

Appendix J

Workshop Information Packages

East West Link Alliance Memorandum

To: Amelia Linzey

Date: 30th March 2016

From: Lloyd de Beer

Our Ref:

Copy: Noel Nancekivell, Lara Jay

Subject: **EWL MCA Assessment – Princes Street
Design Options Presentation**

1 Purpose

This memo presents four design interchange and bridge structure options at the Princes Street/SH1 Interchange (Project Sector 5). The information is presented ahead of MCA (Multi-Criteria Assessment) workshops for analysis by experts prior to the meeting.

This memo with its supplementary information and drawings outlines the key constraints and design inputs specific to each option.

Additional design options have also been included for review by the MCA experts to determine if they have benefit to the project to be included in the design process or further assessed.

2 Location of Princes Street

Refer to Figure 1 below for the location of the Prince Street/SH1 Interchange in Project Sector 5. The assessment area is along the Princes Street Interchange crossing over SH1 from Luke Street to Avenue Road.

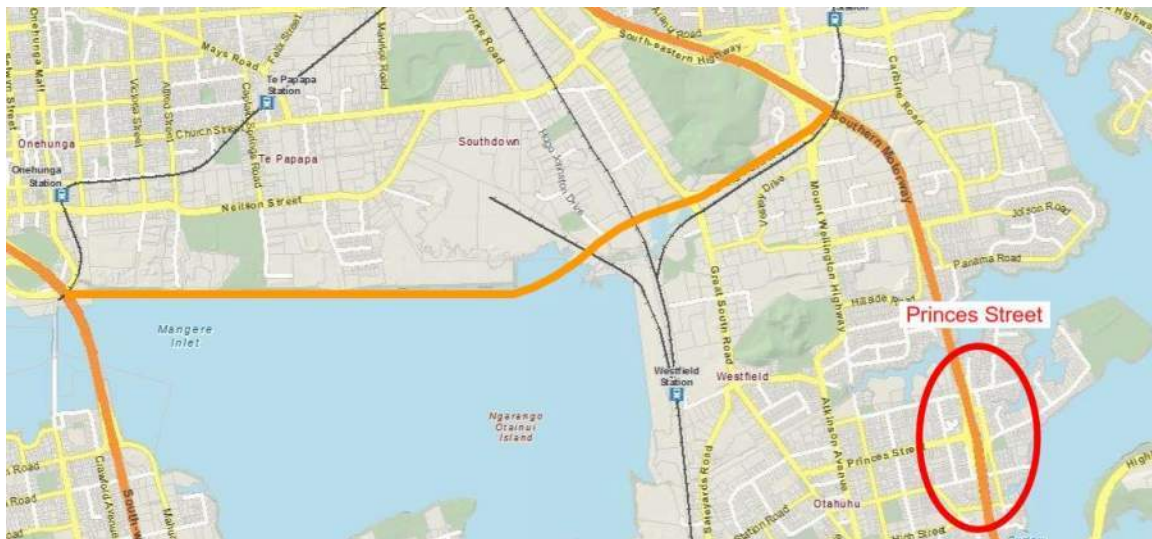


Figure 1 – Princes Street Location for Assessment

Memorandum

3 Information Provided

The following information is provided to allow a full assessment of Princes Street alignment to be made by technical experts:

Appendix A – Option 1 Design Plans, Cross Sections, Longitudinal Sections

Appendix B – Option 2 Design Plans, Cross Sections, Longitudinal Sections

Appendix C – Option 3 Design Plans, Cross Sections, Longitudinal Sections

Appendix D – Option 4 Design Plans, Cross Sections, Longitudinal Sections

Appendix E – Auckland Council Proposed Unitary Plan (PAUP) GIS Feature Information

Appendix F – Geometric Design Criteria

Appendix G – Geological Features (underlying ground conditions)

Appendix H – Alternative Structures

4 Background

The upgrade of Princes St interchange was included after the detailed business case. The upgrade is required as a result of the SH1 4-laning in both north and southbound directions. The widening of the motorway requires the reconstruction of the Princes St bridge. There is an opportunity to improve the interchange layout while reconstructing the bridge to improve the cycling and pedestrian facilities across the SH1 corridor.

5 Options Presented

5.1 Option 1 Overbridge North (Refer to Appendix A)

The first option consists of shifting the overbridge to the north and lining it up with Princes St. The layout includes:

- Modifications to the on- and off-ramps motorway connections allow for SH1 Southern Motorway 4-laning and to comply with the current NZTA TCD 10 standards
- Allowance for a minimum 2 x 100m ramp metering storage for each on-ramp
- Vertical Clearance of 6.0m between proposed overbridge and SH1 Southern Motorway
- Northbound ramp terminal consist of signalised cross intersection (removal of the existing 'dog's leg' traffic island), to improve cycling and pedestrian facilities.
- Southbound ramp terminal consist of signalised cross intersection (will require widening of Frank Grey Place to accommodate additional traffic through the ramp terminal)

Concerns/Issues with this option include:

- Proximity to the existing power pylons of southbound on-and off-ramps, approximately within 2.0m
- Requires 6.0% vertical gradients on the overbridge approaches/Princes St in order to reach the required 6.0m vertical clearance

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- Requires raising the levels of Frank Grey Place by up to 5.0m in order to provide a suitable platform for the southbound ramp terminal
- Will require confirmation of clearance to existing overhead Transpower power lines

5.2 Option 2 Overbridge South (Refer to Appendix B)

The second option consists of using the existing over bridge alignment, reconstructing the bridge and lining it up with Princes St East. The layout includes:

- Modifications to the on- and off-ramps motorway connections allow for SH1 Southern Motorway 4-laning and to comply with the current NZTA TCD 10 standards
- Allowance for a minimum 2 x 100m ramp metering storage for each on-ramp
- Vertical Clearance of 6.0m between proposed overbridge and SH1 Southern Motorway
- Northbound ramp terminal to consist of a similar layout to the existing/retention of the 'dog's leg traffic island.
- Southbound ramp terminal consist of signalised cross intersection with Frank Grey Place.
- Shift of the southbound on-ramp entry to the North
- Minimal modifications expected for Frank Grey Place

Concerns/Issues with this option include:

- Proximity to the existing power pylons of southbound on-and off-ramps, approximately within 2.0m
- Requires 9.0% vertical gradients on the overbridge approaches/Princes St in order to reach the required 6.0m vertical clearance
- Will require confirmation of clearance to existing overhead power lines
- Northbound ramp terminal configuration (dog's leg traffic island) is not optimal for traffic operations and may pose concerns for pedestrian access

5.3 Option 3 Single-Point Urban Interchange (Refer to Appendix C)

The third option consists of applying a Single Point Urban Interchange (SPUI) layout. The layout includes:

- Modifications to the on- and off-ramps motorway connections allow for SH1 Southern Motorway 4-laning and to comply with the current NZTA TCD 10 standards
- Allowance for a minimum 2 x 100m ramp metering storage for each on-ramp
- Vertical Clearance of 6.0m between proposed overbridge and SH1 Southern Motorway
- Overbridge shifted to the North and lines up with Princes St
- Re-alignment of Princes St East to allow for better connectivity with the proposed overbridge
- Removal of the 'dog's leg traffic island on the Northbound Ramp Terminal to improve cycling and pedestrian facilities.
- Frank Grey Place to be split in to two and a new connection between Frank Grey place and Fencible Place for local road connectivity

Concerns/Issues with this option include:

- Proximity to the existing power pylons of southbound on-and off-ramps, approximately within 2.0m

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- Requires 5.5% vertical gradients on the overbridge approaches/Princes St in order to reach the required 6.0m vertical clearance
- Requires raising the levels of Frank Grey Place by up to 6.0m in order to provide a suitable platform for the southbound ramp terminal
- Will require new road connection between Frank Grey Place and Fencible Place
- Will require raising of Fencible Place/Princes St Intersection by approximate 3.0m
- Will require confirmation of clearance to existing overhead power lines
- SPUI layouts generally require wider overbridges when compared to standard interchanges
- SPUI layouts may prove problematic when pedestrian accessibility is taken in to account
- Transpower pylon will be relocated

5.4 Option 4 Full Diamond (Refer to Appendix D)

The fourth option consists of applying a diamond interchange layout. The layout includes:

- Modifications to the on- and off-ramps motorway connections allow for SH1 Southern Motorway 4-laning and to comply with the current NZTA TCD 10 standards
- Allowance for a minimum 2 x 100m ramp metering storage for each on-ramp
- Vertical Clearance of 6.0m between proposed overbridge and SH1 Southern Motorway
- Overbridge shifted to the North and lines up with Princes St
- Re-alignment of Princes St East to allow for better connectivity with the proposed overbridge
- Removal of the 'dog's leg traffic island on the Northbound Ramp Terminal to improve cycling and pedestrian facilities.
- Frank Grey Place to be split in to two and a new connection between Frank Grey place and Fencible Place for local road connectivity

Concerns/Issues with this option include:

- Proximity to the existing power pylons of southbound on-and off-ramps, approximately within 2.0m
- Requires 5.5% vertical gradients on the overbridge approaches/Princes St in order to reach the required 6.0m vertical clearance
- Requires raising the levels of Frank Grey Place by up to 6.0m in order to provide a suitable platform for the southbound ramp terminal
- Will require new road connection between Frank Grey Place and Fencible Place
- Will require raising of Fencible Place/Princes St Intersection by approximate 3.0m
- Will require confirmation of clearance to existing overhead power lines

6 Alternative Options for Consideration

This section outlines potential design solutions not presented for assessment but important to highlight to the expert panel during the options assessments

