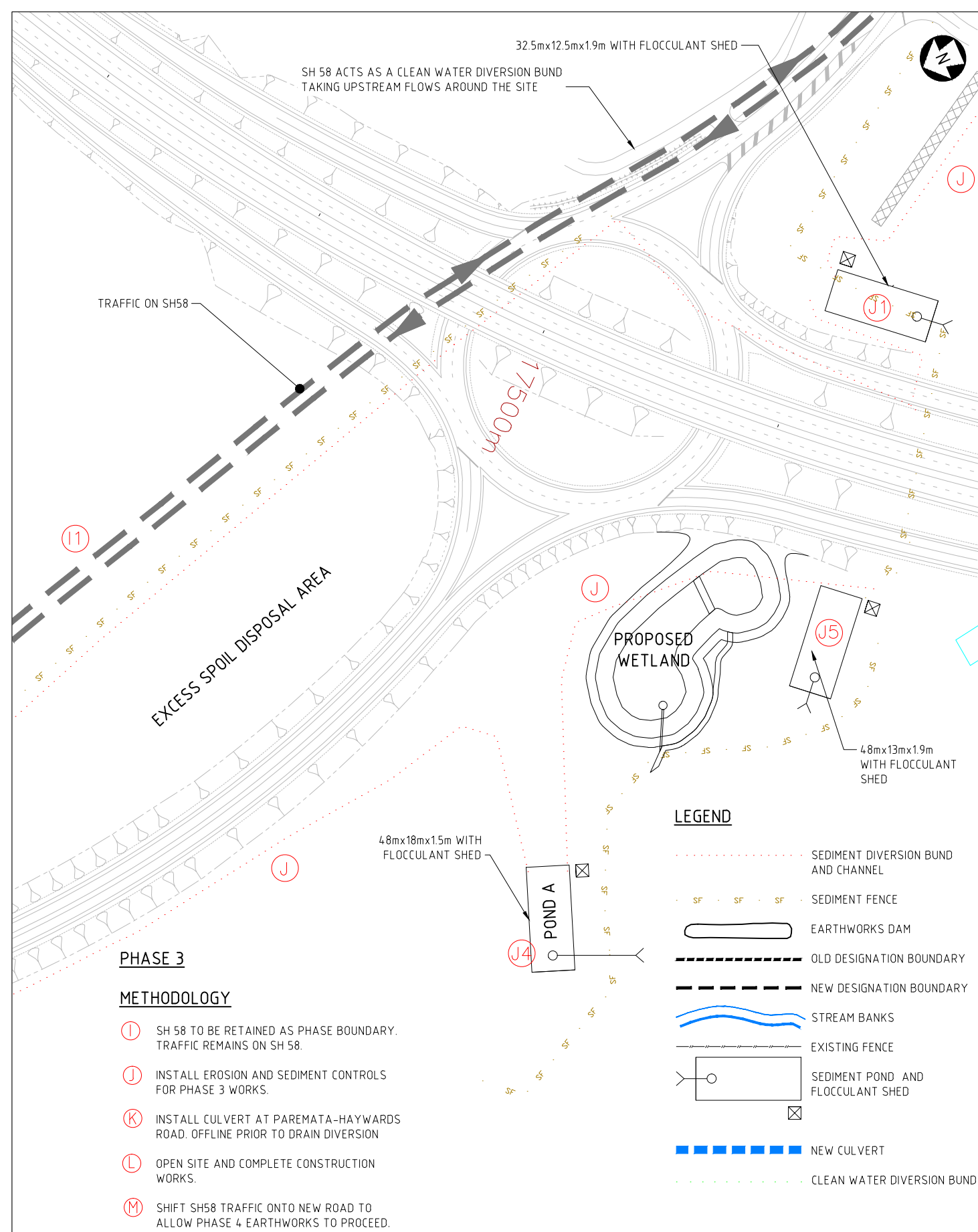
Status:	For Consenting
Sheet No.	SSEMP/C3
Version No.	A



