Appendix B

SURVEYED STRUCTURES

B.1 OLDBURY CREEK STRUCTURES

B.1.1 Old Hume Highway plank bridge

Oldbury Creek flows under a plank bridge at the Old Hume Highway. The HEC-RAS model has included this structure based on a survey undertaken by Southern Cross Consulting Surveyors on 21 March 2014. The dimensions of the bridge structures included in the HEC-RAS model are:

- 650 mm thick plank
- No piers
- 5.4 m opening.

Photo 1.1 Old Hume Highway plank bridge

B.1.2 Hume Highway box culverts

Oldbury Creek flows through three large box culverts under the Hume Highway. The HEC-RAS model has included these structures based on a survey undertaken by Southern Cross Consulting Surveyors on 21 March 2014. The dimensions of the culvert structures included in the HEC-RAS model are:

- Three cells, each 2 m high by 3 m wide.

Photo 1.2 Hume Highway box culverts

B.1.3 Inline structures

There are two inline structures on Oldbury Creek. The most upstream one is a concrete pad, and dirt mound. Under the concrete pad there are 5,300 mm pipes.

Photo 1.3 Upstream inline structure on Oldbury Creek

The downstream inline structure has a high embankment and the spillway is located near the road. There is a single1.6 diameter pipe. The pipe inlet is located at an RL 644.4 mAHD. Only when the water level is above this, will water be able to go through the pipe. At the time of survey the water level was 644.17 mAHD. This was assumed the initial water level in the XP RAFTS model.

Photo 1.4 Downstream inline structure on Oldbury Creek

B.1.4 Culverts under Medway Road

There are two 600mm pipes located under Medway Road to the west and a 900mm x 350mm box culvert located to the east.

Photo 1.5 Photo of Western twin pipe culvert looking upstream

Photo 1.6 Photo of Eastern box culvert looking downstream

B.1.5 Culvert under Hume Highway

There is a single 1.2 diameter pipe located under the Hume Highway, on a tributary that is North of Oldbury Creek. The culvert is located under a steep embankment.

Photo 1.7 Photo of culvert under Hume Highway on western side

B.1.6 Culvert under Old Rail embankment

There are 2 x 600mm diameter pipes located under the old Rail Embankment to the east and 2 x 450 mm diameter pipes located to the west. These are located south of Medway Road Culverts.

Photo 1.8 Photo of culvert under old rail embankment on eastern side

Photo 1.9 Photo of culvert under old rail embankment on eastern side

B.2 STONY CREEK STRUCTURES

B.2.1 Rail Bridge over Stony Creek

A rail bridge is located approximately 150m downstream of Berrima Road. The dimensions of the bridge structures used in the HEC-RAS model are listed below.

- 1.3m thick deck from top of track to bottom of bridge
- One pier under each of the northbound and southbound spans
- 12m opening

Photo 1.10 Photo of Stony Creek rail crossing facing downstream

B.2.2 Berrima Road culvert

A culvert is located on Stony Creek under Berrima Road. The HEC-RAS model has included these structures based on survey undertaken by Southern Cross Consulting Surveyors in February 2016. The Culvert has 4 box culverts each 3.6m x 2.15m. Cad drawings are shown of this culvert.

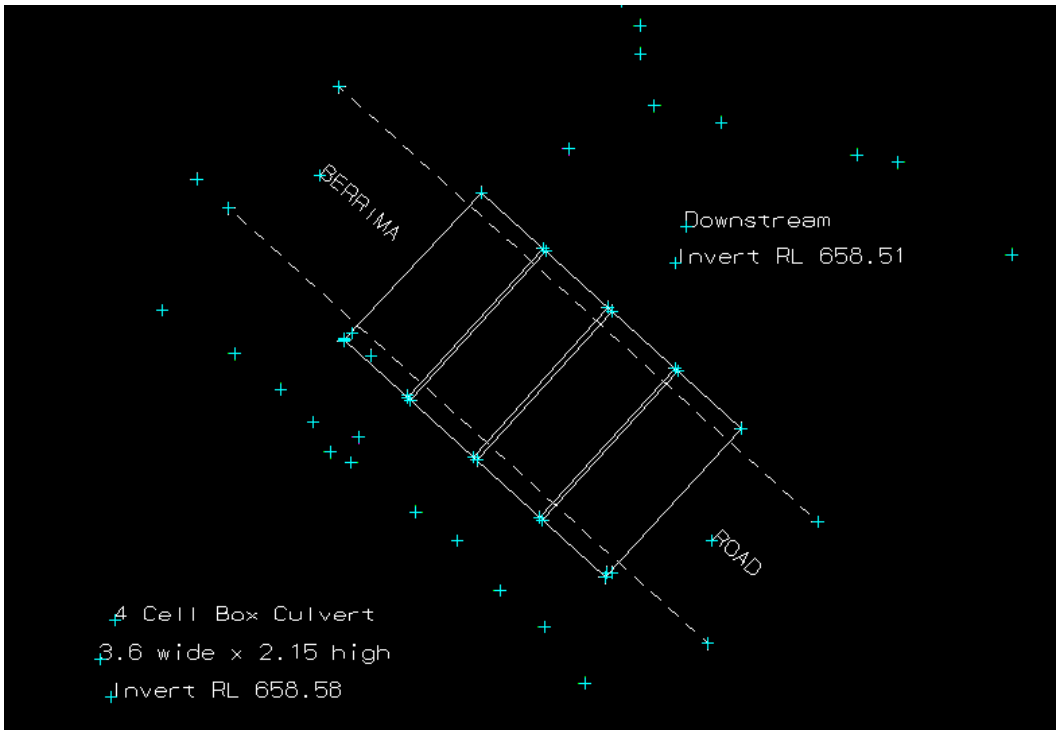

Figure 1.1 Cad drawing of culvert structure under Berrima Road

B.2.3 Structure at the northwest tributary of Oldbury Creek

B.2.3.1 CULVERT UNDER RAIL EMBANKMENT

There is a single box culvert 3.3 x 1.0 located under the railway, downstream of Berrima Road at the northwest tributary.

Photo 1.11 Photo of culvert structure under rail embankment on the northwest tributary facing upstream

B.2.3.2 CULVERT UNDER BERRIMA ROAD

There is a single 600mm diameter pipe located under Berrima Road at the northwester tributary of Stony Creek.

Photo 1.12 Photo of culvert structure under Berrima Road on the northwest tributary facing downstream

B.2.3.3 INLINE STORAGES ON NORTHWEST TRIBUTARY

There are two inline storages located on the northwest tributary of Stony Creek. The dam walls and water levels were surveyed and included in the RAFTS model.

Photo 1.13 Photo of downstream inline storage on the north-western tributary

Appendix C

PREFERRED OPTION FLOOD MAPS

251000 252000 253000 254000 255000 256000 257000 258000

6180000 6179000 6178000 6177000 6176000

Rail loop

Existing underpass under Hume Highway

Train load out

Rail maintenance facility

Rail maintenance access road

Rail bridge over Old Hume Highway

New rail access to Berrima Cement Works

Duplication and raising of rail bridge over Stony Creek

Stream crossing

Stream crossing

BERRIMA

NEW BERRIMA

Berrima Cement Works

OLDBURY CREEK

BLACK SPRINGS CREEK

WINGECARRIBEE RIVER

OLDBURY STREET

BERRIMA ROAD

HUME MOTORWAY

OLD HUME HIGHWAY

HUME HIGHWAY

MEDWAY RIVULET

STONY CREEK

Berrima Branch Line

SYDNEY
CAMDEN
PICTON
WOLLONGONG
MOSS VALE
NOWRA

Legend

- Berrima Rail project (preferred option)
- Rail maintenance access road
- Rail line
- Road
- Natural drainage line
- Existing flood extent
- Operational flood extent
- Boral owned property
- Hume Coal owned property

Map: 2200569A_GIS_010_A7	Author: RP
Date: 15/11/2016	Approved by: LR

Data source: © Land and Property Information 2015, Hume Coal

0 250 500 m

1:20,000

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A3

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Berrima Rail Project

Appendix C1

5 Year ARI flood extent - Operation (Preferred option)

251000 252000 253000 254000 255000 256000 257000 258000

6180000 6179000 6178000 6177000 6176000

Rail loop

Existing underpass under Hume Highway

BLACK SPRINGS CREEK

BERRIMA

WINGECARRIBEE RIVER

OLDBURY STREET

BERRIMA ROAD

OLDBURY CREEK

Train load out

Rail maintenance facility

Rail maintenance access road

NEW BERRIMA

New rail access to Berrima Cement Works

Rail bridge over Old Hume Highway

HUME MOTORWAY

OLD HUME HIGHWAY

Berrima Cement Works

Duplication and raising of rail bridge over Stony Creek

Stream crossing

Stream crossing

Berrima Branch Line

MEDWAY RIVULET

HUME HIGHWAY

STONY CREEK

SYDNEY
CAMDEN
PICTON
WOLLONGONG
MOSS VALE
NOWRA

Legend

- Berrima Rail project (preferred option)
- Rail maintenance access road
- Rail line
- Road
- Natural drainage line
- Existing flood extent
- Operational flood extent
- Hume Coal owned property
- Boral owned property