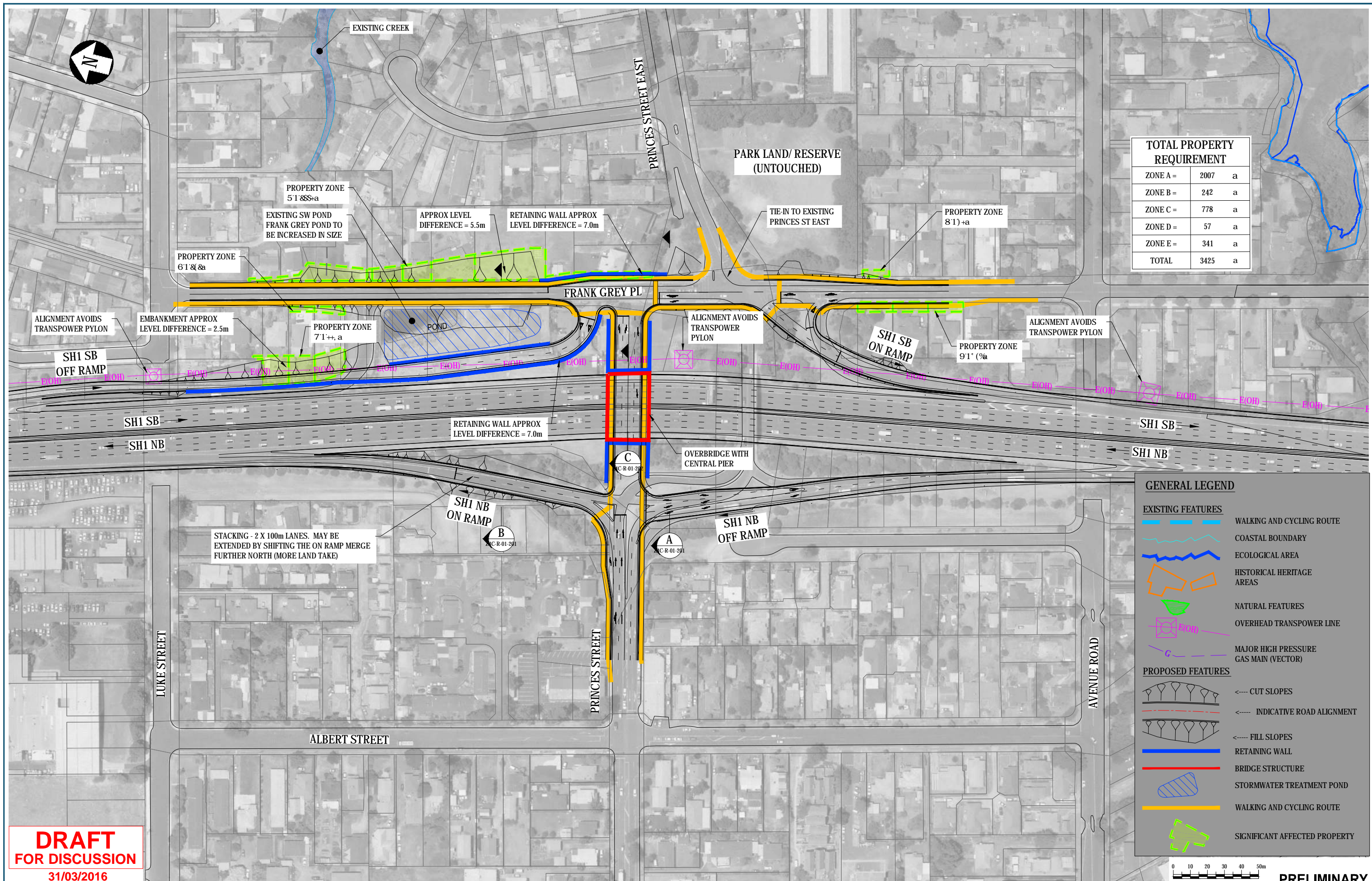
Memorandum

6.1 Structural configuration

Improvements for SH1 Southern Motorway currently allow for 4 laning of each direction of traffic. Additional consideration for the motorway works will be dependent on the structural configuration of the overbridge. The preferred bridge solution (1050mm super-tee concrete beams) limits the span width across the motorway by incorporating a central pier, with MSE walls on either side of the motorway. By limiting the span, the super-structure (bridge beams and deck) can be minimised, thus reducing the height of the embankments and retaining at the intersections on either side of the bridge

Alternative structural options presented in Appendix H are :

1. 2 span Super Tee bridge with central motorway pier with spill through embankments (1500mm depth Super-Tee)
2. 3 span super tee bridge without central motorway pier with spill through embankments (2000mm depth super tee) with the benefit of not requiring temporary motorway realignments
3. 2 span Super Tee bridge with central motorway pier with MSE wall closely located to the roadway shoulders (1050mm depth Super-Tee).



TOTAL PROPERTY REQUIREMENT		
ZONE A =	2007	a
ZONE B =	242	a
ZONE C =	778	a
ZONE D =	57	a
ZONE E =	341	a
TOTAL	3425	a

GENERAL LEGEND

- EXISTING FEATURES**
- WALKING AND CYCLING ROUTE
 - COASTAL BOUNDARY
 - ECOLOGICAL AREA
 - HISTORICAL HERITAGE AREAS
 - NATURAL FEATURES
 - OVERHEAD TRANSPOWER LINE
 - MAJOR HIGH PRESSURE GAS MAIN (VECTOR)
- PROPOSED FEATURES**
- CUT SLOPES
 - INDICATIVE ROAD ALIGNMENT
 - FILL SLOPES
 - RETAINING WALL
 - BRIDGE STRUCTURE
 - STORMWATER TREATMENT POND
 - WALKING AND CYCLING ROUTE
 - SIGNIFICANT AFFECTED PROPERTY

DRAFT FOR DISCUSSION
31/03/2016

No.	Issued Status	Drawn	Check'd	App'd	Date
A	DRAFT ISSUE FOR WORKSHOP DISCUSSION	AR			01/04/2016

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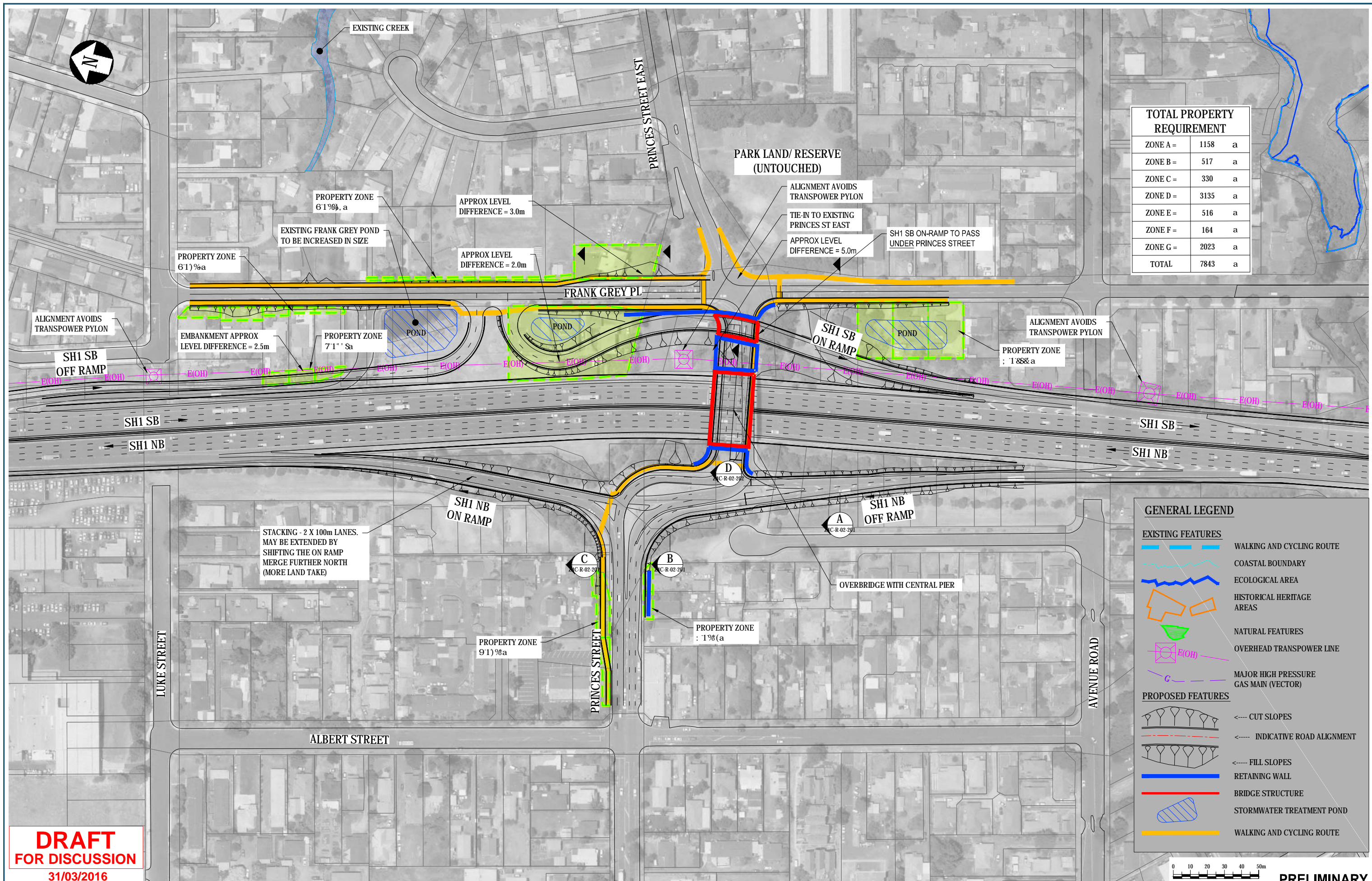


East West Link

Drawn	A RAM	Drafting Check	Reviewed Design Manager	Approved Alliance Manager
Designed	R TAN	Design Check		
Scale: Original Scale (A1)	Reduced Scale (A3)	AS SHOWN	Contract No	PA4041

Discipline	RD ALIGNMENT - MULTI- CRITERIA ASSESSMENT
Drawing Title	PRINCES ST INTERCHANGE -OPTION 1 OVERBRIDGE NORTH - LAYOUT
Drawing Number	Z4C-R-01-101
Rev No.	A

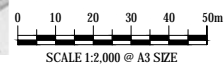
PRELIMINARY



TOTAL PROPERTY REQUIREMENT		
ZONE A =	1158	a
ZONE B =	517	a
ZONE C =	330	a
ZONE D =	3135	a
ZONE E =	516	a
ZONE F =	164	a
ZONE G =	2023	a
TOTAL	7843	a

GENERAL LEGEND

- EXISTING FEATURES**
- WALKING AND CYCLING ROUTE
 - COASTAL BOUNDARY
 - ECOLOGICAL AREA
 - HISTORICAL HERITAGE AREAS
 - NATURAL FEATURES
 - OVERHEAD TRANSPOWER LINE
 - MAJOR HIGH PRESSURE GAS MAIN (VECTOR)
- PROPOSED FEATURES**
- CUT SLOPES
 - INDICATIVE ROAD ALIGNMENT
 - FILL SLOPES
 - RETAINING WALL
 - BRIDGE STRUCTURE
 - STORMWATER TREATMENT POND
 - WALKING AND CYCLING ROUTE



