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Croskell West Drainage Strategy

22010-00

MAB

Croskell West Drainage Strategy

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Contents

Verve Ref Number	22010-00		
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Issue Date	11 November 2024		

1. Introduction

The following report **Croskell West Drainage Strategy** has been prepared to present an alternate strategy for the management of stormwater for the western catchment of the Croskell Precinct Structure Plan.

The Victorian Planning Authority has been developing the Croskell PSP under the PSP2.0 process, requiring a collaborative approach to design. In tandem with the PSP, Melbourne Water has been reviewing the drainage scheme for the area. The area was previously within the Ti-Tree Creek DSS, but that scheme did not contemplate the development of the Croskell Area proposed employment zone as per the direction of the PSP.

Melbourne Water has engaged consultants Water For Good to review the concept and functional design of the drainage scheme assets. In October 2022 three options for drainage scheme assets were presented, and a workshop with key stakeholders was held shortly thereafter allowing landowner representatives to present alternative proposals.

Three alternate landowner proposals were received, and each was assessed by Water for Good against Option 3 as originally presented by Melbourne Water. This allowed Water for Good to develop an Option 4, which was presented to the landowner representatives in May 2024.

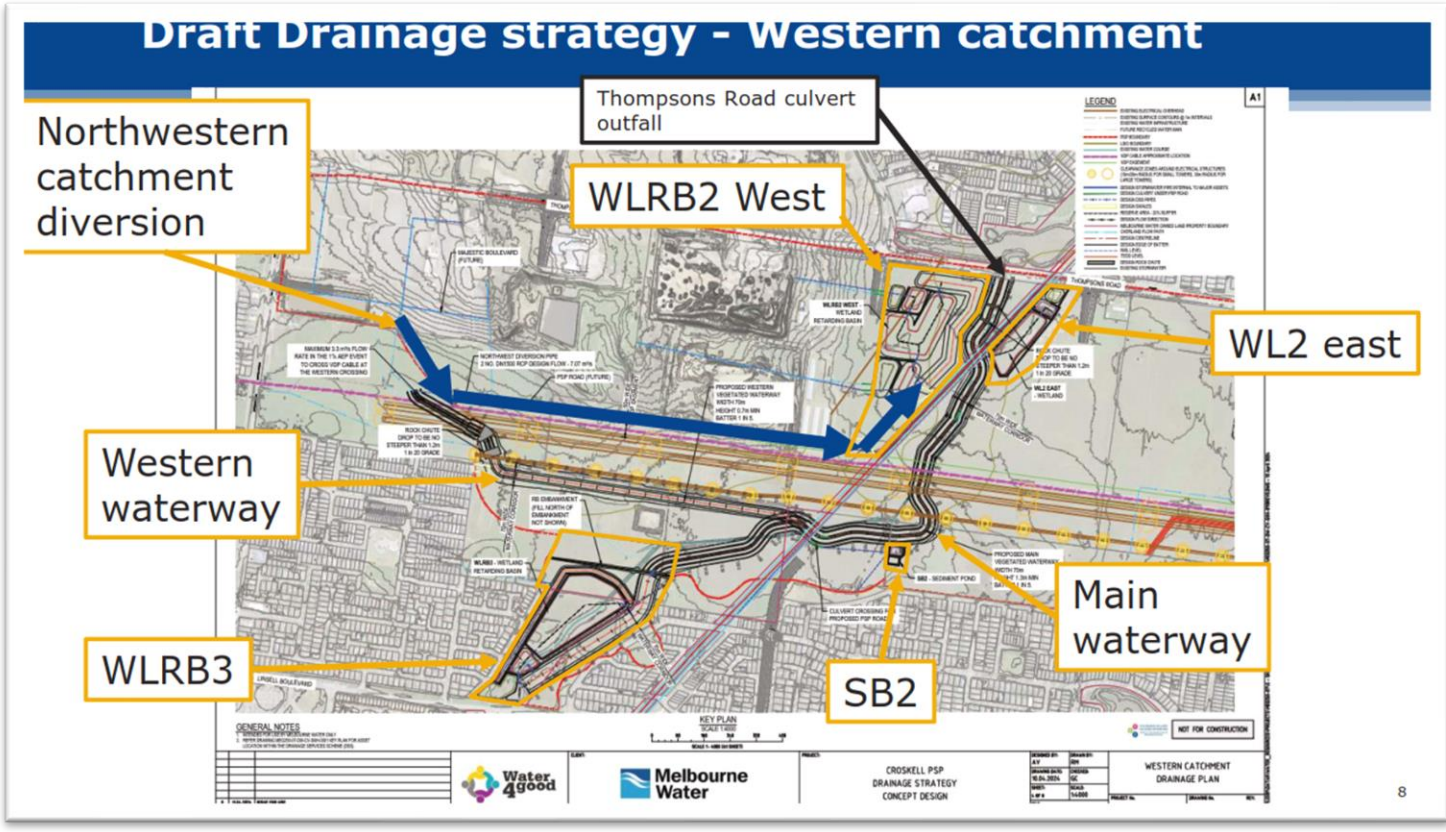

Figure 1 - Melbourne Water Option 4-Western Catchment

2. MAB's Properties

MAB are the owners and developers of 1520-1580 Thompsons Road. Refer Figure 2 below. With the addition of 1520 Thompsons Road since the last consultation session, MAB now own the most significant land holdings in terms of area (approx.. 77 hectares) and location. MAB's land will enable the intersection of Casey Fields Boulevard and Thompsons Road and the northern extension of Casey Fields Boulevard including the crossing of the Victorian Desalination Project (VDP) electrical cable, which is the only road crossing of the VDP cable within the PSP. Importantly, MAB's land contains the existing waterway conveying flows from the west and the south, under Thompsons Road and into Ti-Tree Creek.