Map: 2200569A_GIS_012_A7	Author: RP
Date: 15/11/2016	Approved by: LR

Data source: © Land and Property Information 2015, Hume Coal

0 250 500 m

1:20,000

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A3

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Berrima Rail Project

Appendix C2

20 Year ARI flood extent - Operation (Preferred option)

251000 252000 253000 254000 255000 256000 257000 258000

6180000 6179000 6178000 6177000 6176000

Rail loop

Existing underpass under Hume Highway

Train load out

Rail maintenance facility

Rail maintenance access road

Rail bridge over Old Hume Highway

Stream crossing

Stream crossing

New rail access to Berrima Cement Works

Duplication and raising of rail bridge over Stony Creek

Berrima Cement Works

NEW BERRIMA

Berrima Branch Line

BERRIMA—ROAD

OLDBURY STREET

WINGECARRIBEE RIVER

BLACK SPRINGS CREEK

OLDBURY CREEK

HUME MOTORWAY

OLD HUME HIGHWAY

MEDWAY RIVULET

HUME HIGHWAY

STONY CREEK

SYDNEY
CAMDEN
PICTON
WOLLONGONG
MOSS VALE
NOWRA

Legend

- Berrima Rail project (preferred option)
- Rail maintenance access road
- Rail line
- Road
- Natural drainage line
- Existing flood extent
- Operational flood extent
- Hume Coal owned property
- Boral owned property

Map: 2200569A_GIS_016_A8	Author: RP		0 250 500 m 1:18,520 Coordinate system: GDA 1994 MGA Zone 56 Scale ratio correct when printed at A3
Date: 15/11/2016	Approved by: LR		
Data source: © Land and Property Information 2015, Hume Coal			

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Berrima Rail Project
Appendix C3
PMF flood extent - Operation (Preferred option)

Appendix D

PREFERRED OPTION REHABILITATION FLOOD MAPS

251000 252000 253000 254000 255000 256000 257000 258000

6180000 6179000 6178000 6177000 6176000

WINGECARRIBEE RIVER
OLDBURY STREET
BLACK SPRINGS CREEK
BERRIMA ROAD
OLDBURY CREEK
HUME MOTORWAY
OLD HUME HIGHWAY
NEW BERRIMA
Rail access to Berrima Cement Works
Berrima Cement Works
Duplication and raising of rail bridge over Stony Creek
Berrima Branch Line
STONY CREEK
MEDWAY RIVULET

SYDNEY
CAMDEN
PICTON
WOLLONGONG
MOSS VALE
NOWRA

Legend

- Berrima Rail project (remaining infrastructure)
- Rail line
- Road
- Natural drainage line
- Existing flood extent
- Rehabilitation flood extent
- Hume Coal owned property
- Boral owned property

Map: 2200569A_GIS_011_A7	Author: RP	
Date: 15/11/2016	Approved by: LR	
Data source: © Land and Property Information 2015, Hume Coal		

0 250 500 m

1:20,000

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A3

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Berrima Rail Project

Appendix D1

5 Year ARI flood extent - Rehabilitation (Preferred option)

251000 252000 253000 254000 255000 256000 257000 258000

6180000 6179000 6178000 6177000 6176000

WINGECARRIBEE RIVER
OLDBURY STREET
BLACK SPRINGS CREEK
BERRIMA ROAD
STONY CREEK
OLDBURY CREEK
HUME MOTORWAY
OLD HUME HIGHWAY
NEW BERRIMA
Rail access to Berrima Cement Works
Berrima Cement Works
Duplication and raising of rail bridge over Stony Creek
Berrima Branch Line
MEDWAY RIVULET

SYDNEY
CAMDEN
PICTON
WOLLONGONG
MOSS VALE
NOWRA

Legend

- Berrima Rail project (remaining infrastructure)
- Rail line
- Road
- Natural drainage line
- Existing flood extent
- Rehabilitation flood extent
- Hume Coal owned property
- Boral owned property

Map: 2200569A_GIS_013_A7	Author: RP
Date: 15/11/2016	Approved by: LR

Data source: © Land and Property Information 2015, Hume Coal

0 250 500 m

1:20,000

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A3

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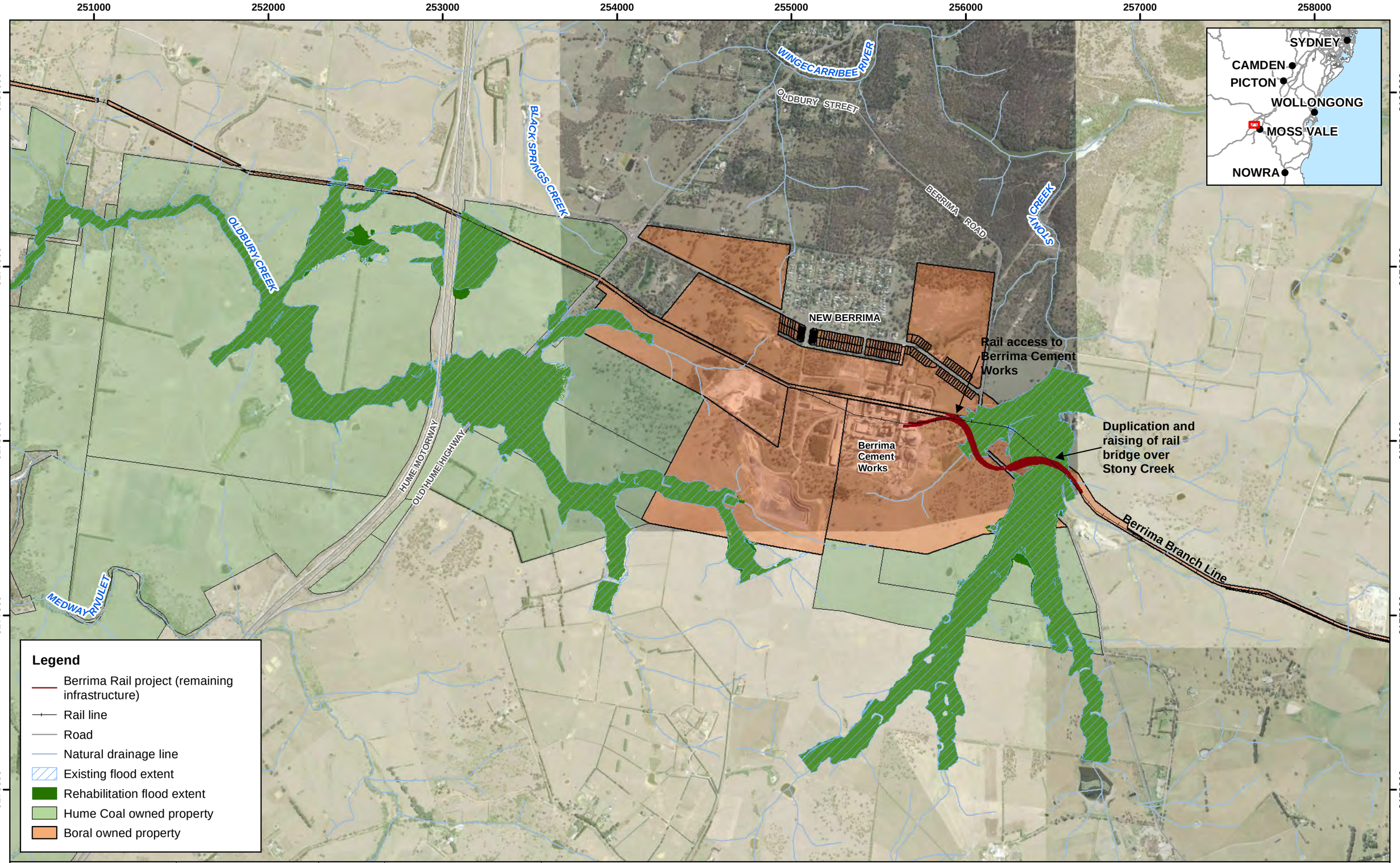
Berrima Rail Project

Appendix D2

20 Year ARI flood extent - Rehabilitation (Preferred option)



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Date: 15/11/2016	Approved by: LR		
Data source: © Land and Property Information 2015, Hume Coal			

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Berrima Rail Project

Appendix D3

PMF flood extent - Rehabilitation (Preferred option)

Appendix E

ALTERNATE OPTION FLOOD MAPS

251000 252000 253000 254000 255000 256000 257000 258000

6180000 6179000 6178000 6177000 6176000

Rail loop

Existing underpass under Hume Highway

BLACK SPRINGS CREEK

WINGECARRIBEE RIVER

OLDBURY STREET

BERRIMA ROAD

STONY CREEK

OLDBURY CREEK

Train load out

Rail maintenance facility

Rail maintenance access road

Rail bridge over Old Hume Highway

HUME MOTORWAY

OLD HUME HIGHWAY

Berrima Road bypass

Duplication of rail bridge over Stony Creek

Berrima Cement Works

Berrima Road bridge over new rail line

Berrima Branch Line

Stream crossing

Stream crossing

MEDWAY RIVULET

SYDNEY
CAMDEN
PICTON
WOLLONGONG
MOSS VALE
NOWRA

Legend

- Berrima Road bypass (alternate option only)
- Rail maintenance access road
- Berrima Rail project (alternate option)
- Rail line
- Road
- Natural drainage line
- Existing flood extent
- Operational flood extent
- Hume Coal owned property
- Boral owned property