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31/03/2016

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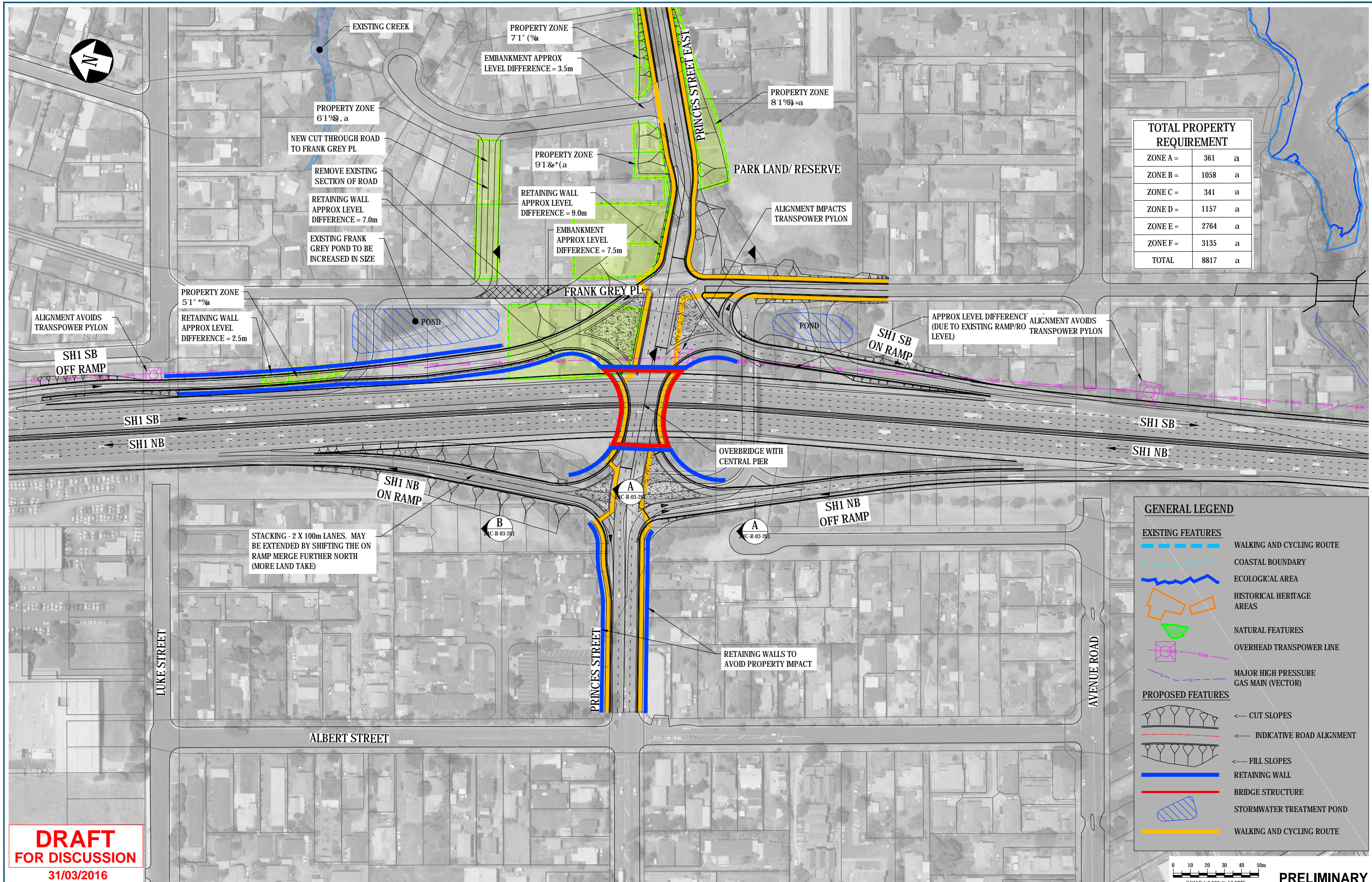
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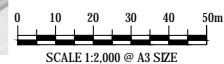
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Drawing Title	PRINCES ST INTERCHANGE - OPTION 2 OVERBRIDGE SOUTH - LAYOUT
Drawing Number	Z4C-R-02-101
Rev No.	A



TOTAL PROPERTY REQUIREMENT	
ZONE A =	361 a
ZONE B =	1058 a
ZONE C =	341 a
ZONE D =	1157 a
ZONE E =	2764 a
ZONE F =	3135 a
TOTAL	8817 a

GENERAL LEGEND

- EXISTING FEATURES**
- WALKING AND CYCLING ROUTE
 - COASTAL BOUNDARY
 - ECOLOGICAL AREA
 - HISTORICAL HERITAGE AREAS
 - NATURAL FEATURES
 - OVERHEAD TRANSPOWER LINE
 - MAJOR HIGH PRESSURE GAS MAIN (VECTOR)
- PROPOSED FEATURES**
- CUT SLOPES
 - INDICATIVE ROAD ALIGNMENT
 - FILL SLOPES
 - RETAINING WALL
 - BRIDGE STRUCTURE
 - STORMWATER TREATMENT POND
 - WALKING AND CYCLING ROUTE



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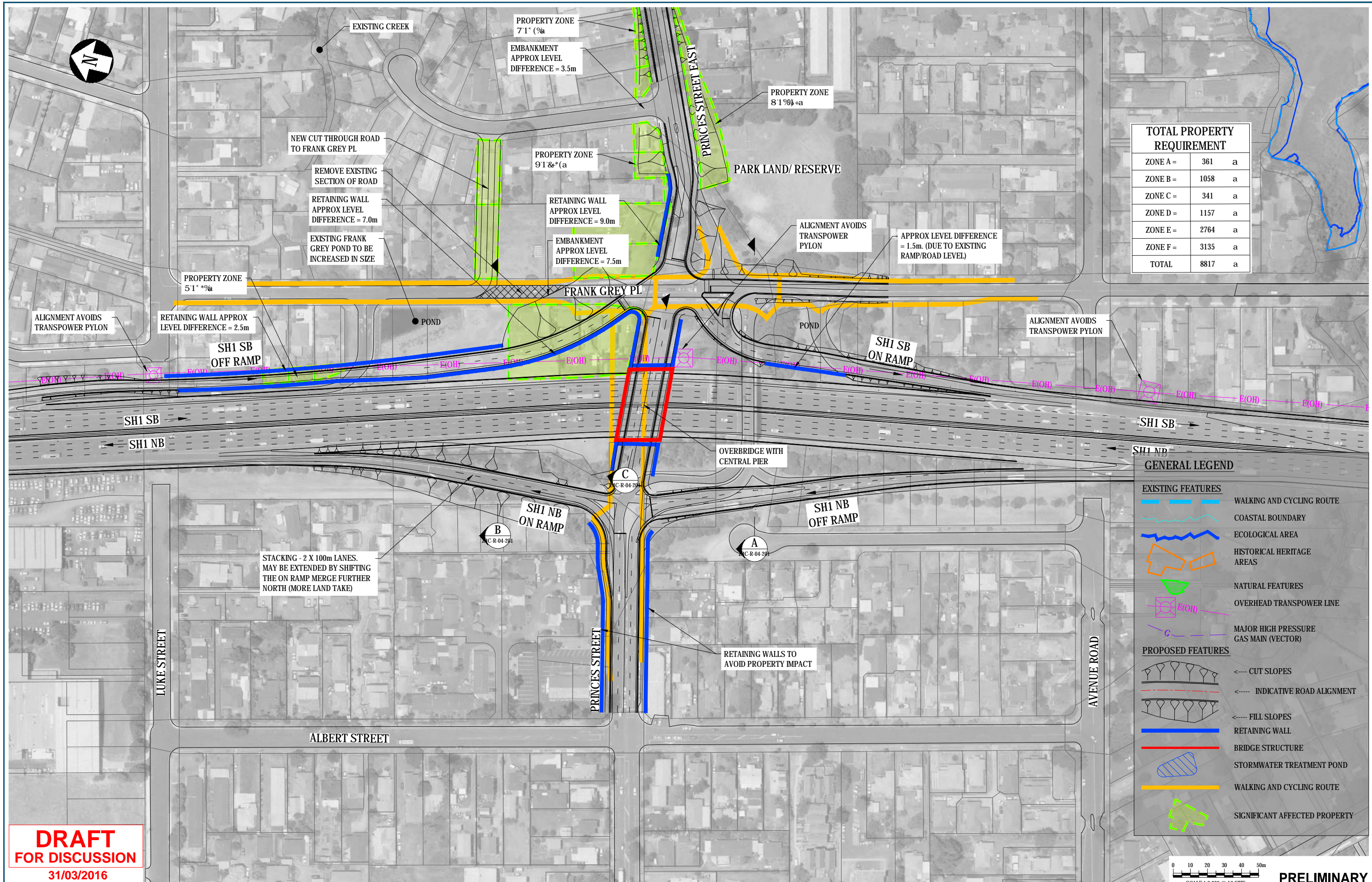
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Discipline	RD ALIGNMENT - MULTI- CRITERIA ASSESSMENT
Drawing Title	PRINCES ST INTERCHANGE - OPTION 3 SINGLE POINT URBAN INTERCHANGE - LAYOUT
Drawing Number	Z4C-R-03-101
Rev No.	A



TOTAL PROPERTY REQUIREMENT		
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ZONE B =	1058	a
ZONE C =	341	a
ZONE D =	1157	a
ZONE E =	2764	a
ZONE F =	3135	a
TOTAL	8817	a

GENERAL LEGEND

EXISTING FEATURES

- WALKING AND CYCLING ROUTE
- COASTAL BOUNDARY
- ECOLOGICAL AREA
- HISTORICAL HERITAGE AREAS
- NATURAL FEATURES
- OVERHEAD TRANSPOWER LINE
- MAJOR HIGH PRESSURE GAS MAIN (VECTOR)

PROPOSED FEATURES

- CUT SLOPES
- INDICATIVE ROAD ALIGNMENT
- FILL SLOPES
- RETAINING WALL
- BRIDGE STRUCTURE
- STORMWATER TREATMENT POND
- WALKING AND CYCLING ROUTE
- SIGNIFICANT AFFECTED PROPERTY

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Discipline	RD ALIGNMENT - MULTI- CRITERIA ASSESSMENT
Drawing Title	PRINCES ST INTERCHANGE - OPTION 4 DIAMOND INTERCHANGE - LAYOUT
Drawing Number	Z4C-R-04-101
Rev No.	A

East West Link Alliance Memorandum

To: Amelia Linzey

Date: 24th March 2016

From: Lloyd de Beer

Our Ref:

Copy: Noel Nancekivell, Lara Jay

Subject: **EWL MCA Assessment – Neilson Street Interchange Design Options**

1 Purpose

This memo presents three design alignment options at the Neilson Street Interchange (Project Sector 1). The information is presented ahead of MCA (Multi-Criteria Assessment) workshops for analysis by experts prior to the meeting.

This memo with its supplementary information and drawings outlines the key constraints and design inputs specific to each option.

Additional design options have also been included for review by the MCA experts to determine if they have benefit to the project to be included in the design process or further assessed.

2 Location of Neilson Street Interchange

Refer to Figure 1 below for location of the Neilson Street Interchange in Project Sector 1. The assessment area includes SH20 motorway, associated ramps and local road connections up to Neilson Street and Galway St.

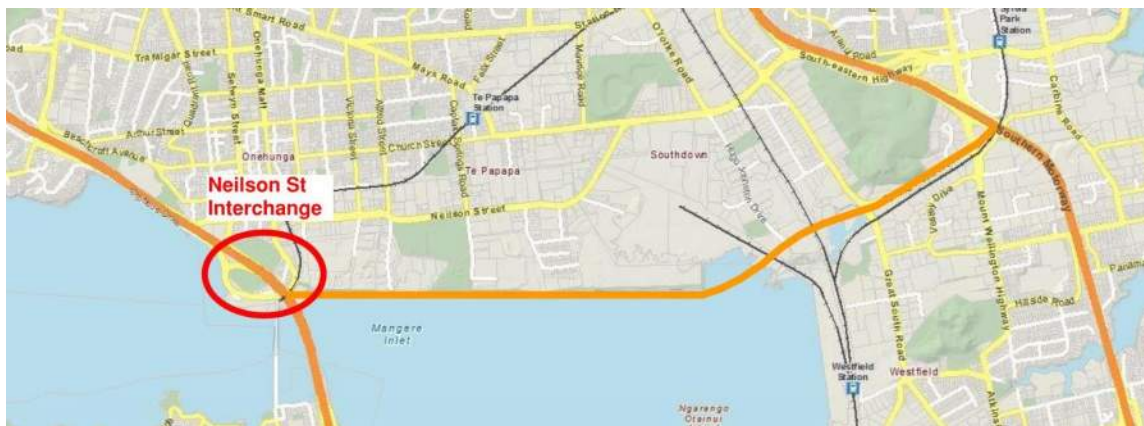


Figure 1 – Neilson Street Interchange Location for Assessment

3 Information Provided

The following information is provided to allow a full assessment of the Neilson Street interchange to be made by technical experts:

Appendix A – TOES Design Plans, Cross Sections, Longitudinal Sections

Appendix B – DBC Design Plans, Cross Sections, Longitudinal Sections

Memorandum

Appendix C – Freeflow Design Plans, Cross Sections, Longitudinal Sections

Appendix D – Auckland Council Proposed Unitary Plan (PAUP) GIS Feature Information

Appendix E – Geometric Design Criteria at interchange

Appendix F – Geological Features (underlying ground conditions)

Appendix G – Traffic Flow Data (comparing existing to future traffic flows)

4 Background to Potential Alignment Change

The current interchange layout (Detailed Business Case, DBC) provides for all necessary links between the SH20 motorway to the Onehunga region and EW link. The DBC option utilises traffic signals to provide safe intersections for traffic and pedestrian movements.