Revision	Amendment	Approved	Date



Project: TRANSMISSION GULLY PROJECT		Status: For Consenting
Title: Site Environmental Management Plan SH58 Interchange Erosion & Sediment Control - Sheet 1		Version No. A
Sheet No. SSEMP/C4		



PHASE 3

METHODOLOGY

- ① SH 58 TO BE RETAINED AS PHASE BOUNDARY. TRAFFIC REMAINS ON SH 58.
- ② INSTALL EROSION AND SEDIMENT CONTROLS FOR PHASE 3 WORKS.
- ③ INSTALL CULVERT AT PAREMATA-HAYWARDS ROAD. OFFLINE PRIOR TO DRAIN DIVERSION
- ④ OPEN SITE AND COMPLETE CONSTRUCTION WORKS.
- ⑤ SHIFT SH58 TRAFFIC ONTO NEW ROAD TO ALLOW PHASE 4 EARTHWORKS TO PROCEED.

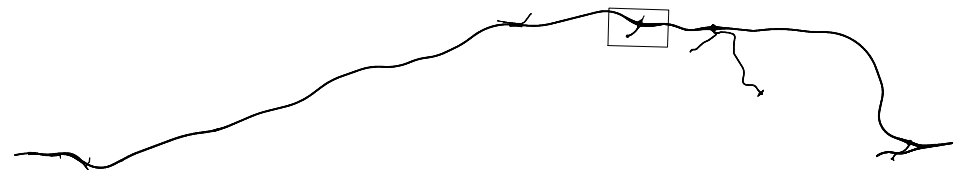
LEGEND

- SEDIMENT DIVERSION BUND AND CHANNEL
- SF SF SF SEDIMENT FENCE
- EARTHWORKS DAM
- - - OLD DESIGNATION BOUNDARY
- - - NEW DESIGNATION BOUNDARY
- ~ ~ ~ STREAM BANKS
- - - EXISTING FENCE
- SEDIMENT POND AND FLOCCULANT SHED
- NEW CULVERT
- ... CLEAN WATER DIVERSION BUND