Map: 2200569A_GIS_002_A7	Author: RP
Date: 15/11/2016	Approved by: LR

Data source: © Land and Property Information 2015, Hume Coal

0 250 500 m

1:20,000

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A3

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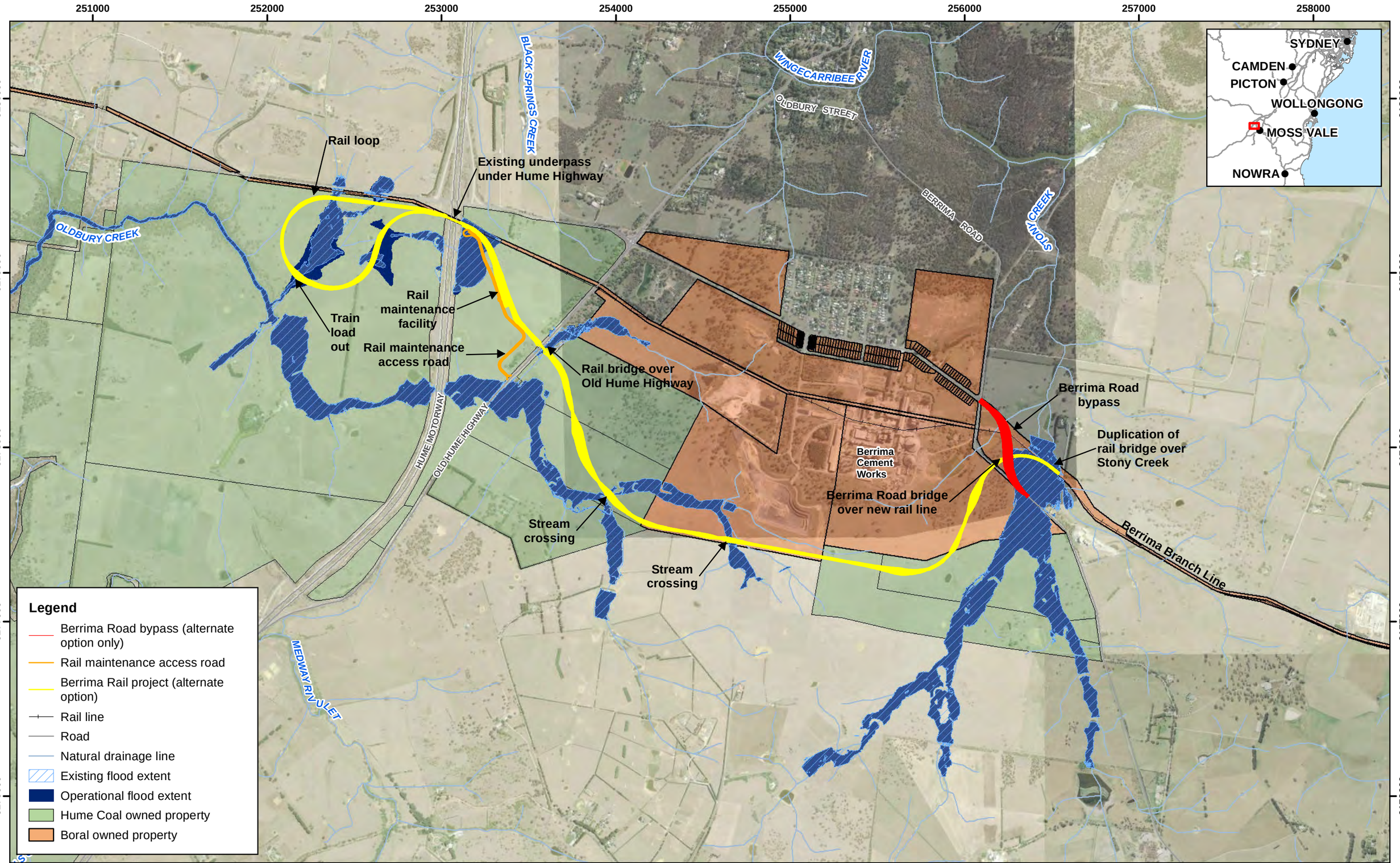
Berrima Rail Project

Appendix E1

5 year ARI flood extent - Operation (Alternate option)



Map: 2200569A_GIS_004_A7	Author: RP		0 250 500 m 1:20,000 Coordinate system: GDA 1994 MGA Zone 56 Scale ratio correct when printed at A3
Date: 15/11/2016	Approved by: LR		
Data source: © Land and Property Information 2015, Hume Coal			

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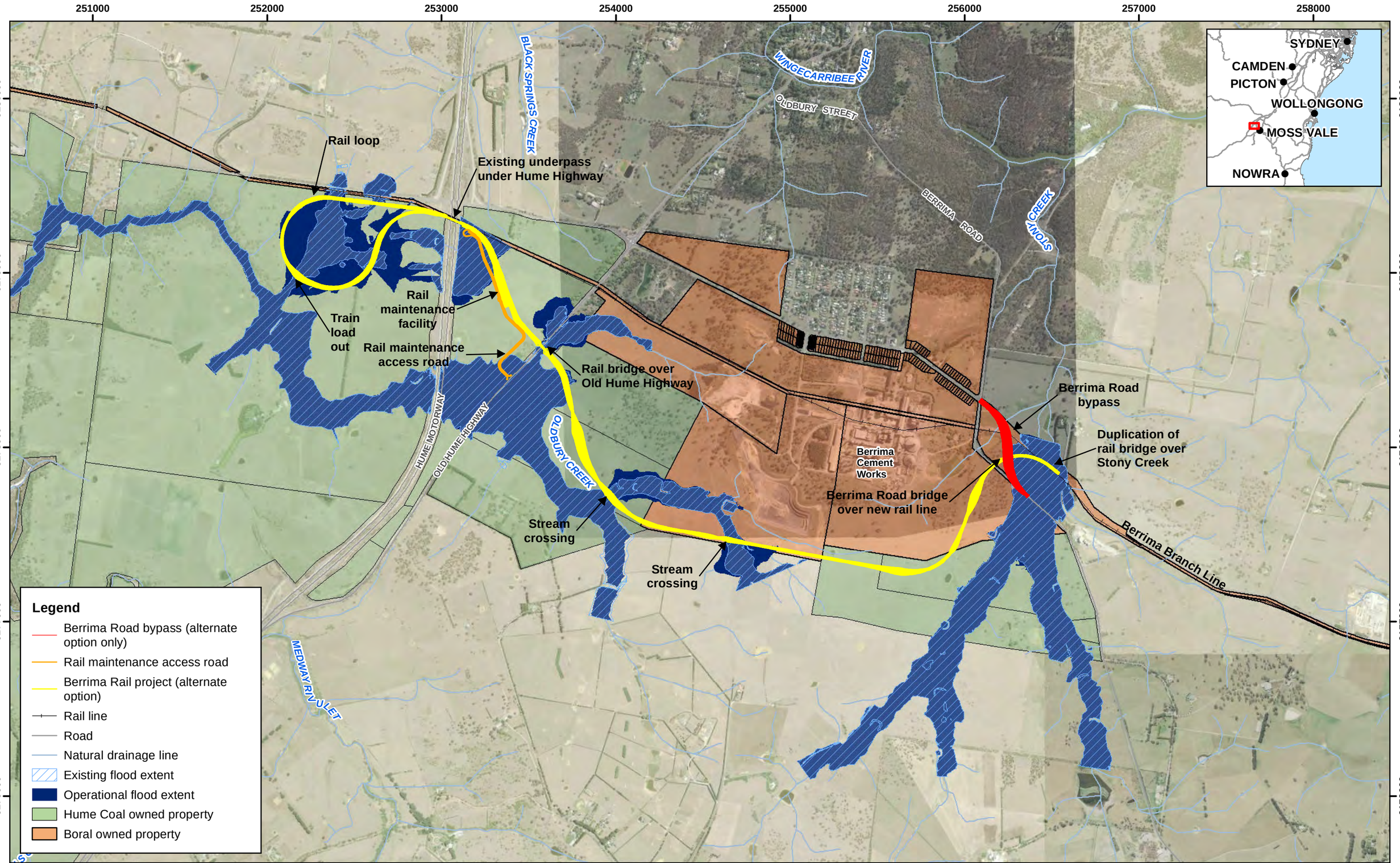
Berrima Rail Project

Appendix E2

20 year ARI flood extent - Operation (alternate option)



Map: 2200569A_GIS_008_A6	Author: RP
Date: 15/11/2016	Approved by: LR

Data source: © Land and Property Information 2015, Hume Coal

0 250 500 m

1:20,000

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A3

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Berrima Rail Project

Appendix E3

PMF flood extent - Operation (Alternate option)

Appendix F

ALTERNATE OPTION REHABILITATION FLOOD MAPS

251000 252000 253000 254000 255000 256000 257000 258000

6180000 6179000 6178000 6177000 6176000

BERRIMA
WINGECARRIBEE RIVER
OLDBURY STREET
BLACK SPRINGS CREEK
BERRIMA ROAD
OLDBURY CREEK
HUME MOTORWAY
OLD HUME HIGHWAY
NEW BERRIMA
Berrima Road bypass
Berrima Cement Works
Berrima Branch Line
MEDWAY RIVULET
STONY CREEK

SYDNEY
CAMDEN
PICTON
WOLLONGONG
MOSS VALE
NOWRA

Legend

- Berrima Road bypass
- Rail line
- Road
- Natural drainage line
- Existing flood extent
- Rehabilitation flood extent
- Hume Coal owned property
- Boral owned property

Map: 2200569A_GIS_003_A7	Author: RP
Date: 15/11/2016	Approved by: - LR

Data source: © Land and Property Information 2015, Hume Coal

0 250 500 m

1:20,000

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A3

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Berrima Rail Project

Appendix F1

5 year ARI flood extent - Rehabilitation (Alternate option)

251000 252000 253000 254000 255000 256000 257000 258000

6180000 6179000 6178000 6177000 6176000

BERRIMA
WINGECARRIBEE RIVER
OLDBURY STREET
BLACK SPRINGS CREEK
BERRIMA ROAD
OLDBURY CREEK
HUME MOTORWAY
OLD HUME HIGHWAY
NEW BERRIMA
Berrima Road bypass
Berrima Cement Works
Berrima Branch Line
MEDWAY RIVULET
STONY CREEK