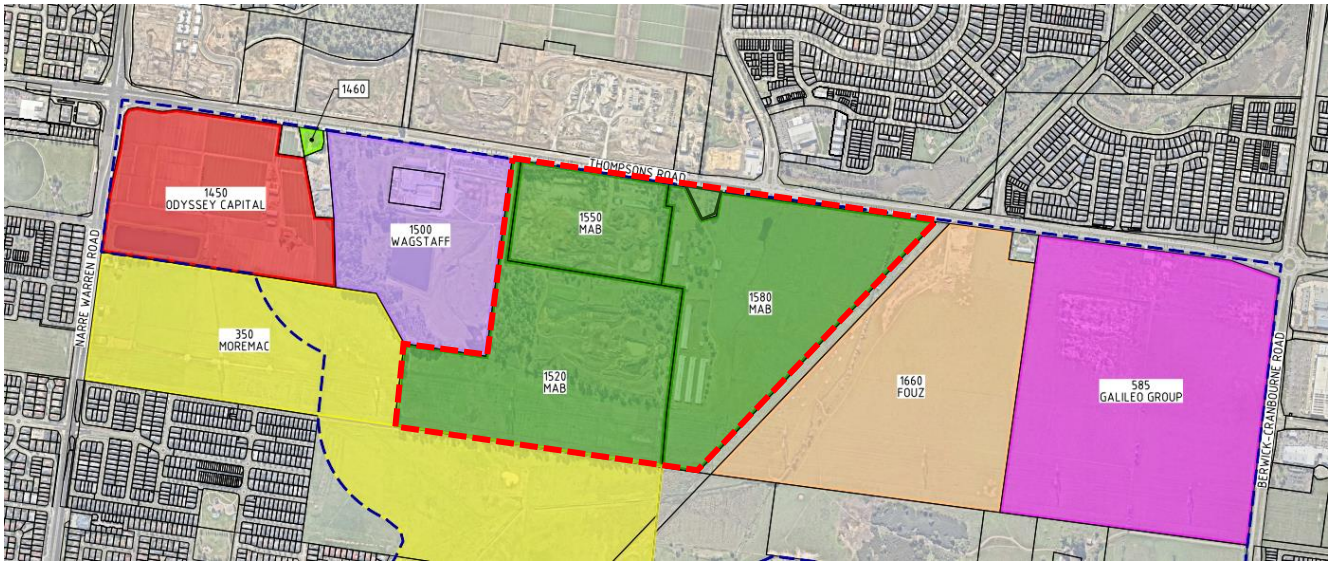

Figure 2 – Landowners Plan

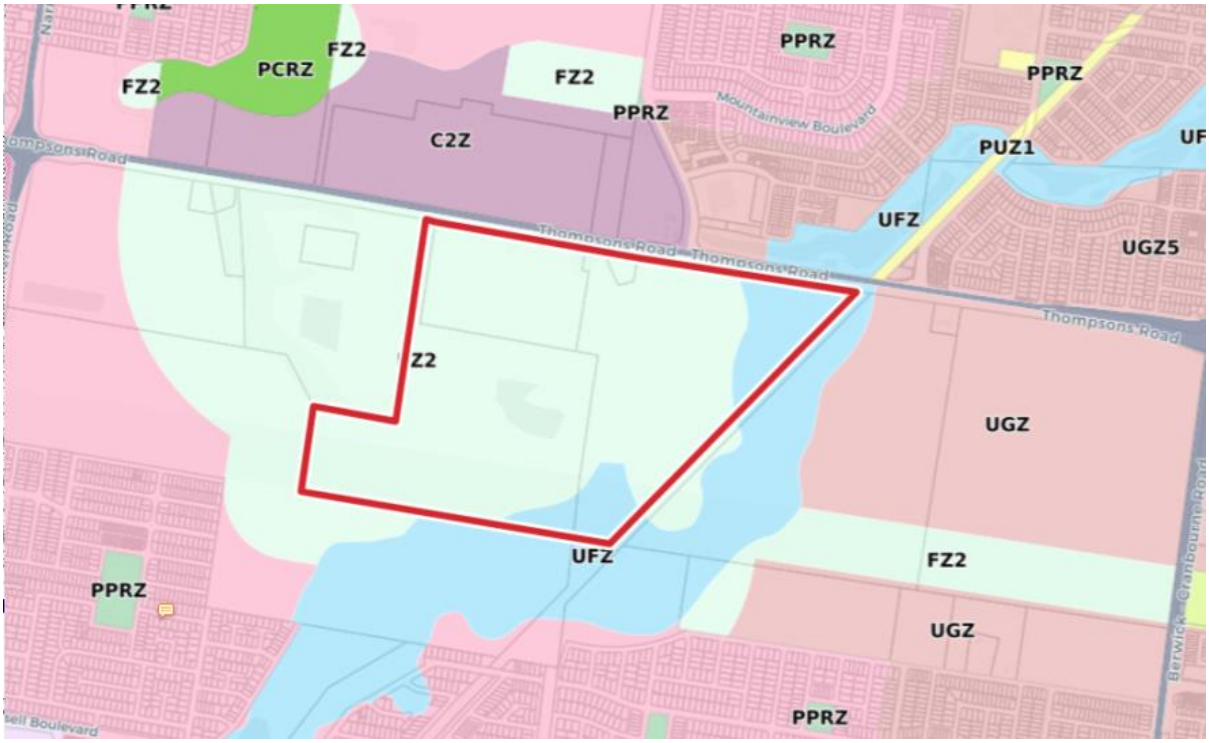

Figure 3 - MAB Properties affected by the Urban Floodway Zone.

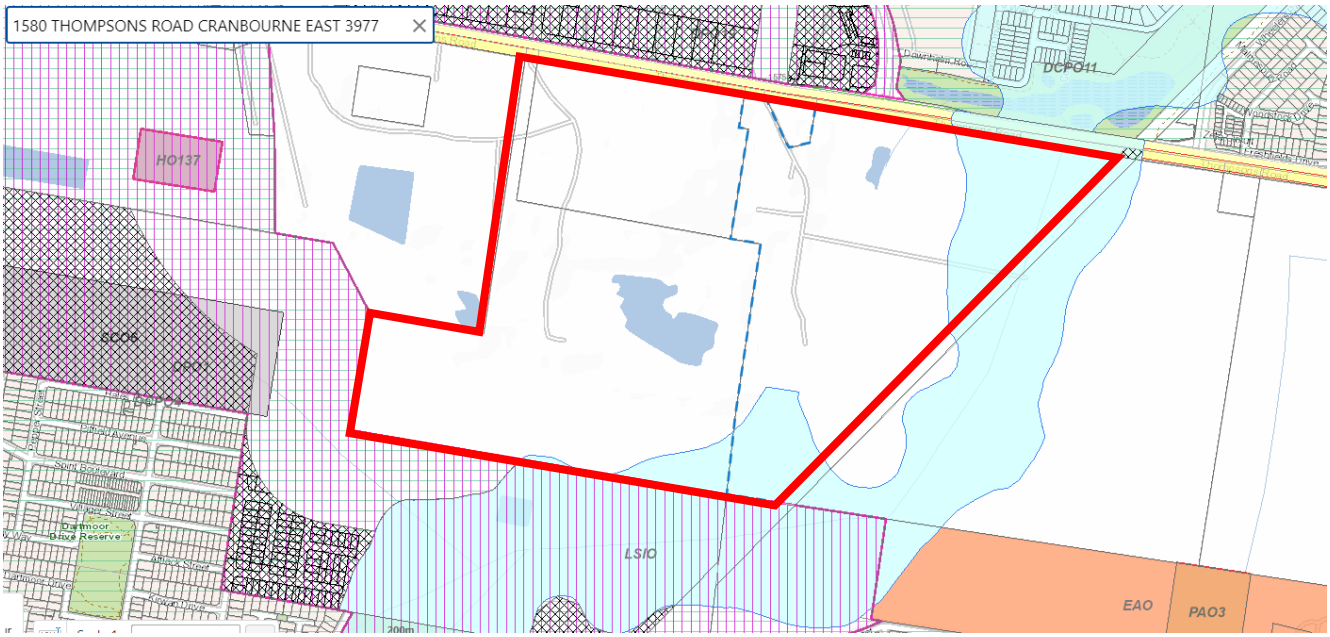

Figure 4 – MAB Properties affected by the LSIO

3. Melbourne Water Option 4

Melbourne Water's Option 4 as presented May 2024 had a number of significant issues for MAB. The proposal has several impacts on the development potential of MAB's land and the ability to deliver meaningful employment outcomes.

These issues include:
A loss of future developable land along the planned Casey Fields Boulevard alignment, rendering key parts of MAB's land undevelopable;
Underutilisation of the area of MAB's land impacted by the UFZ for drainage purposes; and
An overall costly drainage scheme, particularly in regards to the excessive areas needed for retention purposes, outside of the UFZ.

4. Alternate Drainage Proposal

An alternate proposal has been developed to provide flood protection for properties within and external to the PSP area, while making maximum use of land already affected by flooding. The main features of the alternate proposal are:

- A sediment basin incorporated within the proposed residential land in the west of the precinct. This provides a means of collecting and delivering flows into the east-west bypass pipeline while ensuring that sediment and large debris can be removed protecting the east-west bypass pipe from blockages and excessive maintenance. The outlet of the sediment basin will be via a square pit of 10m by 10m to provide sufficient weir length. Emergency or >100 Yr AEP overflows can be discharged to the existing waterway crossing the VDP cable.

- Twin 1500 diameter east-west bypass pipe, ensuring flows across the VDP cable do not increase in rate or volume compared with pre-developed flows. These pipes can be designed to either take the full 100yr AEP flows, or alternatively, the predeveloped flows can be allowed to cross the VPD cable and gap flows only conveyed within the pipeline. This latter option may have improved environmental outcomes by ensuring more regular flows within the western tributary of Ti-Tree Creek. There is no requirement to convey flows from the western catchment overland into the eastern catchment.