Alternative schemes have been suggested (internally and by TOES – The Onehunga Enhancement Society) to be developed to provide free-flowing connections between alignments, and to provide increased local connections into public spaces.

5 Options Presented

5.1 Option DBC (Appendix A)

The fundamental elements of DBC Option are:

- Standard motorway to local road interchange configuration with signalised intersections provided for conflicting movements.
- Bridge connection over SH20 required
- Local road access into Onehunga Wharf from Onehunga
- Maintains Orpheus Drive connections, via two structures around the foreshore which crosses over into the CMA
- Preserves the yacht club but impacts on the Sea Scouts clubhouse
- Provides for SH20 NB and SB on-ramp truck by-pass lanes
- Provides for bus linkages into the Onehunga centre along Galway St and link road to Onehunga Harbour Rd
- Outstanding Natural Feature preserved around Gloucester Park, although ramps to be built over top of ground
- No Transpower Pylons disturbed, Vector HP gas impacted, but less than TOES option
- future light and heavy rail construction not precluded
- Linkage to Galway Street provided

5.2 Option TOES (Refer to Appendix B)

The fundamental elements of TOES Option are:

- Maintains general configuration of the existing interchange without the need for a bridge structure over SH20
- Bridged connection from EWL WB to SH20 SB across Mangere Inlet
- Trenched cut and cover connections from SH20 SB to EWL EB

Memorandum

- Galway Link provided and as a result bus linkages, although on a less direct route.
- Outstanding Natural Feature impacted with trench through Gloucester Park
- Preserves the yacht club and Sea Scouts clubhouse
- Provides for SH20 NB and SB on-ramp truck by-pass lanes
- Maintains Orpheus Drive connections, alignment allows for roadway to be clear of CMA
- No Transpower Pylons disturbed, Vector HP gas impacted by trenched section
- Difficult for future rail connections to be installed due to additional bridged structures in the vicinity of Galway Street.
- Difficult connections into wharf area and “the Landing”
- Significant impact on new multi-storey buildings at end of Onehunga Mall

5.3 Option Freeflow (Refer to Appendix C)

The fundamental elements of Freeflow Option are:

- Motorway to local road connections utilising free-flowing linkages, rather than signalised intersections
- Bridge connection over SH20 required
- Local road access into Onehunga Wharf from Onehunga
- Maintains Orpheus Drive connections, alignment allows for roadway to be clear of CMA
- Preserves the yacht club and Sea Scouts clubhouse
- Provides for SH20 NB and SB on-ramp truck by-pass lanes
- Provides for bus linkages into the Onehunga centre
- Outstanding Natural Feature preserved around Gloucester Park, although ramps to be built over top of ground
- No Transpower Pylons disturbed, Vector HP gas impacted, but less than TOES option
- future light and heavy rail construction not precluded
- linkage provided to Galway Street

6 Alternative Options for Consideration

This section outlines potential design solutions not presented for assessment but important to highlight to the expert panel during the options assessments

6.1 Selwyn Street Connection

Refer to Figure 2 below for option to connect Onehunga Harbour Road to Selwyn Street. This will allow traffic heading north to the Campbell Road region to avoid the Onehunga centre and to provide better access into the Gloucester park region. The option will have significant impact on the outstanding natural feature (tuff ring) and properties.

Memorandum

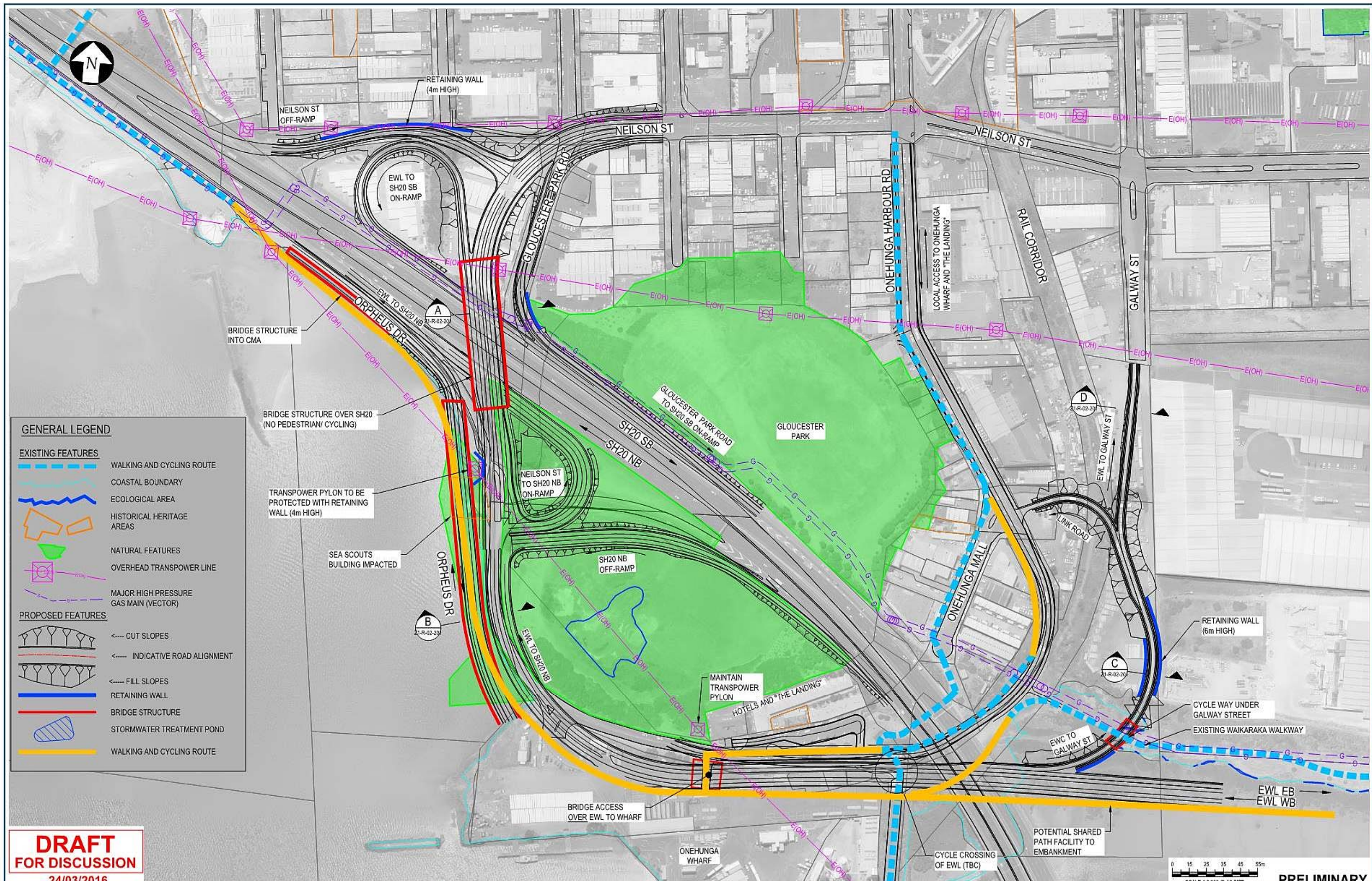


Figure 2 – Potential Selwyn Street Connection

6.2 Additional Access to Wharf Area

Access to the wharf area is provided in DBC and Freeflow options. Further access can be provided into the wharf on all options with

- Left in, left out (no signals) and prohibiting right turns out of the wharf
- All manoeuvres out of the wharf by using traffic signals



DRAFT FOR DISCUSSION
24/03/2016

D	REVISED ISSUE FOR DISCUSSION	AR			
C	ISSUED FOR HUI DISCUSSION	AR		16/03/2016	
B	DRAFT ISSUE FOR NZTA DISCUSSION	AR		29/02/2016	
A	DRAFT ISSUE FOR WORKSHOP DISCUSSION	AR		12/02/2016	
No.	Issued Status	Drawn	Checked	App'd	Date

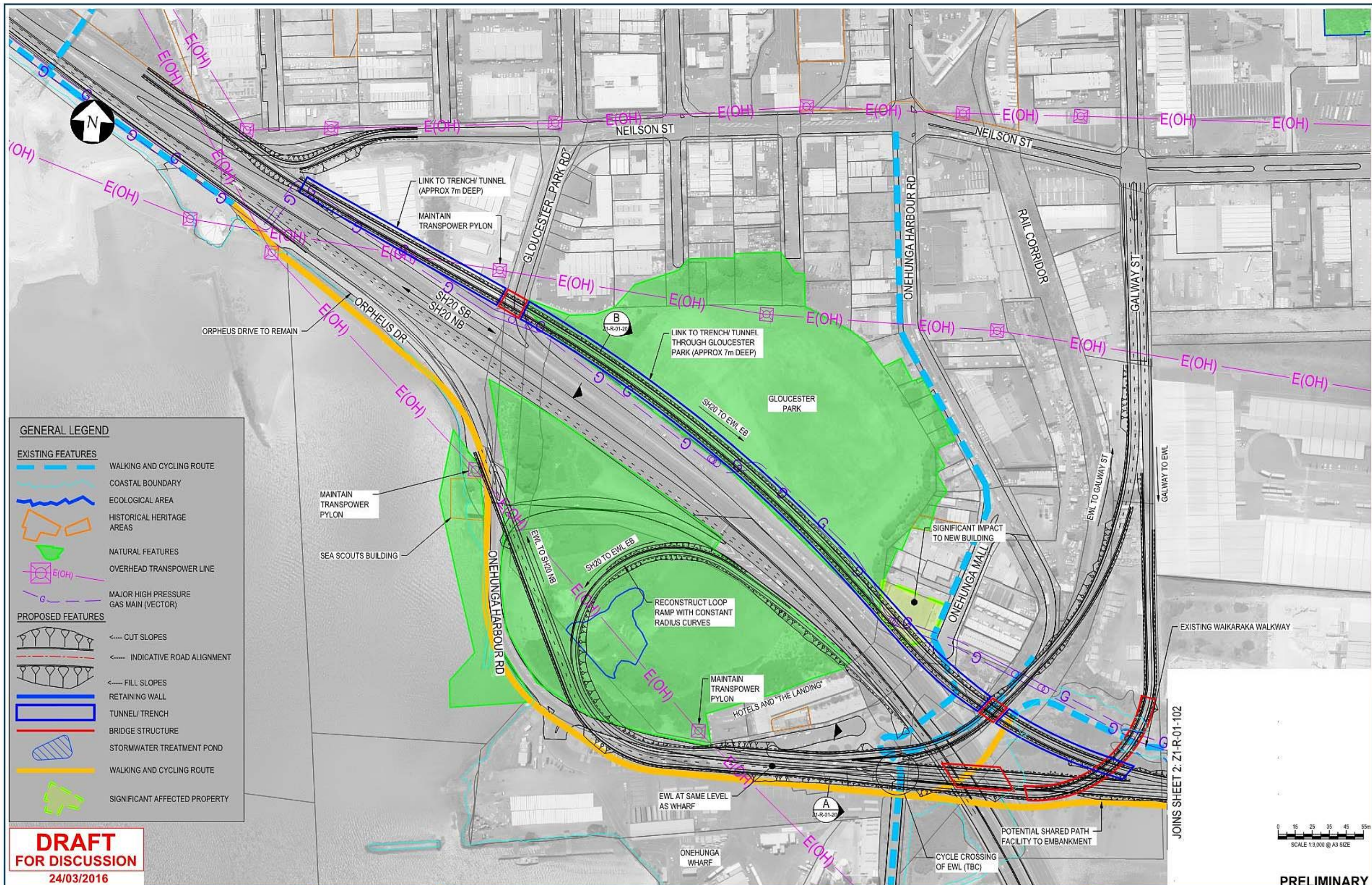
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Designed	S FOX/R TAN	Design Check				
Scale:	Original Scale (A1)	Reduced Scale (A3)	AS SHOWN	Contract No	PA4041	