SYDNEY
CAMDEN
PICTON
WOLLONGONG
MOSS VALE
NOWRA

Legend

- Berrima Road bypass
- Rail line
- Road
- Natural drainage line
- Existing flood extent
- Rehabilitation flood extent
- Hume Coal owned property
- Boral owned property

Map: 2200569A_GIS_005_A6	Author: RP
Date: 15/11/2016	Approved by: - LR

Data source: © Land and Property Information 2015, Hume Coal

0 250 500 m

1:20,000

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A3

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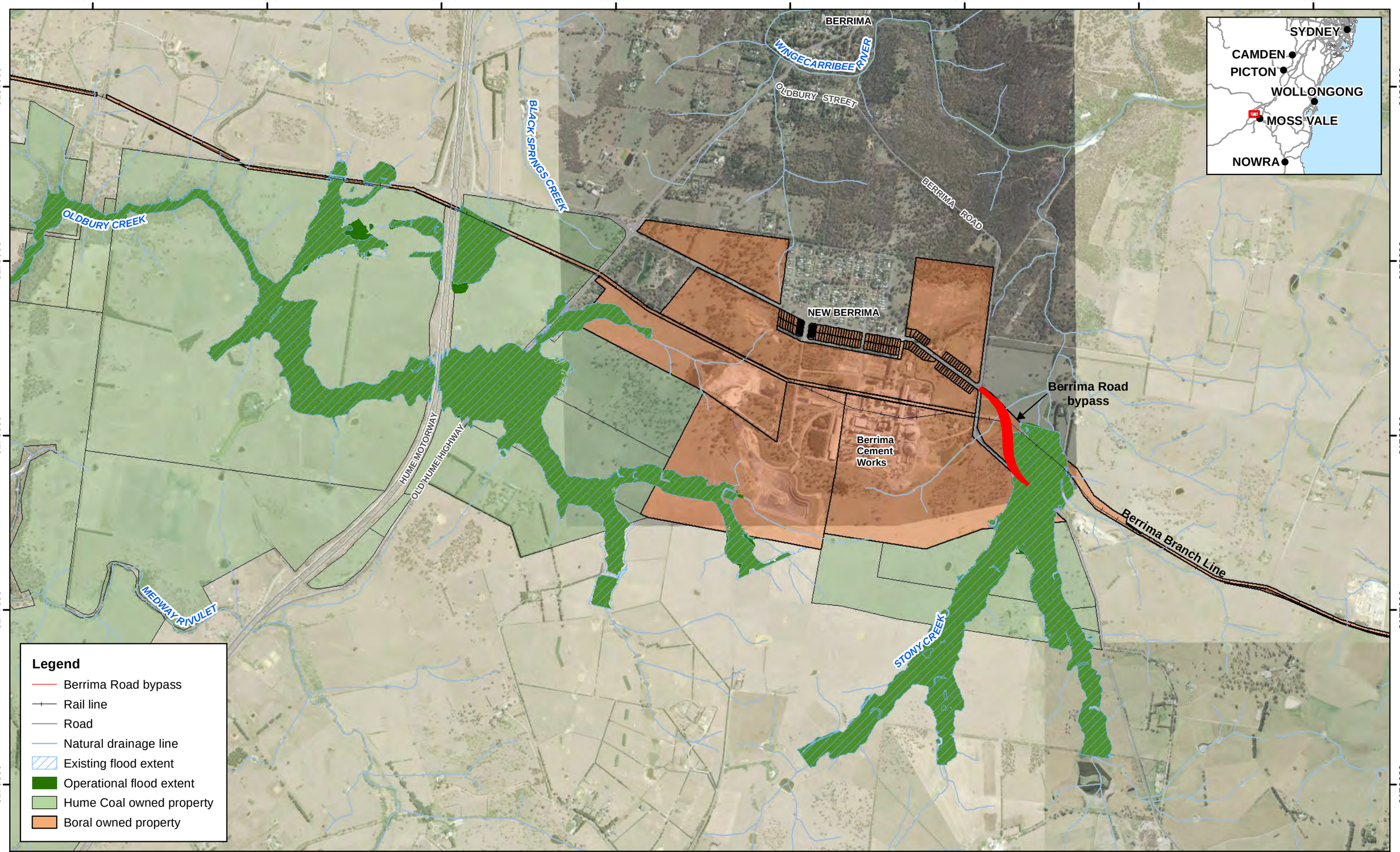
Berrima Rail Project

Appendix F2

20 year ARI flood extent - Rehabilitation (Alternate option)



Map: 2200569A_GIS_009_A6	Author: RP		0 250 500 m 1:20,000 Coordinate system: GDA 1994 MGA Zone 56 Scale ratio correct when printed at A3
Date: 15/11/2016	Approved by: LR		
Data source: © Land and Property Information 2015, Hume Coal			

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Berrima Rail Project

Appendix F3

PMF flood extent - Rehabilitation (Alternate option)

Appendix G

CUMULATIVE FLOOD MAPS

248000 249000 250000 251000 252000 253000 254000 255000

6180000 6179000 6178000 6177000 6176000

WINGECARRIBEE RIVER

BLACK SPRINGS CREEK

MEDWAY ROAD

OLDBURY CREEK

OLD HUME HIGHWAY

MEDWAY DAM

MEDWAY RIVULET

WELLS CREEK

GINGERBELLEN LANE

STONY CREEK

Legend

- Berrima Rail project
- Rail maintenance access road
- Rail line
- Road
- Natural drainage line
- Hume Coal Project area
- Existing flood extent
- Operation flood extent
- Waterbody
- Hume Coal owned property
- Boral owned property

Hume Coal Project indicative surface infarstructure

- Existing WSC easement
- Proposed powerline and pipeline easement
- Powerline route
- Drift (underground)
- Conveyor
- Water pipeline
- Temporary construction accommodation village
- Administration/ bathhouse/workshop
- Main substation
- CPP and stockpiles
- Topsoil stockpiles
- Stormwater management earthworks
- Water management area
- Top water level
- All-weather track

Map: 2200569A_GIS_029_A6	Author: RP
Date: 15/11/2016	Approved by: LR

Data source: © Land and Property Information 2015, Hume Coal

0 250 500 m

1:20,000

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A3

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Berrima Rail Project

Appendix G1

Cumulative 5 Year ARI flood extent - Operation

248000 249000 250000 251000 252000 253000 254000 255000

6180000 6179000 6178000 6177000 6176000

WINGECARRIBEE RIVER
BLACK SPRINGS CREEK
MEDWAY ROAD
OLDBURY CREEK
OLD HUME HIGHWAY
MEDWAY DAM
MEDWAY RIVULET
WELLS CREEK
GINGERBELLEN LANE
STONY CREEK

SYDNEY
CAMDEN
PICTON
WOLLONGONG
MOSS VALE
NOWRA

Legend

- Berrima Rail project
- Rail maintenance access road
- Rail line
- Road
- Natural drainage line
- Hume Coal Project area
- Existing flood extent
- Operation flood extent
- Waterbody
- Hume Coal owned property
- Boral owned property

Hume Coal Project indicative surface infarstructure

- Existing WSC easement
- Proposed powerline and pipeline easement
- Powerline route
- Drift (underground)
- Conveyor
- Water pipeline
- Temporary construction accommodation village
- Administration/ bathhouse/workshop
- Main substation
- CPP and stockpiles
- Topsoil stockpiles
- Stormwater management earthworks
- Water management area
- Top water level
- All-weather track

Map: 2200569A_GIS_031_A6	Author: RP
Date: 15/11/2016	Approved by: LR

Data source: © Land and Property Information 2015, Hume Coal

0 250 500 m

1:20,000

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A3

Berrima Rail Project

Appendix G2

Cumulative 20 Year ARI flood extent - Operation

248000 249000 250000 251000 252000 253000 254000 255000

6180000 6179000 6178000 6177000 6176000

WINGECARRIBEE RIVER
BLACK SPRINGS CREEK
MEDWAY ROAD
OLDBURY CREEK
OLD HUME HIGHWAY
MEDWAY DAM
MEDWAY RIVULET
WELLS CREEK
GINGERBELLEN LANE
STONY CREEK

SYDNEY
CAMDEN
PICTON
WOLLONGONG
MOSS VALE
NOWRA

Legend

- Berrima Rail project
- Rail maintenance access road
- Rail line
- Road
- Natural drainage line
- Hume Coal Project area
- Waterbody
- Hume Coal owned property
- Boral owned property

Hume Coal Project indicative surface infarstructure

- Existing WSC easement
- Proposed powerline and pipeline easement
- Powerline route
- Drift (underground)
- Conveyor
- Water pipeline
- Temporary construction accommodation village
- Administration/ bathhouse/workshop
- Main substation
- CPP and stockpiles
- Topsoil stockpiles
- Stormwater management earthworks
- Water management area
- Top water level
- All-weather track

Map: 2200569A_GIS_033_A6	Author: RP
Date: 15/11/2016	Approved by: LR

Data source: © Land and Property Information 2015, Hume Coal

0 250 500 m

1:20,000

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A3

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Berrima Rail Project

Appendix G3

Cumulative PMF flood extent - Operation

Appendix H

CUMULATIVE REHABILITATION FLOOD MAPS

248000 249000 250000 251000 252000 253000 254000 255000

6180000 6179000 6178000 6177000 6176000

WINGECARRIBEE RIVER

MEDWAY DAM

MEDWAY RIVULET

WELLS CREEK

OLDBURY CREEK

BLACK SPRINGS CREEK

MEDWAY ROAD

OLD HUME HIGHWAY

GINGERLINE LANE

STONY CREEK

Legend

- Rail line
- Road
- Natural drainage line
- Existing flood extent
- Rehabilitation flood extent
- Waterbody
- Hume Coal owned property
- Boral owned property