- Large WLRB3 treating flows from the catchment south of the precinct and utilizing existing flood prone land. The shape has been amended since earlier iterations to provide better flow regime within the wetland, and also to provide better land utilization.

- Reduced size Wetland 2 west (Thompsons Rd), only marginally extending beyond the edge of the flood prone land. This is achieved by increasing WLRB3 as per above, and utilising the land between the channel and the MW transfer pipelines for sediment dry out. The sediment dry out area requires access over the main waterway, achieved via shared used path and culverts proposed in PSP.

- The T- Tree Creek and western tributary of Ti-Tree Creek remain as per the Melbourne Water Option 4. This alignment requires the crossing of the VDP electrical cable and communications conduit, as well as the Melbourne Water Transfer mains at two locations.

    - VDP crossing
      Our preliminary assessment has revealed that the channel can be graded such that the invert of the channel maintains the same approximate level as the invert of the existing Ti-Tree Creek. The cross section of the waterway needs to be considered in detail during the design phase.
    - Pipeline Crossings
      It appears that the Melbourne Water Option 4 allows for the invert of Ti-Tree Creek to pass above the existing water transfer mains, with a level of 30.77. This will need to be considered in more detail during the functional design of the waterway.

- Wetland 2 East remains as per Melbourne Water Option 4.

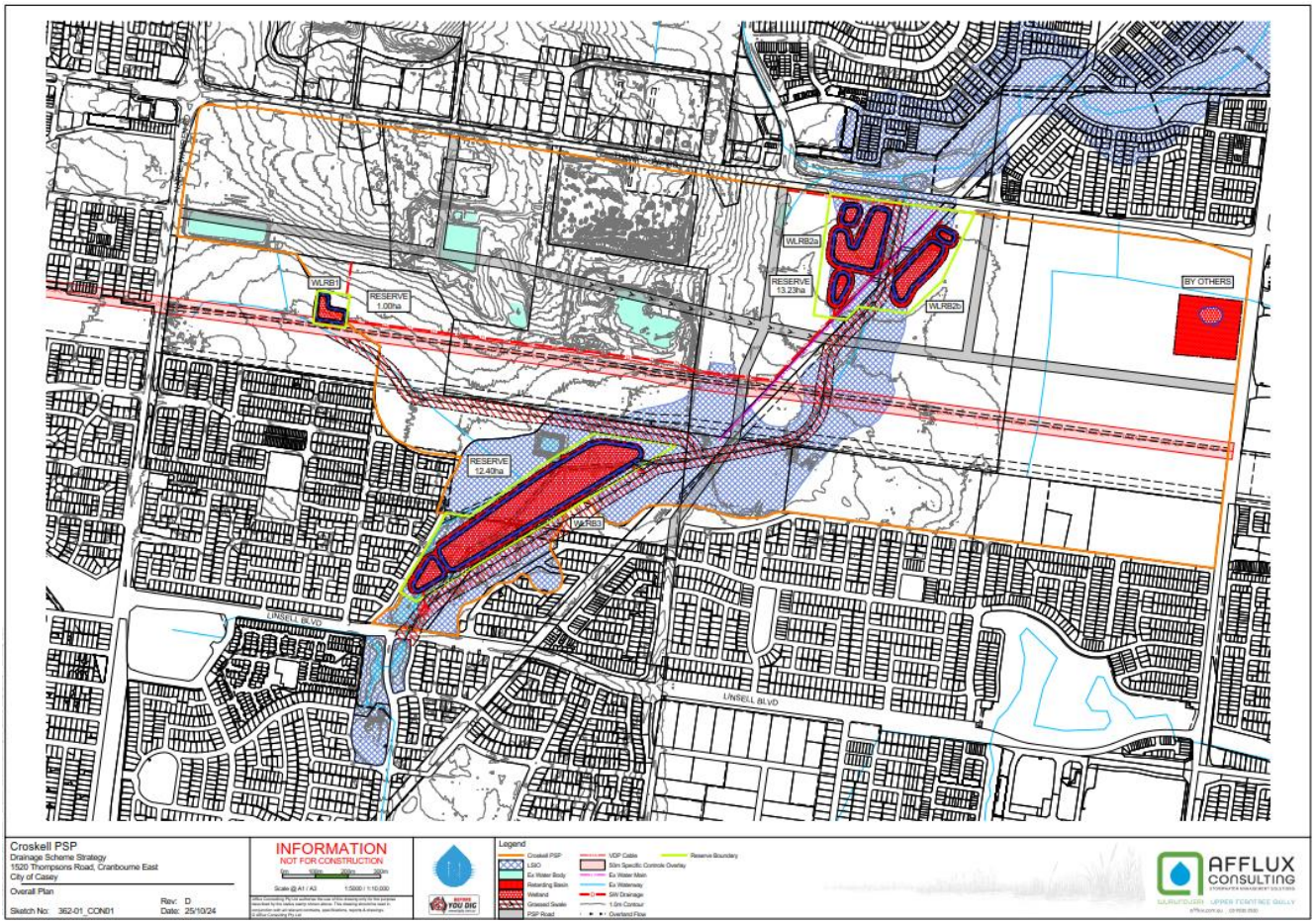

Figure 5 – Overall drainage proposal (See Appendix A for full details)

The concept has been designed using MUSIC to ensure that BPEM targets are met at the outlet of the scheme (Thompsons Road). The assessment has been completed using the latest Melbourne Water MUSIC guidelines.