Discipline	RD ALIGNMENT - MULTI- CRITERIA ASSESSMENT
Drawing Title	NEILSON ST INTERCHANGE - DBC OPT LAYOUT
Drawing Number	Z1-R-02-101
Rev No.	D



DRAFT FOR DISCUSSION
24/03/2016

D	REVISED ISSUE FOR DISCUSSION	AR			
C	ISSUED FOR HUI DISCUSSION	AR		16/03/2016	
B	DRAFT ISSUE FOR NZTA DISCUSSION	AR		29/02/2016	
A	DRAFT ISSUE FOR WORKSHOP DISCUSSION	AR		12/02/2016	
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NZ TRANSPORT AGENCY
WAKA KOTAHĪ

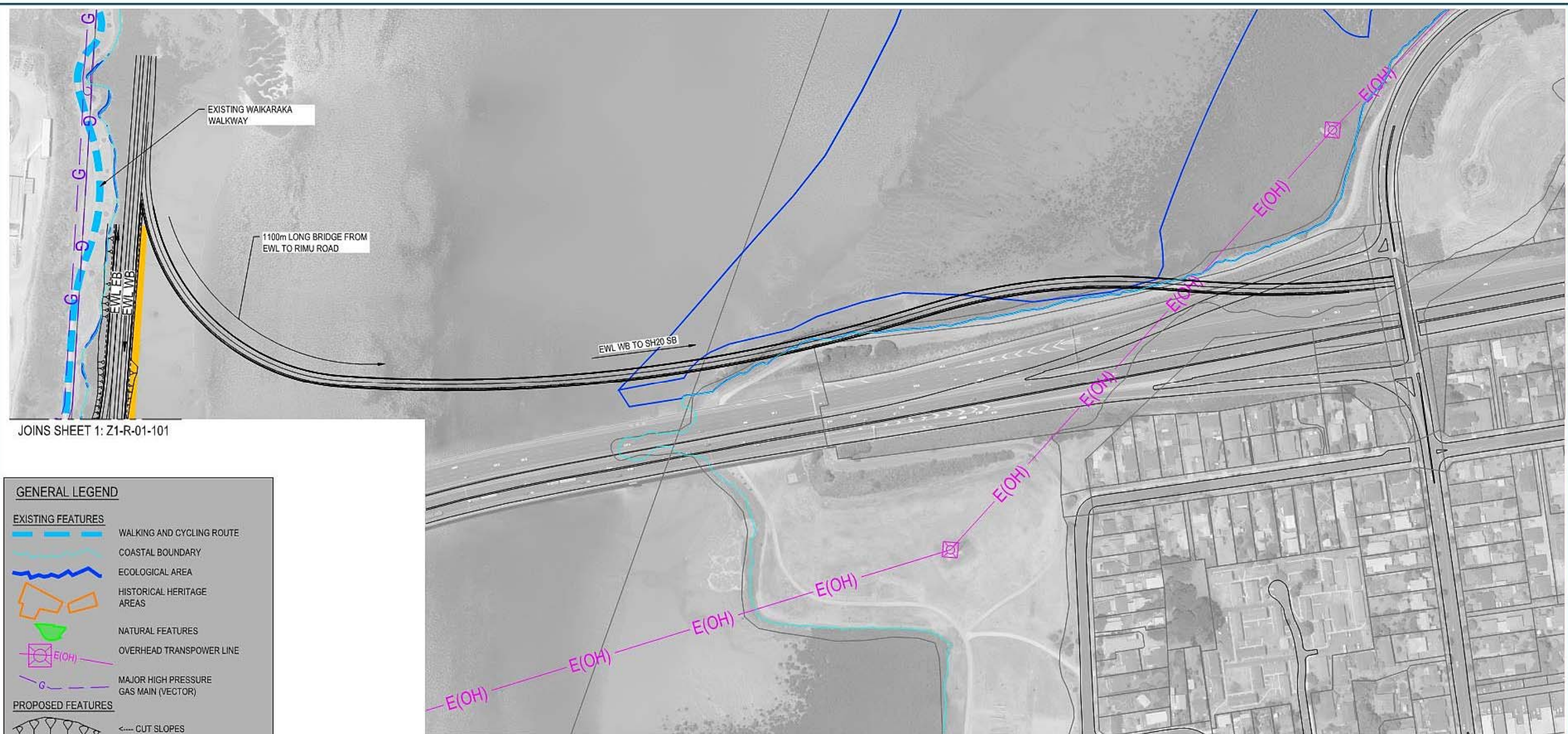
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Designed	S FOX/ R TAN	Design Check		
Scale: Original Scale (A1)	Reduced Scale (A3)	AS SHOWN	Contract No	PA4041

Discipline	RD ALIGNMENT - MULTI- CRITERIA ASSESSMENT
Drawing Title	NEILSON ST INTERCHANGE - TOES OPT LAYOUT - SH 1 OF 2
Drawing Number	Z1-R-01-101
Rev No.	D



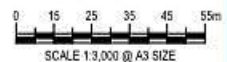
PRELIMINARY



JOINS SHEET 1: Z1-R-01-101

GENERAL LEGEND	
EXISTING FEATURES	
	WALKING AND CYCLING ROUTE
	COASTAL BOUNDARY
	ECOLOGICAL AREA
	HISTORICAL HERITAGE AREAS
	NATURAL FEATURES
	OVERHEAD TRANSPOWER LINE
	MAJOR HIGH PRESSURE GAS MAIN (VECTOR)
PROPOSED FEATURES	
	CUT SLOPES
	INDICATIVE ROAD ALIGNMENT
	FILL SLOPES
	RETAINING WALL
	TUNNEL/ TRENCH
	BRIDGE STRUCTURE
	STORMWATER TREATMENT POND
	WALKING AND CYCLING ROUTE
	SIGNIFICANT AFFECTED PROPERTY

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24/03/2016



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A	DRAFT ISSUE FOR WORKSHOP DISCUSSION	AR			

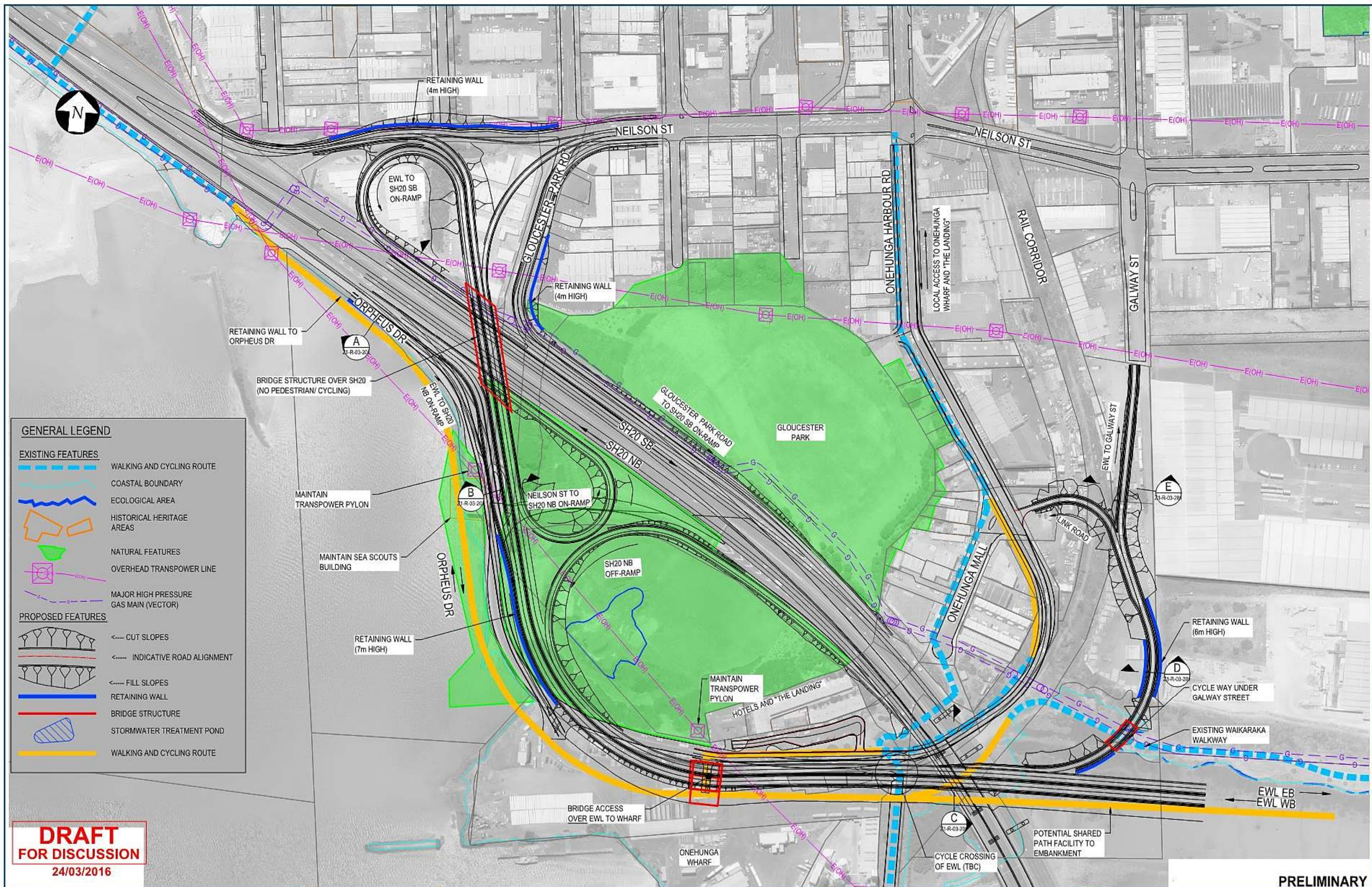
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Scale: Original Scale (A1)	Reduced Scale (A3)	AS SHOWN	Contract No PA4041	