Map: 2200569A_GIS_030_A6	Author: RP
Date: 15/11/2016	Approved by: LR

Data source: © Land and Property Information 2015, Hume Coal

0 250 500 m

1:20,000

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A3

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Berrima Rail Proiect

Appendix H1

Cumulative 5 year ARI flood extent - Rehabilitation

248000 249000 250000 251000 252000 253000 254000 255000

6180000 6179000 6178000 6177000 6176000

WINGECARRIBEE RIVER

MEDWAY DAM

MEDWAY RIVULET

WELLS CREEK

OLDBURY CREEK

BLACK SPRINGS CREEK

MEDWAY ROAD

OLD HUME HIGHWAY

BARNETT CREEK

STONY CREEK

Legend

- Rail line
- Road
- Natural drainage line
- Existing flood extent
- Rehabilitation flood extent
- Waterbody
- Hume Coal owned property
- Boral owned property

Map: 2200569A_GIS_032_A6	Author: RP
Date: 15/11/2016	Approved by: LR

Data source: © Land and Property Information 2015, Hume Coal

0 250 500 m

1:20,000

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A3

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Berrima Rail Project

Appendix H2

Cumulative 20 year ARI flood extent - Rehabilitation

248000 249000 250000 251000 252000 253000 254000 255000

6180000 6179000 6178000 6177000 6176000

WINGECARRIBEE RIVER

BLACK SPRINGS CREEK

MEDWAY ROAD

OLDBURY CREEK

OLD HUME HIGHWAY

MEDWAY DAM

MEDWAY RIVULET

WELLS CREEK

GINGERBELLENLAKE

STONY CREEK

SYDNEY
CAMDEN
PICTON
WOLLONGONG
MOSS VALE
NOWRA

Legend

- Rail line
- Road
- Natural drainage line
- Existing flood extent
- Rehabilitation flood extent
- Waterbody
- Hume Coal owned property
- Boral owned property

Map: 2200569A_GIS_034_A6	Author: RP
Date: 15/11/2016	Approved by: LR

Data source: © Land and Property Information 2015, Hume Coal

0 250 500 m

1:20,000

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A3

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Berrima Rail Project

Appendix H3

Cumulative PMF flood extent - Rehabilitation

Appendix I

ADJUSTMENT OF NUTRIENT BACKGROUND CONCENTRATIONS IN SWALES

A key input parameter in MUSIC treatment nodes is the background pollutant levels, C*(stormflow background pollutant concentration) and C** (baseflow background pollutant levels) values. The default MUSIC background concentrations for TP and TN in swales are set high and are required to be revised to simulate more realistic values.

The C* estimate for total suspended solids (TSS) is obtained by Fletcher (2004) from the particle size at which only 20% removal is achieved. The method and particle distribution figures are provided in Fletcher (2004).

Applying the Fletcher (2004) methodology for TP results in a C* value of 0.18mg/L and an EMC of 0.26mg/L. This is significantly higher than the TP EMC recorded in the Hume Coal project baseline water quality data at 0.14mg/L. Therefore, it was considered reasonable to adjust the C* and C** values to reflect the lower recorded TP concentrations in the watercourses in the project area.

The C* was adjusted by identifying the ratio between the C* and the EMC identified in Fletcher (2004) and the EMC from the project area in the equation below.

$$C^*_{new} = EMC_{from\ baseline\ data} * \frac{C^*_{fletcher}}{EMC_{fletcher}}$$

MUSIC applies the same value for both C* and C** for swales. Therefore, the C^*_{new} value was applied for both C* and C**.

The same method was applied for TN and the revised C* and C** for swales for both TP and TN are shown in the table below.

Table 1: Revised C* and C** values for swales

	k	C*	C**
TSS	8000	20	14
TP	6000	0.096^	0.096^
TN	500	0.89^	0.89^

^C* and C** values that were revised

By adjusting the C* it is assumed that the background concentration of the swales will not increase because the swales will be properly maintained.

Appendix J

MUSIC MODELLING OUTPUT – CUMULATIVE FREQUENCY PLOTS

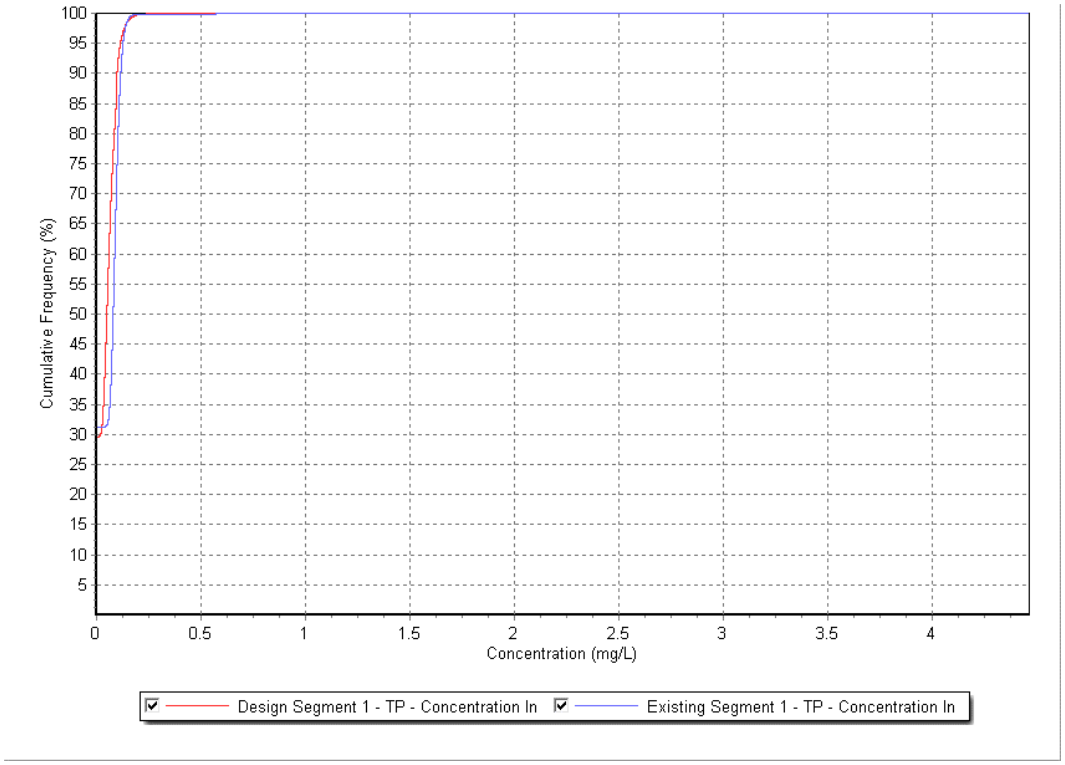

Figure J1: Cumulative Frequency Plots of TP for pre development (existing) and post development (operation) with treatment for Segment 1 of Oldbury Creek preferred and alternate options

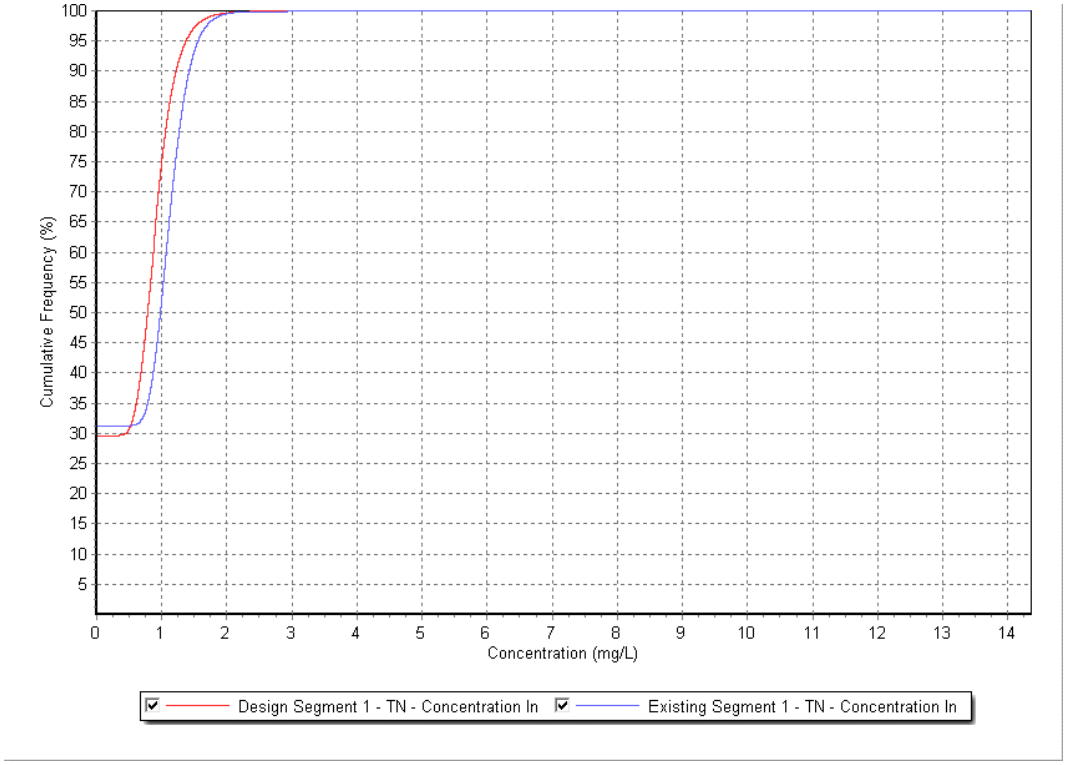

Figure J2: Cumulative Frequency Plots of TN for pre development (existing) and post development (operation) with treatment for Segment 1 of Oldbury Creek preferred and alternate options