The 1:100yr AEP flows that were used by Melbourne Water in their drainage scheme proposal have been modelled to confirm the effectiveness of this alternate proposal. Using the Cardno culvert invert levels and flood level in the downstream wetland, the flood extents is contained within the footprint of the retarding basins. As a check, double the MW flows have also been modelled, which remains within the reserve areas. It is noted that the Cardno Flood level should be a driving constraint for the Thompson Rd crossing, we have met this constraint.

A cost comparison of the two options has been completed to assess the viability of the proposed option. Some broad assumptions have been made in relation to asset construction costs and land acquisition costs. The same assumptions were made for both options to ensure the comparison is fair. The Alternate option presented in this report is significantly cheaper to deliver than Melbourne Water's Option 4.
The results are summarized in the table below. Details are included as Appendix C.

	Melbourne Water Option 4	MAB Proposal (increased WLRB3 and convert WLRB1 to SB1)
Construction Costs	$81,011,254	$75,259,485

9% Allowance for Design, const, PM	$7,291,012	$6,773,354
Land Costs	$72,872,250	$55,292,500
10% DSS Scheme Admin	$16,117,451	$13,732,534
Total Scheme Cost	**$177,291,957**	**$151,057,872**
DSS Rate	**$537,248.36/ha**	**$457,751.13/ha**

The concept design provides for a practical approach to drainage of the western portion of the Croskell precinct. The concept design also addresses the Melbourne Water criteria as listed below. Further detail on each criteria is included in Appendix B.

Water quality asset in the west (former WLRB1)	**We have sized this at 6.5Ha. If the 2024 guidelines are used we get a size closer to 9ha**
Western VDP crossing	We have used the W4G culverts and find no flow over the VDP for a 1% AEP
West to East diversion pipe	We have used the 2x 1500 RCPs as per W4G. These take the entire flow if an adequate inlet is used
Climate change approach	We have tested the basin with 2x Q100, this would cover off any climate scenario though note this would overtop Thompsons Road unless further design interventions. See flood assumptions tab
Groundwater	Groundwater will be present in all 4 wetland locations. This is just an engineering constraint and can be dealt with via standard methods as now agreed with SRW
WLRB2-W design	See updated drawings and flood levels
High flow bypass	High flow bypasses shown. Note on WLRB3 we have limited the inflow to 2m³/s maximum.
Inundation frequency	See Flow Exceedance Curves tab. All below 20% @ 0.2m. Note preliminary no custom curves
Sediment drying area	As shown. Far exceed requirements
Flow diversion pooling area	As shown.
Croskell PSP requirements	
Flood protection is to be provided for properties within the PSP	This is achieved in the design and matches the Cardon Original culvert design
New developments are not to further exacerbate existing flooding conditions for downstream/neighbouring properties	This is achieved in the design and matches the Cardon Original culvert design
New developments are to achieve appropriate best practice stormwater quality treatment for flows generated from their property to mitigate impacts on downstream environments	This is achieved. See Wetland Calcs Tab
To optimise drainage land requirements within the existing Urban Floodway Zone area and Melbourne Water owned land	All assets have been maximised withing the existing flood zones and minimised outside of these zones

Proposed constructed waterways to provide safe drainage and flood protection and to incorporate environmental, cultural and amenity values	Constructed waterways have been placed on logical alignments
Main stem of Ti Tree Ck is to be an open channel	Achieved
Western tributary into Ti Tree Ck is to be an open channel	Achieved
Climate Change effects to be included in the Development Services Scheme design	Sensitivity testing has been included. It is noted that climate change effects on wetlands (most likely reductions in area) have not been tested
Protect/minimise impacts on existing environmental and waterway values	Achieved
Meet critical and other agency asset operational requirements to ensure constructability (i.e. water supply mains, transmission infrastructure and Victorian Desalination Project assets)	Desal crossing has been achieved at or above the existing invert with a higher channel. The two water supply mains crossings have a number of crossing options that can be further evaluated at detailed design stage
DEECA advice on VDP assets	Crossing depth has been maintained. See waterway cross section
Minimise works over the cable reserve	Achieved
Do not increase volume of stormwater over the cable, unless approved by DEECA	Achieved through W4G bypass pipes. Note a minimum of a sediment basin is recommended at the diversion location to both reduce pipe sediment, but also to aid inlet functions
Therefore, for large catchments in the west and central, flows are to be retarded upstream of VDP assets.	Not required with W4G pipe diversions
A design requirement for the VDP assets is that the post-development peak flow rate across the assets does not exceed the pre-development peak flow rate.	Achieved through diversion and minimal development on central catchment (ie no change in flow due to relative change area)
Achieve the principles as set out in the Melbourne Water Principles for Provision of Waterway and Drainage Services for Urban Growth (i.e. equity, cost/performance balance)	Reasonably equitable land take with maximised assets within existing flood zones
Other requirements (Need to refer to the Drainage Strategy Concept report for additional information)	As above
Maximise drainage within existing Urban Floodway Zone	Achieved
No detrimental impact to performance, operation, maintenance or access to Melbourne Water supply mains	Achieved
Ongoing asset ownership considerations:	All proposed assets are MW owned and maintained.
If an asset is servicing a catchment <60ha, it will be vested to Council	No major assets proposed
If an asset is servicing a catchment >60ha, it will be vested to Melbourne Water	All proposed assets are MW owned and maintained.
Consideration of the implementation and delivery of assets post PSP gazettal	Providing the western sediment basin provides the best opportunity for development in the west of the precinct without relying on the construction of all downstream assets. It would remove sediment, providing the temporary treatment needed for a new development, and with some augmentation could provide opportunity to retard flows back to pre-developed rates.