PHASE 4

METHODOLOGY

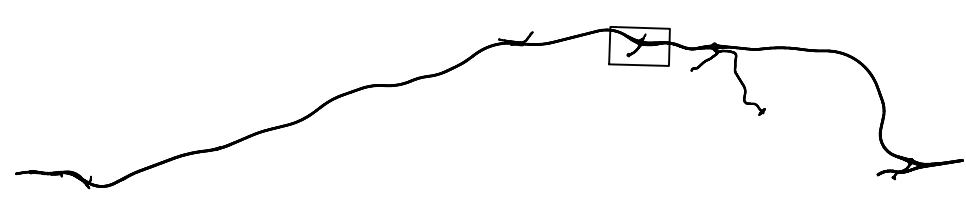
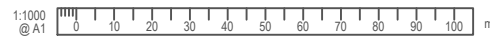
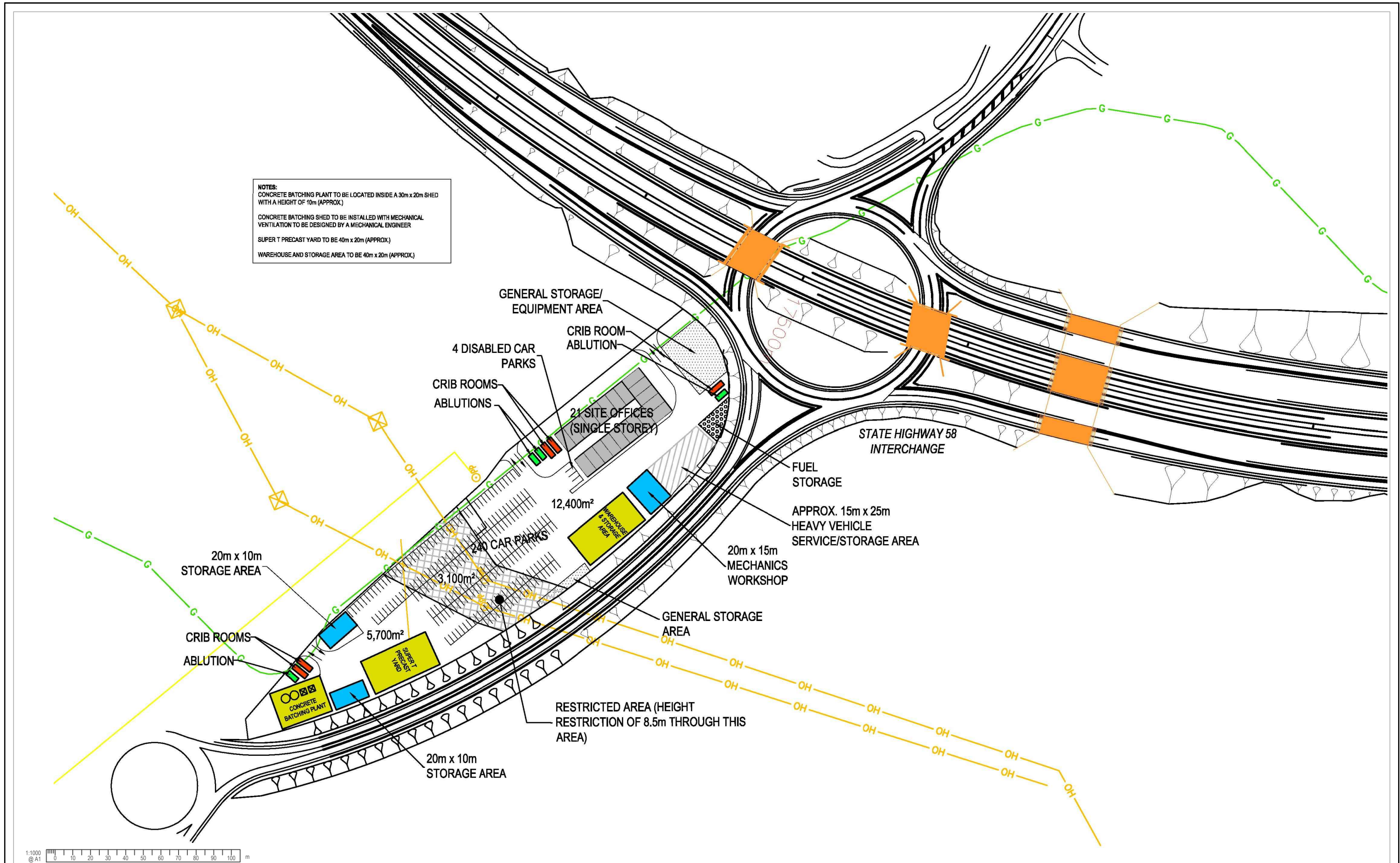
- ⑥ REMOVE REDUNDANT EROSION AND SEDIMENT CONTROLS FROM PHASE 3
- ⑦ INSTALL PHASE 4 EROSION AND SEDIMENT CONTROLS (RETAIN POND B FROM PHASE 3)
- ⑧ TRAFFIC TO BE DIVERTED TO NEW ROUNDABOUT
- ⑨ INSTALL CULVERTS UNDER FUTURE ALIGNMENT, DIVERT STREAMS
- ⑩ UNDERTAKE CONSTRUCTION WORKS



Revision	Amendment	Approved	Date



Project.		TRANSMISSION GULLY PROJECT	
Title.	Site Environmental Management Plan SH58 Interchange Erosion & Sediment Control - Sheet 2	Status.	For Consenting
Sheet No.	SSEMP/C5	Version No.	A



Revision	Amendment	Approved	Date



Project: TRANSMISSION GULLY PROJECT	
Title: Site Environmental Management Plan SH58 Interchange Conceptual Main Site Compound Layout	Status: For Consenting
Sheet No. SSEMP/C6	Version No. A