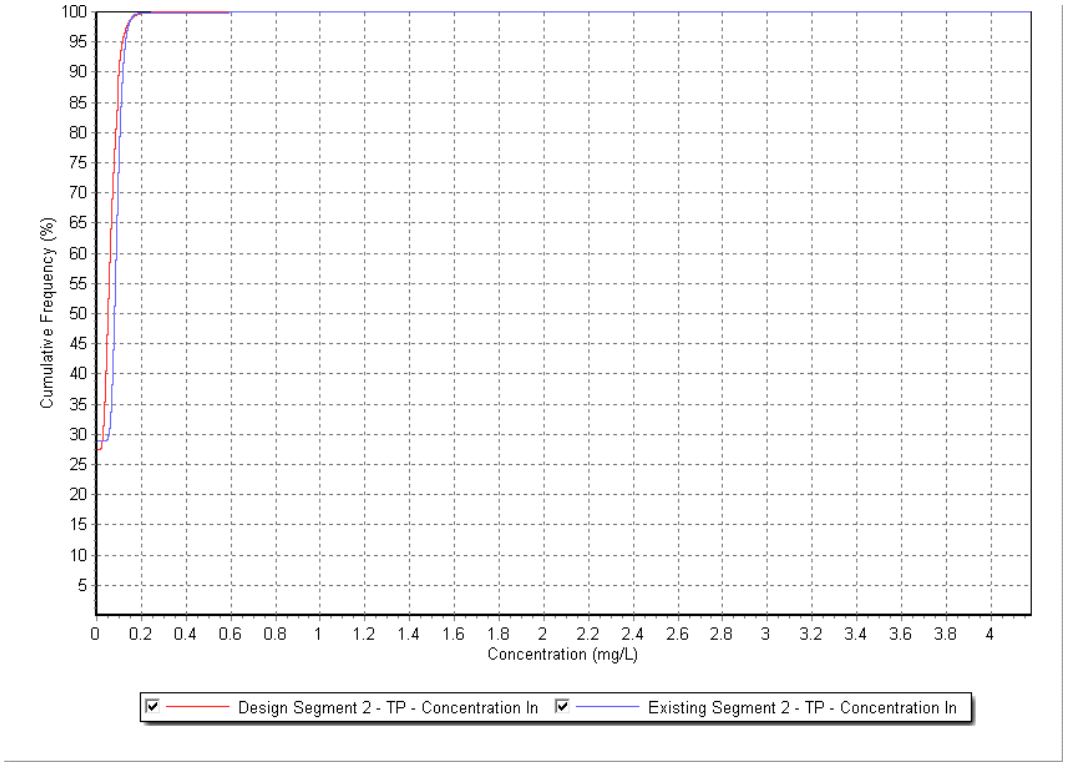

Figure J3: Cumulative Frequency Plots of TP for pre development (existing) and post development (operation) with treatment for Segment 2 of Oldbury Creek preferred and alternate options

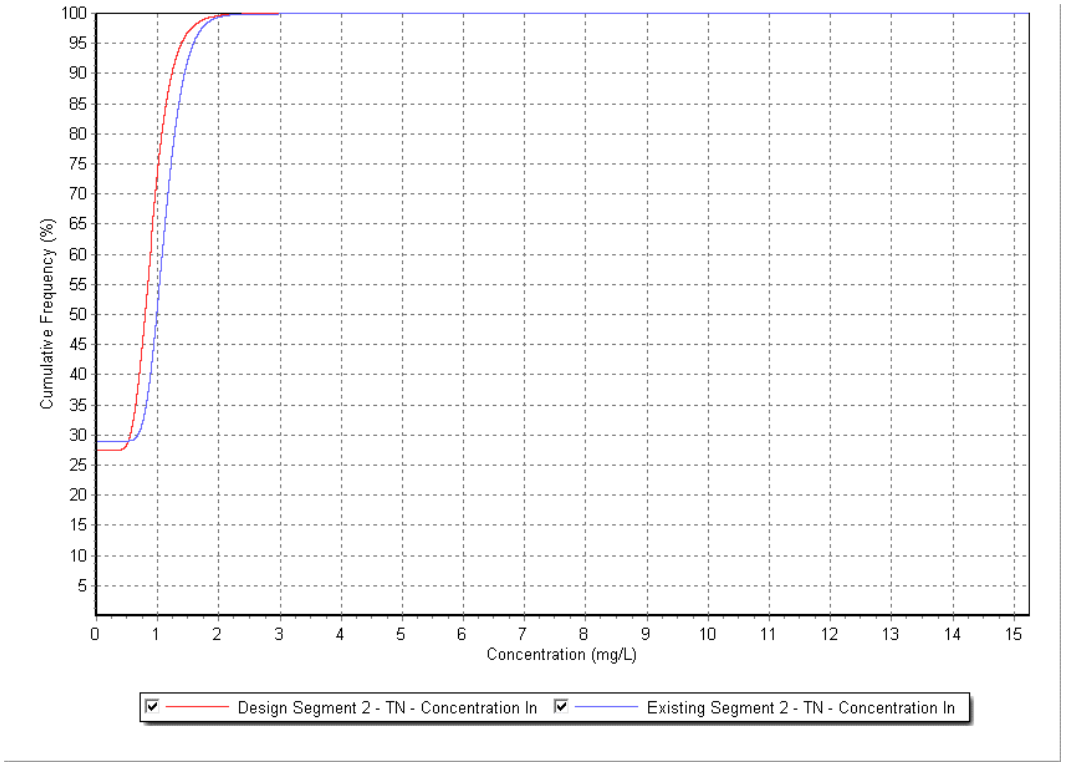

Figure J4: Cumulative Frequency Plots of TN for pre development (existing) and post development (operation) with treatment for Segment 2 of Oldbury Creek preferred and alternate options

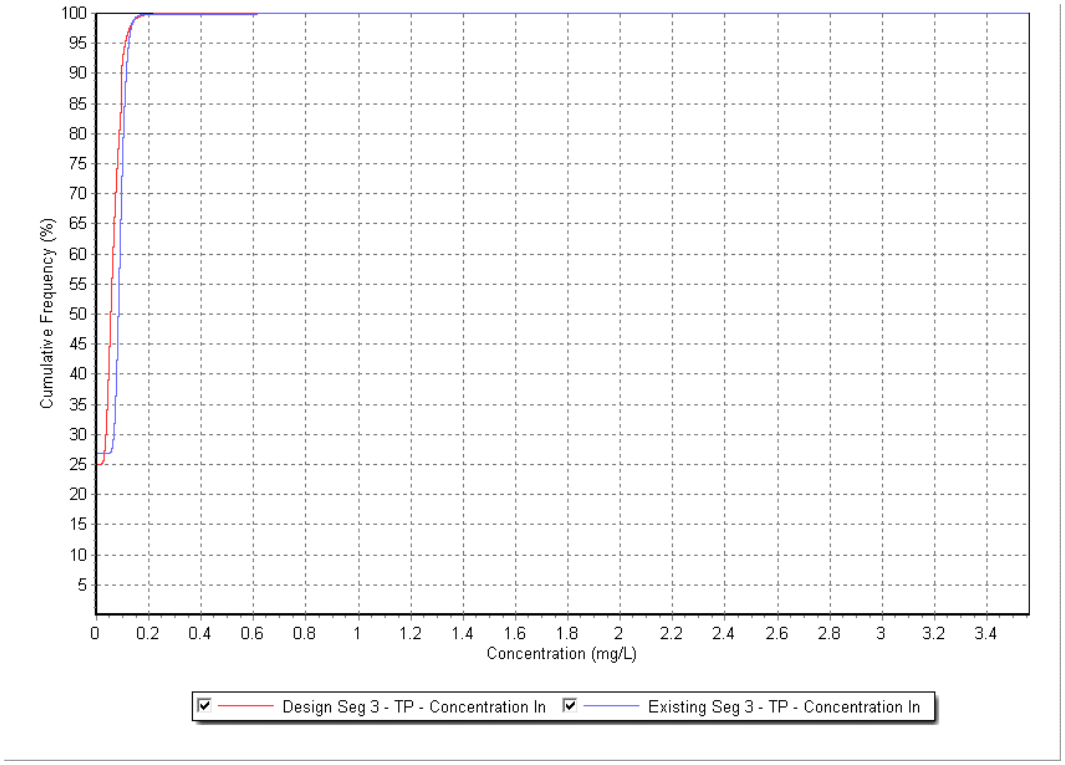

Figure J5: Cumulative Frequency Plots of TP for pre development (existing) and post development (operation) with treatment for Segment 3 of Oldbury Creek preferred and alternate options