	The more dispersed nature of the drainage scheme assets means there is no need for staging of the PSP.
Melbourne Water will not consider assets that clearly demonstrate a shifting of assets from one property to another without meeting the above objectives	Understood. We have demonstrated this requirement is met.

5. Conclusion

The alternate drainage scheme satisfies all of Melbourne Water's requirements for the Croskell drainage scheme. It provides a more equitable solution to drainage in the precinct and minimises the DSS levies, while meeting all criteria set by Melbourne Water and the VPA. The key points from this review include:

- ✓ A high level of modelling has been completed to show the criteria achievement, including detailed terrain and flood modelling.
- ✓ The inclusion of the western sediment basin allows the western catchment to develop independently of the main Thompsons Road Wetlands with minimal temporary works, avoiding the need for staging of the PSP.
- ✓ Increasing the size of WLRB3 in the south makes the best use of land within the existing LSIO and maximises the developable area of the employment land on the eastern side of proposed Casey Fields Boulevard.

If you require any further information, please contact me on the details below.

Mark Fleming
Project Manager
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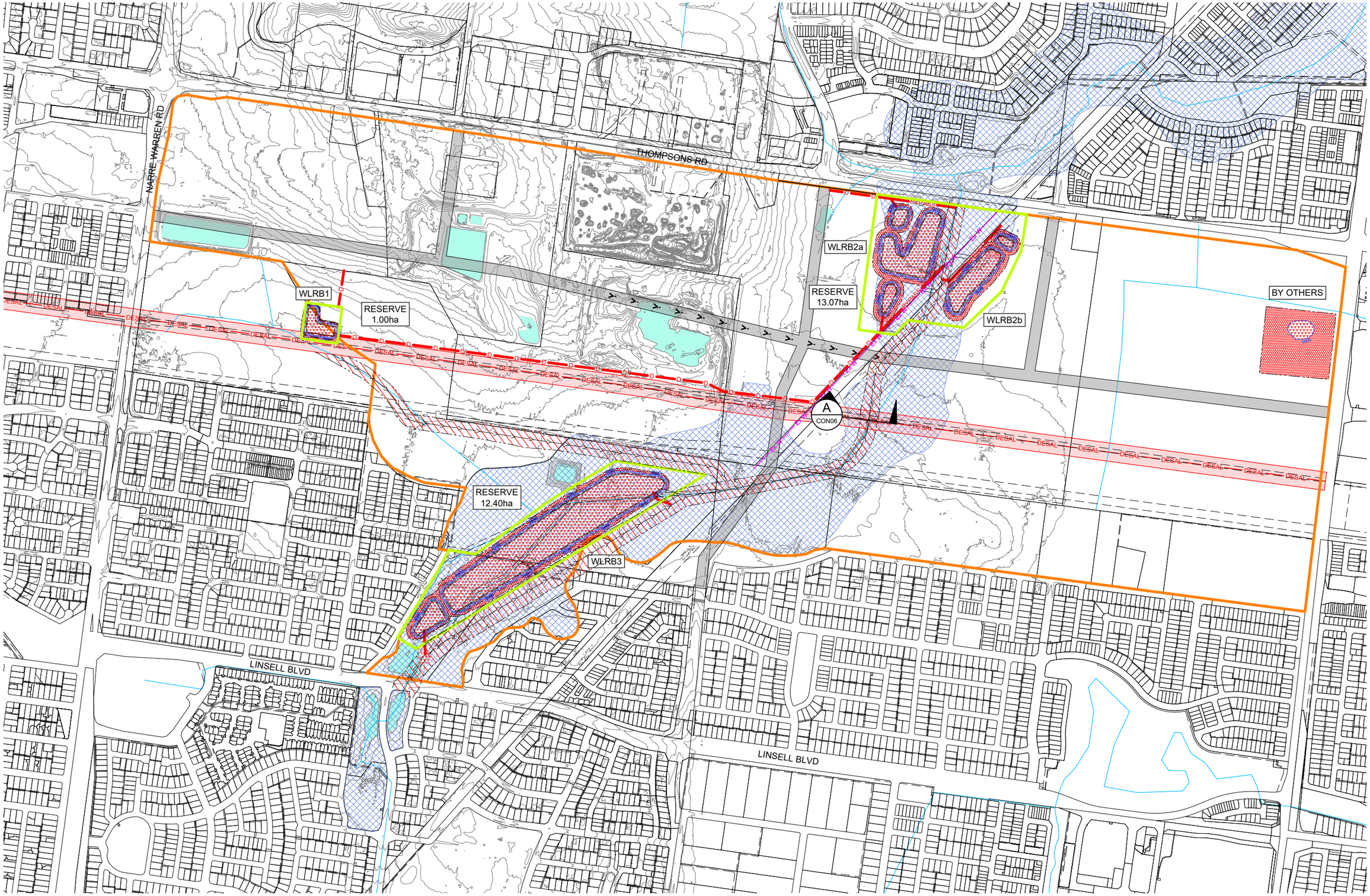
Verve Projects Australia Pty Ltd