Discipline	RD ALIGNMENT - MULTI- CRITERIA ASSESSMENT		
Drawing Title	NEILSON ST INTERCHANGE - TOES OPT LAYOUT - SH 2 OF 2		
Drawing Number	Z1-R-01-102	Rev No.	A



GENERAL LEGEND

- EXISTING FEATURES**
- WALKING AND CYCLING ROUTE
 - COASTAL BOUNDARY
 - ECOLOGICAL AREA
 - HISTORICAL HERITAGE AREAS
 - NATURAL FEATURES
 - OVERHEAD TRANSPOWER LINE
 - MAJOR HIGH PRESSURE GAS MAIN (VECTOR)
- PROPOSED FEATURES**
- CUT SLOPES
 - INDICATIVE ROAD ALIGNMENT
 - FILL SLOPES
 - RETAINING WALL
 - BRIDGE STRUCTURE
 - STORMWATER TREATMENT POND
 - WALKING AND CYCLING ROUTE

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24/03/2016

D	REVISED ISSUE FOR DISCUSSION	AR			
C	ISSUED FOR HUI DISCUSSION	AR		16/03/2016	
B	DRAFT ISSUE FOR NZTA DISCUSSION	AR		29/02/2016	
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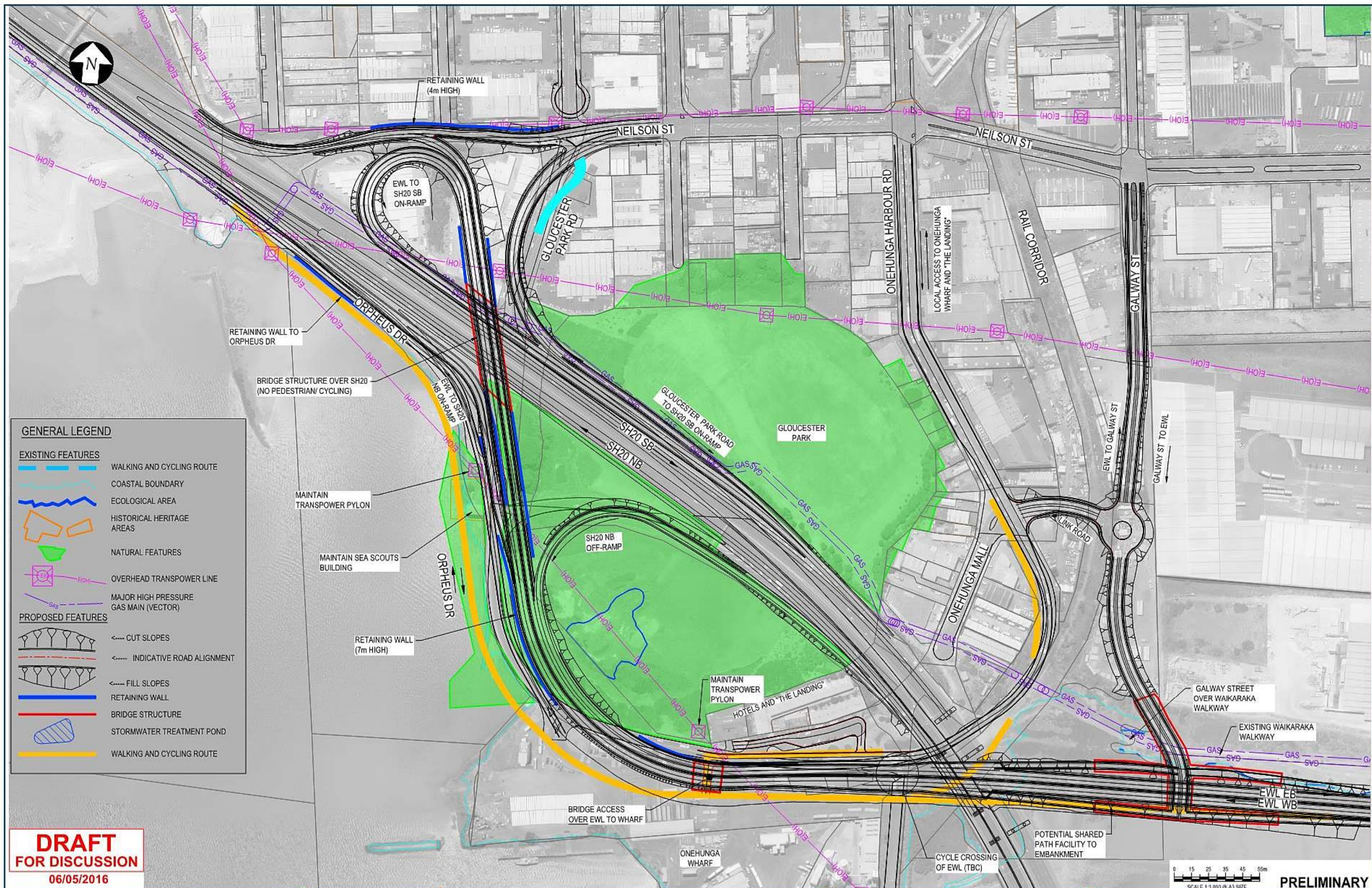
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East West Link

Drawn	A RAM	Drafting Check	Reviewed Design Manager	Approved Alliance Manager
Designed	R TAN	Design Check		
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Discipline	RD ALIGNMENT - MULTI- CRITERIA ASSESSMENT
Drawing Title	NEILSON ST INTERCHANGE - FREEFLOW OPT LAYOUT
Drawing Number	Z1-R-03-101
Rev No.	D



GENERAL LEGEND

EXISTING FEATURES

- WALKING AND CYCLING ROUTE
- COASTAL BOUNDARY
- ECOLOGICAL AREA
- HISTORICAL HERITAGE AREAS
- NATURAL FEATURES
- OVERHEAD TRANSPOWER LINE
- MAJOR HIGH PRESSURE GAS MAIN (VECTOR)

PROPOSED FEATURES

- CUT SLOPES
- INDICATIVE ROAD ALIGNMENT
- FILL SLOPES
- RETAINING WALL
- BRIDGE STRUCTURE
- STORMWATER TREATMENT POND
- WALKING AND CYCLING ROUTE

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06/05/2016

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Drawing Number	Z1-R-04-101
Rev No.	A

East West Link Alliance Memorandum

To: Amelia Linzey

Date: 15th April 2016

From: Lloyd de Beer

Revision: Revision 2

Copy: Noel Nancekivell, Lara Jay

Subject: EWL MCA Assessment – Anns Creek
Design Options Presentation

1 Purpose

This memo has been revised and reissued as agreed at the MCA held on the 8th of April 2016. This memo includes an additional Option 4 where land take in the CMA is minimised by moving the alignment north of the CMA and addresses the implications of removing the intersection at EWL/Hugo Johnston Drive.

The assessment team is requested to assess Option 4, and in addition, make an assessment on Option1-4 with and without intersection connections at EWL/Hugo Johnston Drive.

This memo presents three design alignment options in the vicinity of Anns Creek (Project Sector 3). The information is presented ahead of MCA (Multi-Criteria Assessment) workshops for analysis by experts prior to the meeting.

This memo with its supplementary information and drawings outlines the key constraints and design inputs specific to each option.

Additional design options have also been presented for discussion by the MCA experts to determine if they have benefit to the project to be included in the design process or further assessed.

2 Location of Anns Creek

Refer to Figure 1 below for location of Anns Creek in Project Sector 3. The assessment area extends between the foreshore embankment within the Mangere Inlet to the Great South Road/Sylvia Park

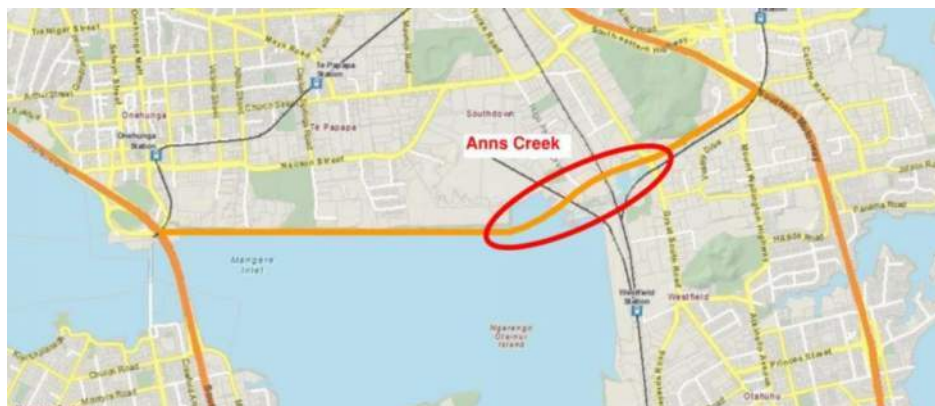


Figure 1 – Anns Creek Location for Assessment

Memorandum

3 Information Provided

The following information is provided to allow a full assessment of Anns Creek alignment to be made by technical experts:

Appendix A – Option 1 Design Plans, Cross Sections, Longitudinal Sections

Appendix B – Option 2 Design Plans, Cross Sections, Longitudinal Sections

Appendix C – Option 3 Design Plans, Cross Sections, Longitudinal Sections

Appendix D – Option 4 Design Plans, Cross Sections, Longitudinal Sections

Appendix E – Auckland Council Proposed Unitary Plan (PAUP) GIS Feature Information

Appendix F – Geometric Design Criteria

Appendix G – Geological Features (underlying ground conditions)

Appendix H – Details of Proposed Shared Path/Cycling Strategy at Anns Creek

Appendix I – Alternative Grade Separation option at Great South Road

Appendix J – Alternative alignments (dependant on location of foreshore embankment position)

4 Changes to Detailed Business Case

The current Anns Creek alignment (Detailed Business Case, DBC Option 1) was chosen to avoid the Mighty River Power site. This design was put forward and signed off through the NZ Transport Agency Business Case process.

Subsequent information available suggests that the Might River Power station is closing down and the property might be available for purchase. This allows for alternative alignments to be investigated that could pass through this property. Two subsequent options have been investigated and presented.

5 Options Presented

5.1 Option 1 Detailed Business Case (Refer to Appendix A)

The fundamental elements of Option 1 DBC are:

- Alignment avoids Mighty River Power property.
- Majority of alignment to bridge structure through Coastal Protection Area. Steel members bridging over rail corridors, concrete members bridging over coastal zone.
Spans over the rail network are longer in this option than those presented in Option 2 & 3 due to increased numbers of rails to cross further north.
- Grade separation of Hugo Johnston Dr/EWL intersection. Hugo Johnston Dr to EWL Eastbound on-ramp, EWL Westbound to Hugo Johnston Dr off-ramp (non-signalised intersection).
- Encroaches into Dilworth Trust property and TR Group property, however at a lesser extent to Option 2 & 3.