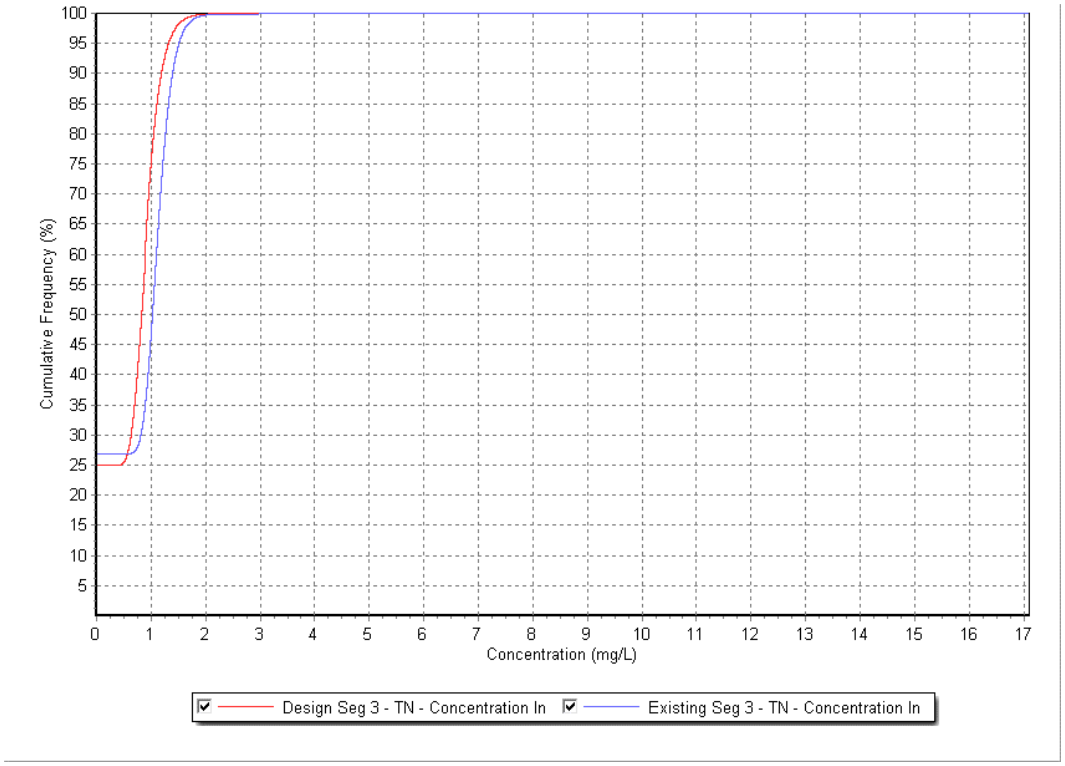

Figure J6: Cumulative Frequency Plots of TN for pre development (existing) and post development (operation) with treatment for Segment 3 of Oldbury Creek preferred and alternate options

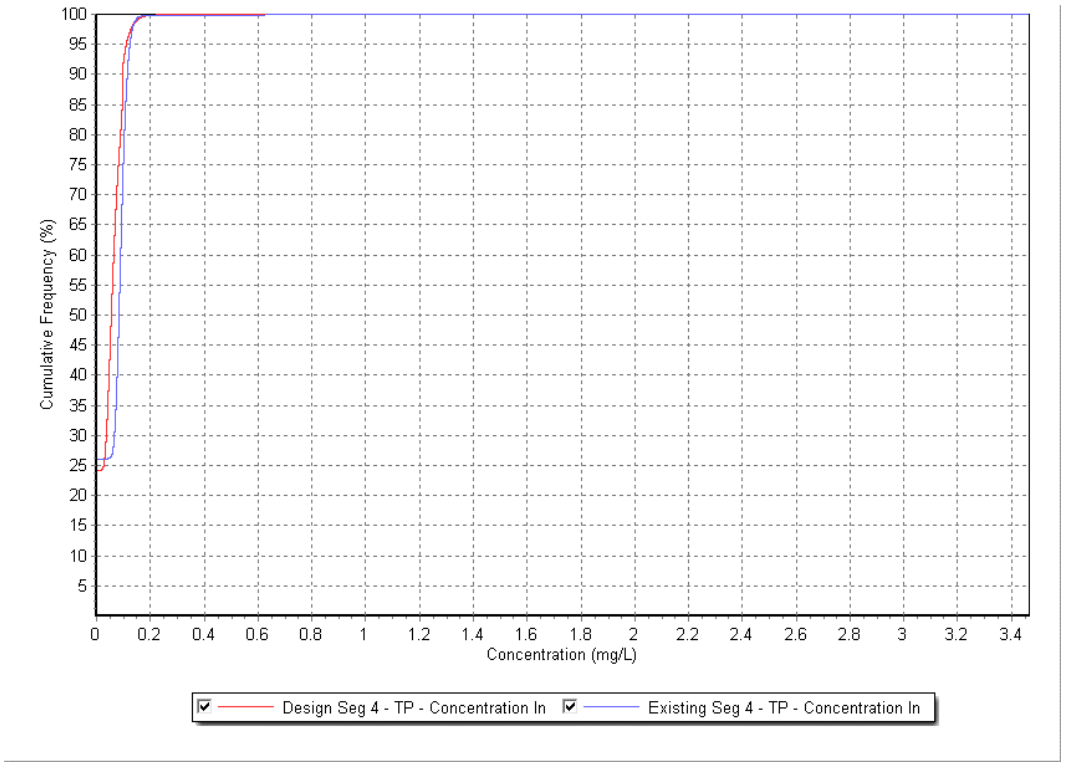

Figure J7: Cumulative Frequency Plots of TP for pre development (existing) and post development (operation) with treatment for Segment 4 of Oldbury Creek preferred and alternate options

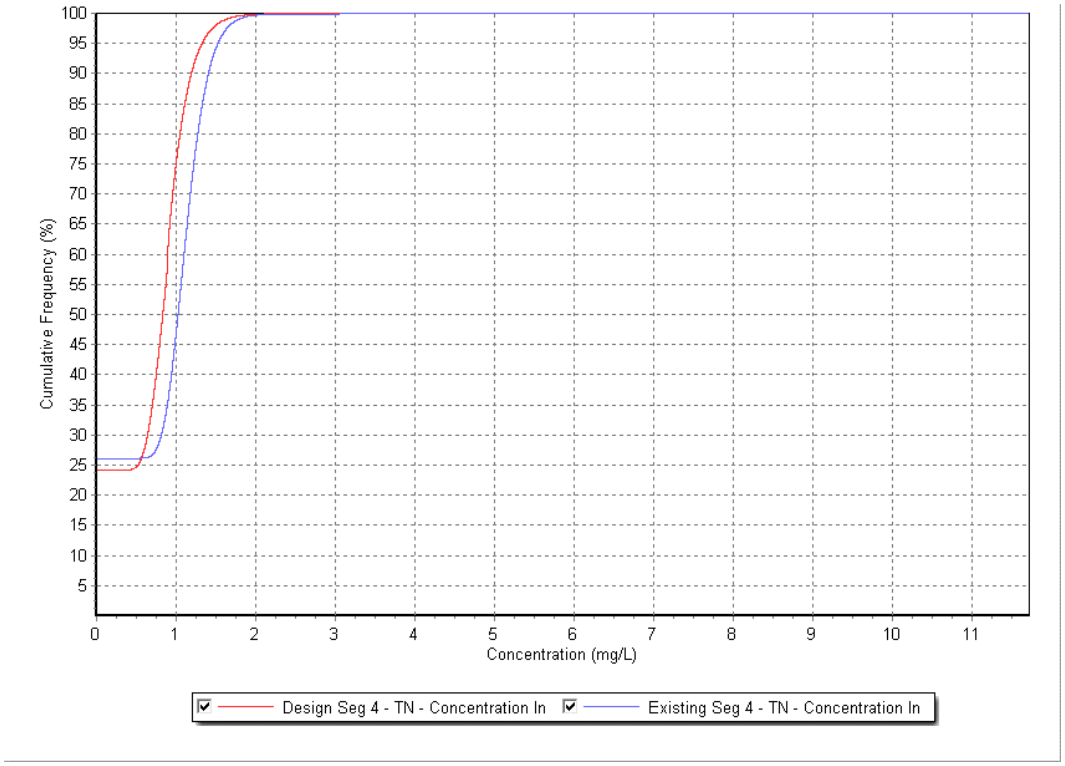

Figure J8: Cumulative Frequency Plots of TN for pre development (existing) and post development (operation) with treatment for Segment 4 of Oldbury Creek preferred and alternate options

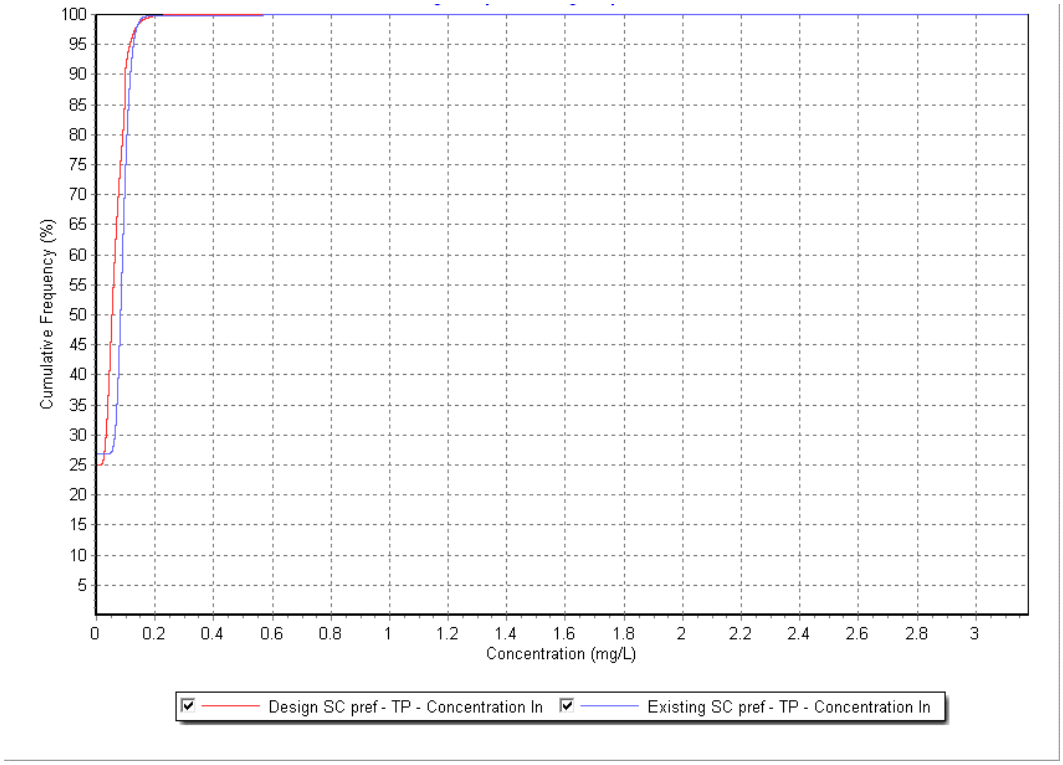

Figure J9: Cumulative Frequency Plots of TP for pre development (existing) and post development (operation) with treatment for Stony Creek preferred option