Appendix A – Drainage Scheme Concept Design



Croskell PSP

Drainage Scheme Strategy
1520 Thompsons Road, Cranbourne East
City of Casey

Overall Plan

Sketch No: 362-01_CON01
Rev: D
Date: 30/10/24

INFORMATION

NOT FOR CONSTRUCTION

0m 100m 200m 300m

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Legend

- Croskell PSP
- LSIO
- Ex Water Body
- Retarding Basin
- Wetland
- Grassed Swale
- PSP Road
- VDP Cable
- 50m Specific Controls Overlay
- Ex Water Main
- Ex Waterway
- SW Drainage
- 1.0m Contour
- Overland Flow
- Reserve Boundary

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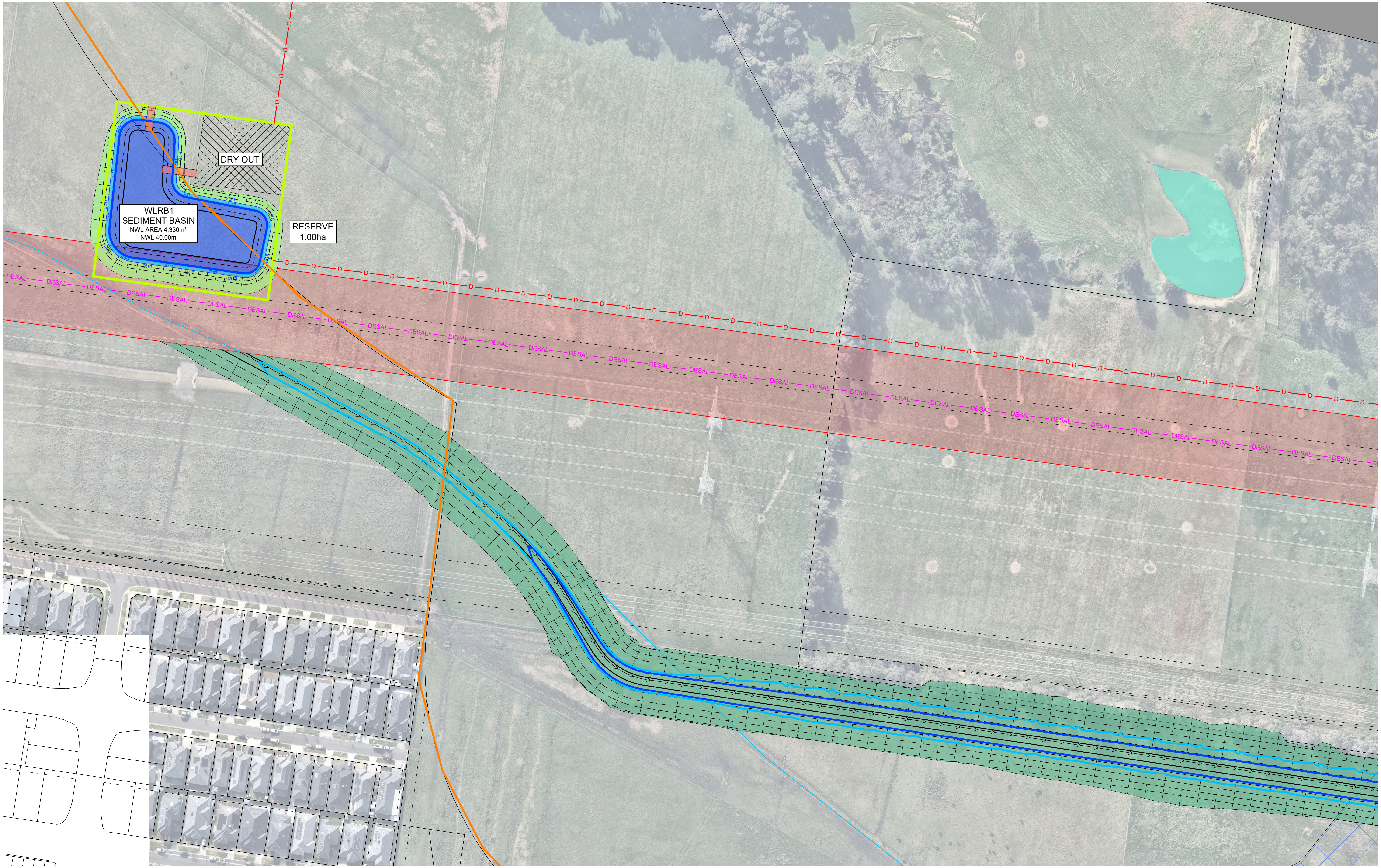