Memorandum

- Avoids majority of ecological feature zones in the Anns Creek area.
- Ramp constructed over top of asbestos contaminated land (west of Hugo Johnston Dr).
- Cycling/walking strategy proposed to southern side of bridge structure. Grade separated pedestrian and cycling movements at intersection so as not to cause safety concerns.
- Two stormwater ponds required (although flexibility remains on final locations dependant on sensitivity and land requirement).
- Requires a minimum of 2 Transpower Pylons to be relocated and/or raised.
- No impact on Vector High Pressure gas main.

5.2 Option 2 Revised Alignment (Refer to Appendix B)

The fundamental elements of Option 2 revised alignment are:

- Alignment passes through the Mighty River Power site.
- Majority of alignment to bridge structure through Coastal Protection Area. Steel members bridging over rail corridors, concrete members bridging over coastal zone.
- Hugo Johnston Dr to EWL Eastbound left turn & EWL Westbound to Hugo Johnston Dr right turn, at-grade signalised intersection.
- Alignment moves further south away from Dilworth Trust property, but further into ecological zones and TR Group Ltd property.
- Ramps avoid the asbestos contaminated land.
- Cycling/walking strategy to southern side of southern side of alignment. Pedestrians and cyclists to use at-grade intersection signals to cross intersection to Hugo Johnston Drive.
- Two stormwater ponds required (although flexibility remains on final locations dependant on sensitivity and land requirement).
- Potential impact on Vector high pressure gas main due to abutments constructed in close proximity to the main.
- Requires a minimum of 1 Transpower Pylons to be raised.

5.3 Option 3 Revised Alignment (Refer to Appendix C)

The fundamental elements of Option 3 revised alignment are:

- Alignment passes through the Mighty River Power site.
- Hugo Johnston Dr to EWL Eastbound left turn (at-grade, not signalised) & EWL Westbound to Hugo Johnston Dr slip lane (grade separated, non-signalised).
- Majority of alignment to bridge structure through Coastal Protection Area. Steel members bridging over rail corridors, concrete members bridging over coastal zone.
- Alignment moves further south away from Dilworth Trust property, but further into ecological zones and TR Group Ltd property.
- Roundabout incorporated into design to minimise ramp radii however crosses further into natural feature zones.
- Ramp cuts into existing ground close to contaminated land zone.
- Cycling/walking strategy to southern side of alignment as well as utilising existing shared path to access Hugo Johnston Drive passing under EWL.
- Two stormwater ponds required (although flexibility remains on final locations dependant on sensitivity and land requirement).

Memorandum

- Potential impact on Vector high pressure gas main due to abutments constructed in close proximity to the main.
- Requires a minimum of 1 Transpower Pylons to be raised.

5.4 Option 4 Revised Alignment (Refer to Appendix D)

The fundamental elements of Option 4 revised alignment are:

- Alignment avoids Mighty River Power property.
- Alignment avoids the CMA and Anns Creek ecological sites.
- Hugo Johnston Dr to EWL Eastbound left turn (at-grade, not signalised) & EWL Westbound to Hugo Johnston Dr slip lane (grade separated, non-signalised). Hugo Johnston Drive will pass under EWL.
- The EWL encroaches into the Port of Auckland Car Storage facility. It is proposed that the bridge in this property will be designed to maximise the use of the land beneath the alignment.
- Spans over the rail network are longer in this option than those presented in Option 2 & 3 due to increased numbers of rails to cross further north.
- Encroaches into Dilworth Trust property and TR Group property, however at a lesser extent to Option 2 & 3.
- Ramp cuts into existing ground close to contaminated land zone
- Cycling/walking strategy to southern side of alignment as well as utilising existing shared path to access Hugo Johnston Drive passing under EWL. Shared path to cross westbound off-ramp at-grade.
- Requires a minimum of 3 Transpower Pylons to be raised.
- No effect on Vector gas main, although protection is required.

6 Alternative Options for Consideration

This section outlines potential design solutions not presented for assessment but important to highlight to the expert panel during the options assessments

6.1 Grade Separation of Great South Road

Options 1,2 & 3 all rely on tying the EWL into the Great South Road/Sylvia Park Road intersection at-grade. An alternative solution for the alignment is presented in Appendix H to grade separate the intersection. This has the benefit of removing all EWL traffic from the intersection and allows traffic to bypass. The alignment would take on a free-flowing feel similar to a motorway environment encouraging increased vehicle speeds.

The option presented in Appendix H requires the EWL alignment to pass under Great South Road at a similar level to the adjacent rail network. Great South Road passes over top with ramp connections at Sylvia Park/Great South Road intersection.

If the EWL alignment was to remain at grade, the Great South Road alignment would need to be raised over top.

Foreshore Embankment Alignments

Memorandum

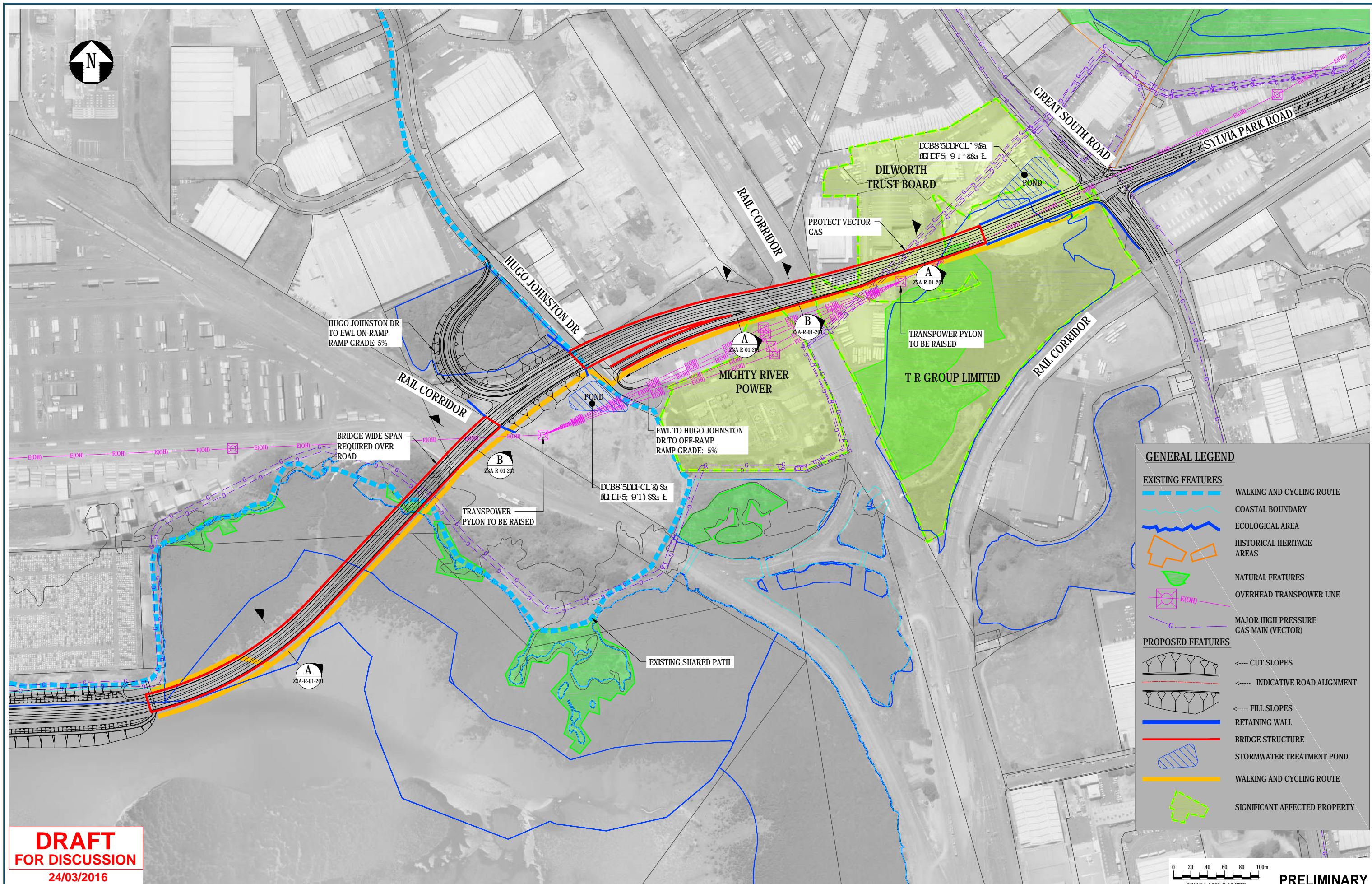
All alignments of Options 1, 2 & 3 are dependent on the final location of the foreshore embankment. The further the foreshore embankment along the Mangere Inlet is positioned, the tighter the alignment required through the Anns Creek region.

Compliant alignments can be achieved at lower design speeds and are presented in Appendix I.

6.2 Hugo Johnston Ramps

From the MCA workshop, there was a discussion around the use of ramps to connect to Hugo Johnston Drive.

The ramps were included between the EWL and Hugo Johnston Drive to provide access to and from this local industrial area. The ramps raised significant concern in regards to local ecology and natural landscape on the Southdown reserve. Due to this concern, the Anns Creek connection without ramps needs to be considered in each of the assessments of the four options.



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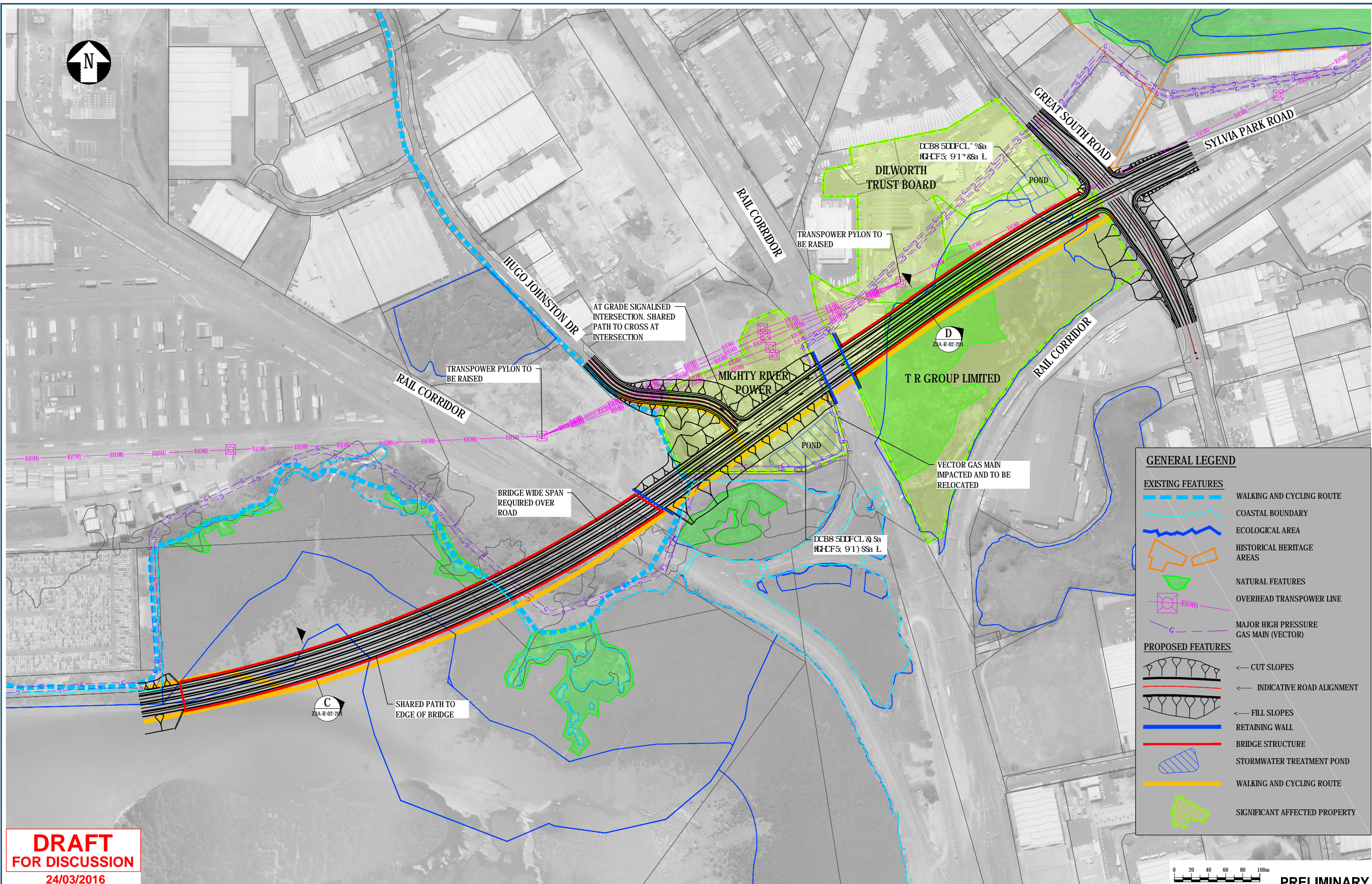
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Drawing Title	ANNS CREEK - OPTION 1 - DBC LAYOUT
Drawing Number	Z3A-R-01-101
Rev No.	B