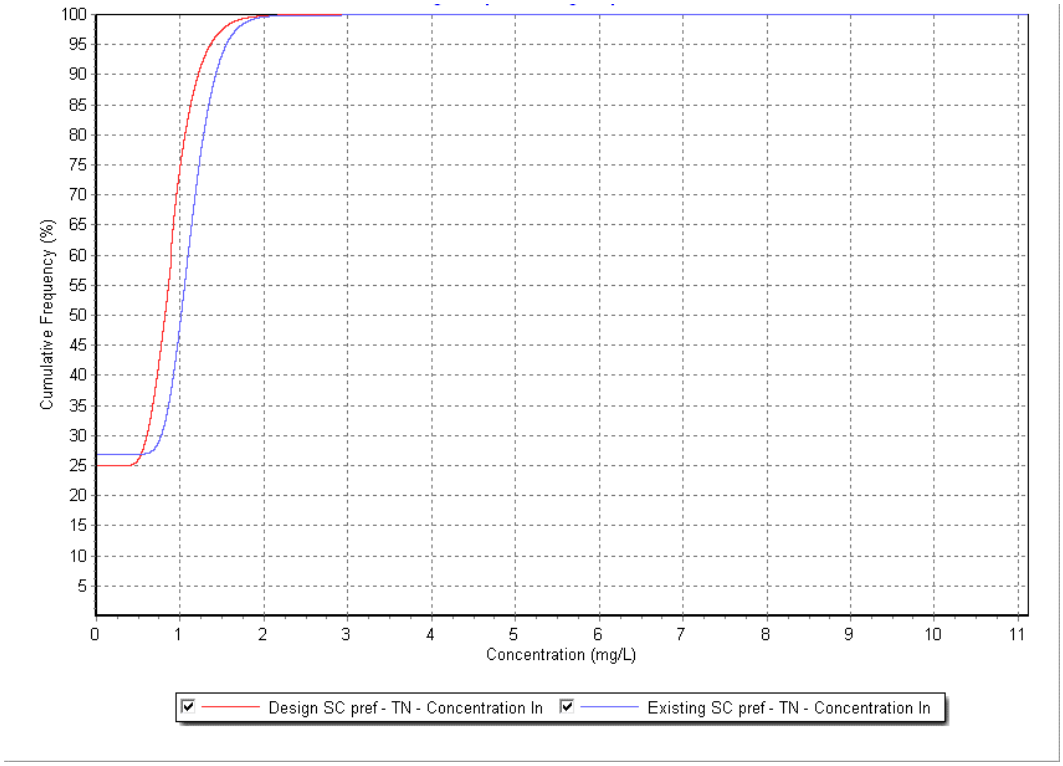

Figure J10: Cumulative Frequency Plots of TN for pre development (existing) and post development (operation) with treatment for Stony Creek preferred option

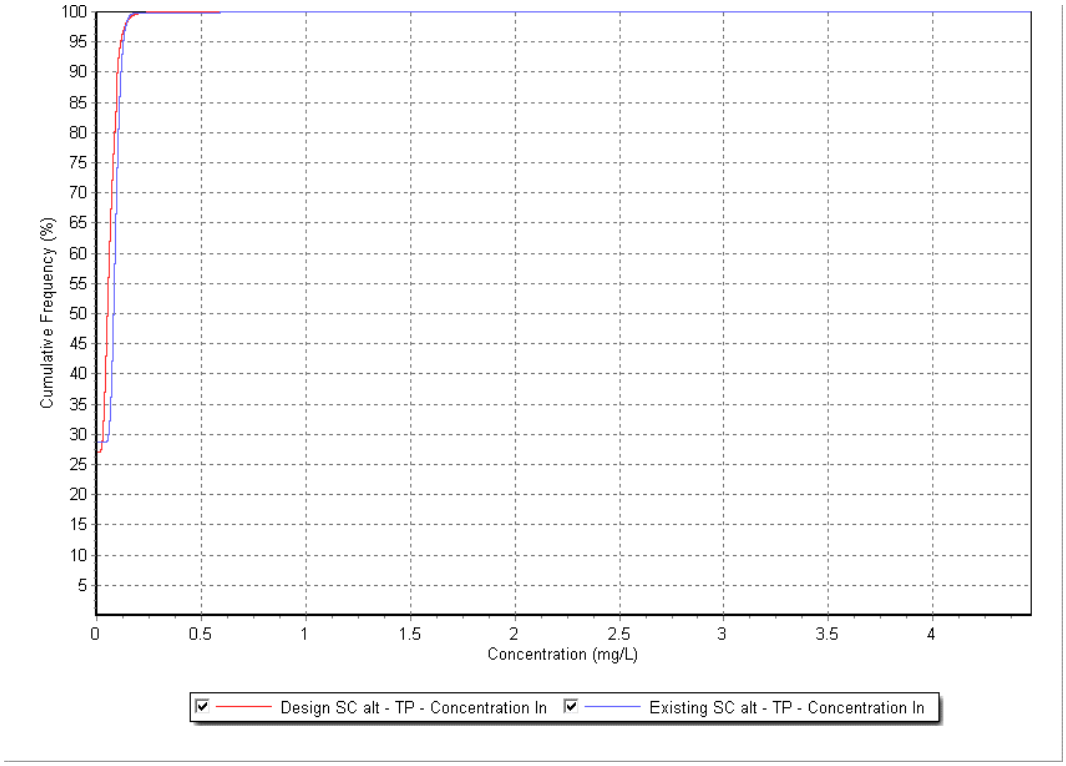

Figure J11: Cumulative Frequency Plots of TP for pre development (existing) and post development (operation) with treatment for Stony Creek alternate option

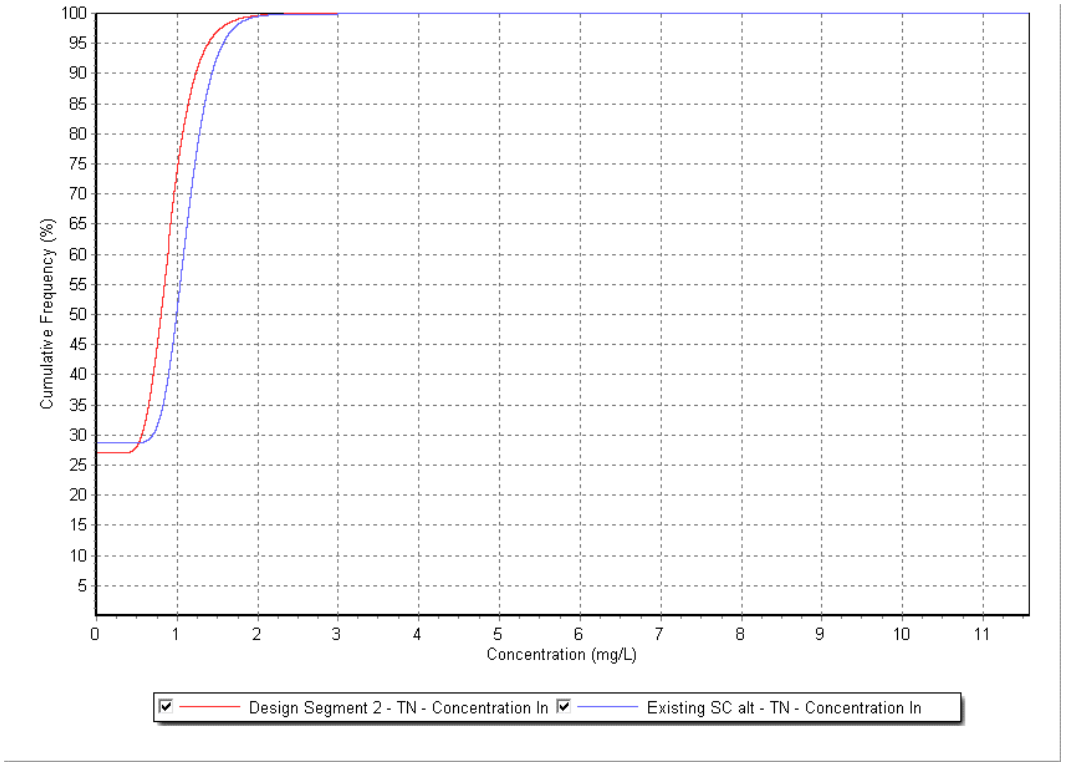

Figure J12: Cumulative Frequency Plots of TN for pre development (existing) and post development (operation) with treatment for Stony Creek alternate option


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