PRELIMINARY



GENERAL LEGEND

EXISTING FEATURES

- WALKING AND CYCLING ROUTE
- COASTAL BOUNDARY
- ECOLOGICAL AREA
- HISTORICAL HERITAGE AREAS
- NATURAL FEATURES
- OVERHEAD TRANSPOWER LINE
- MAJOR HIGH PRESSURE GAS MAIN (VECTOR)

PROPOSED FEATURES

- CUT SLOPES
- INDICATIVE ROAD ALIGNMENT
- FILL SLOPES
- RETAINING WALL
- BRIDGE STRUCTURE
- STORMWATER TREATMENT POND
- WALKING AND CYCLING ROUTE
- SIGNIFICANT AFFECTED PROPERTY

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24/03/2016

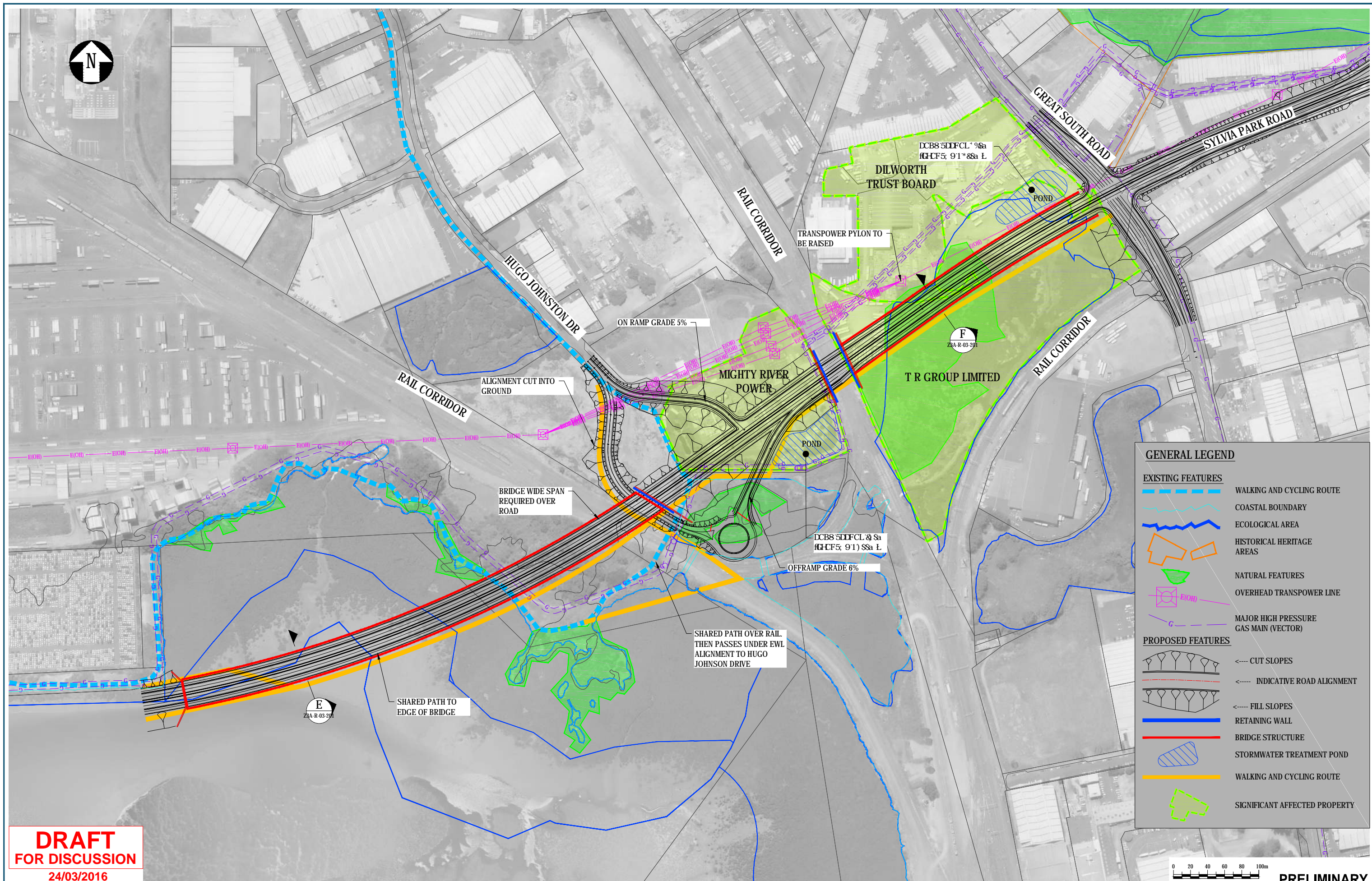
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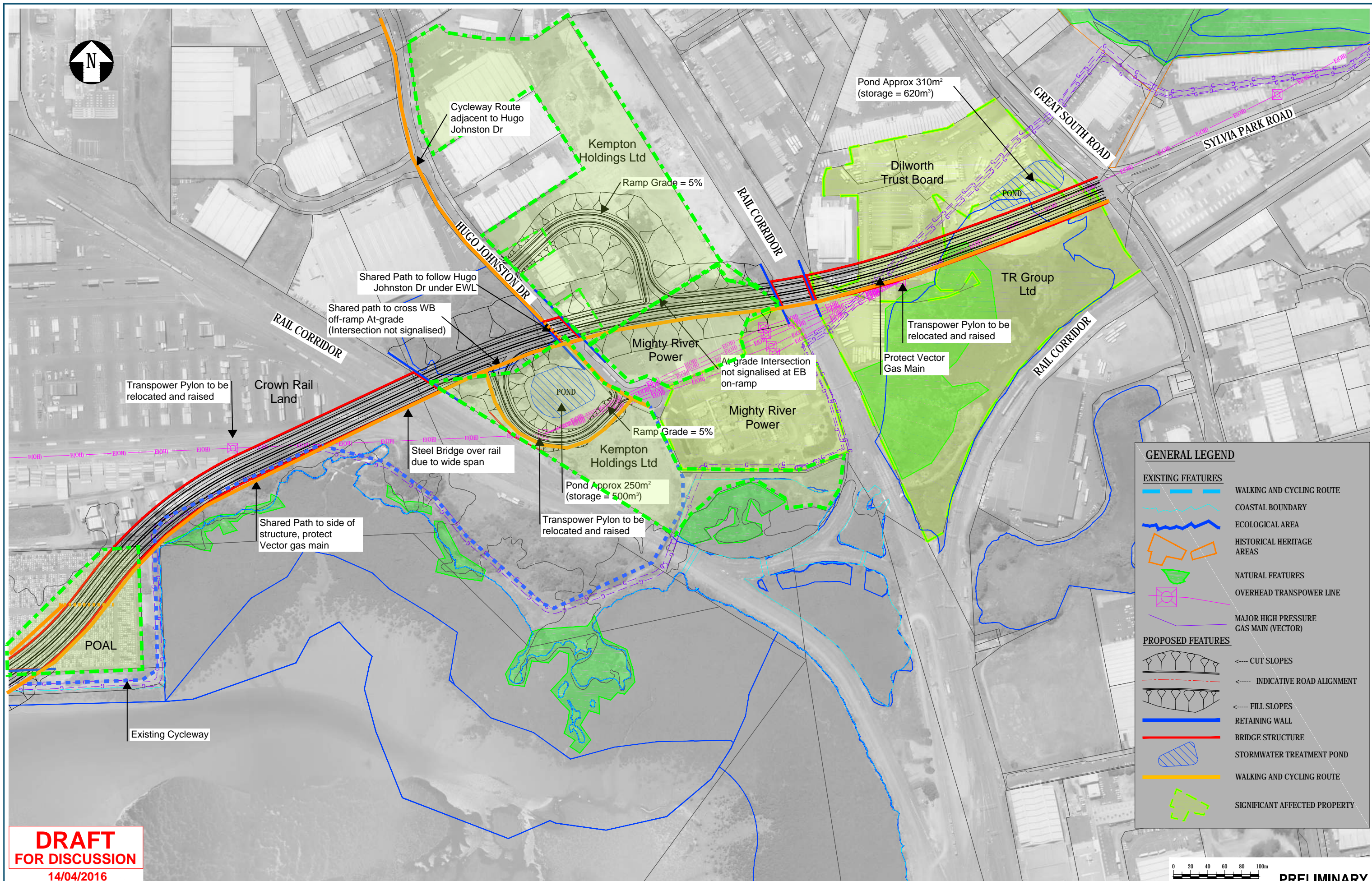
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Drawing Title	ANNS CREEK - OPTION 3 LAYOUT
Drawing Number	Z3A-R-03-101
Rev No.	A



GENERAL LEGEND

EXISTING FEATURES

- Walking and Cycling Route
- Coastal Boundary
- Ecological Area
- Historical Heritage Areas
- Natural Features
- Overhead Transpower Line
- Major High Pressure Gas Main (Vector)

PROPOSED FEATURES

- Cut Slopes
- Indicative Road Alignment
- Fill Slopes
- Retaining Wall
- Bridge Structure
- Stormwater Treatment Pond
- Walking and Cycling Route
- Significant Affected Property



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Discipline RD ALIGNMENT - MULTI- CRITERIA ASSESSMENT	Drawing Title ANNS CREEK - OPTION 4 LAYOUT	Drawing Number Z3A-R-04-101	Rev No. A
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