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Croskell PSP

Drainage Scheme Strategy
1520 Thompsons Road, Cranbourne East
City of Casey

Basin / Wetland Concept Plan
WLRB1
Sketch No: 362-01_CON02
Rev: D
Date: 30/10/24

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Legend

- Croskell PSP
- Reserve Boundary
- 1000 Yr Flood Level
- 100 Yr Flood Level
- Main Drain
- Bypass Drainage
- VDP Cable Special Overlay Zone
- LSIO
- Basin
- EDD
- NWL
- Constructed Channel
- Sediment Dry Out
- Access Track / Share Path
- Culvert
- Road Reserve

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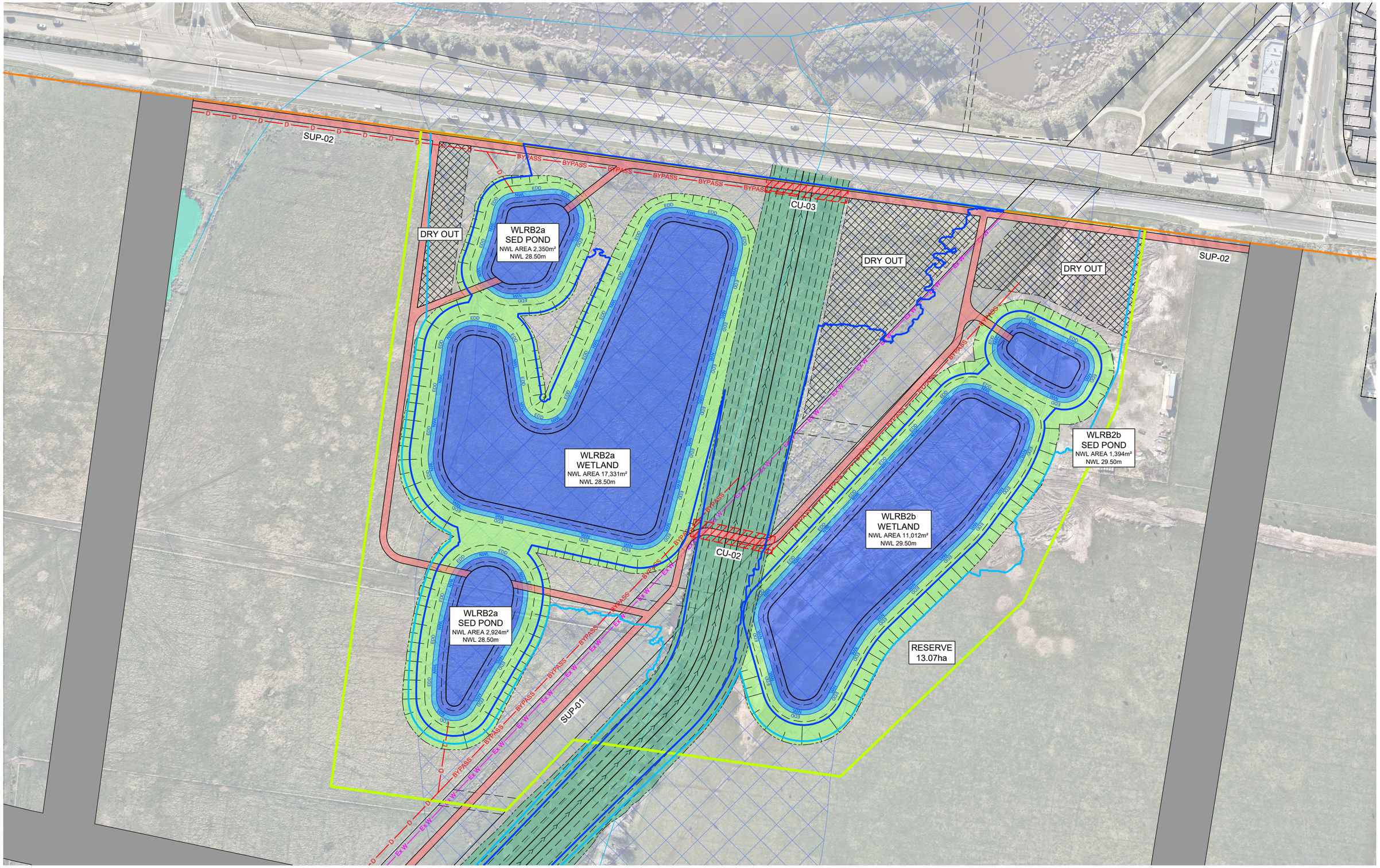

Croskell PSP

Drainage Scheme Strategy
1520 Thompsons Road, Cranbourne East
City of Casey

Basin / Wetland Concept Plan
WLRB2a & WLRB2b
Sketch No: 362-01_CON03
Rev: D
Date: 30/10/24

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Legend

- Croskell PSP
- Reserve Boundary
- 1000 Yr Flood Level
- 100 Yr Flood Level
- D — Main Drain
- BYPASS — Bypass Drainage
- VDP Cable Special Overlay Zone
- LSIO
- Basin
- EDD
- NWL
- Constructed Channel
- Sediment Dry Out
- Access Track / Share Path
- Culvert
- Road Reserve

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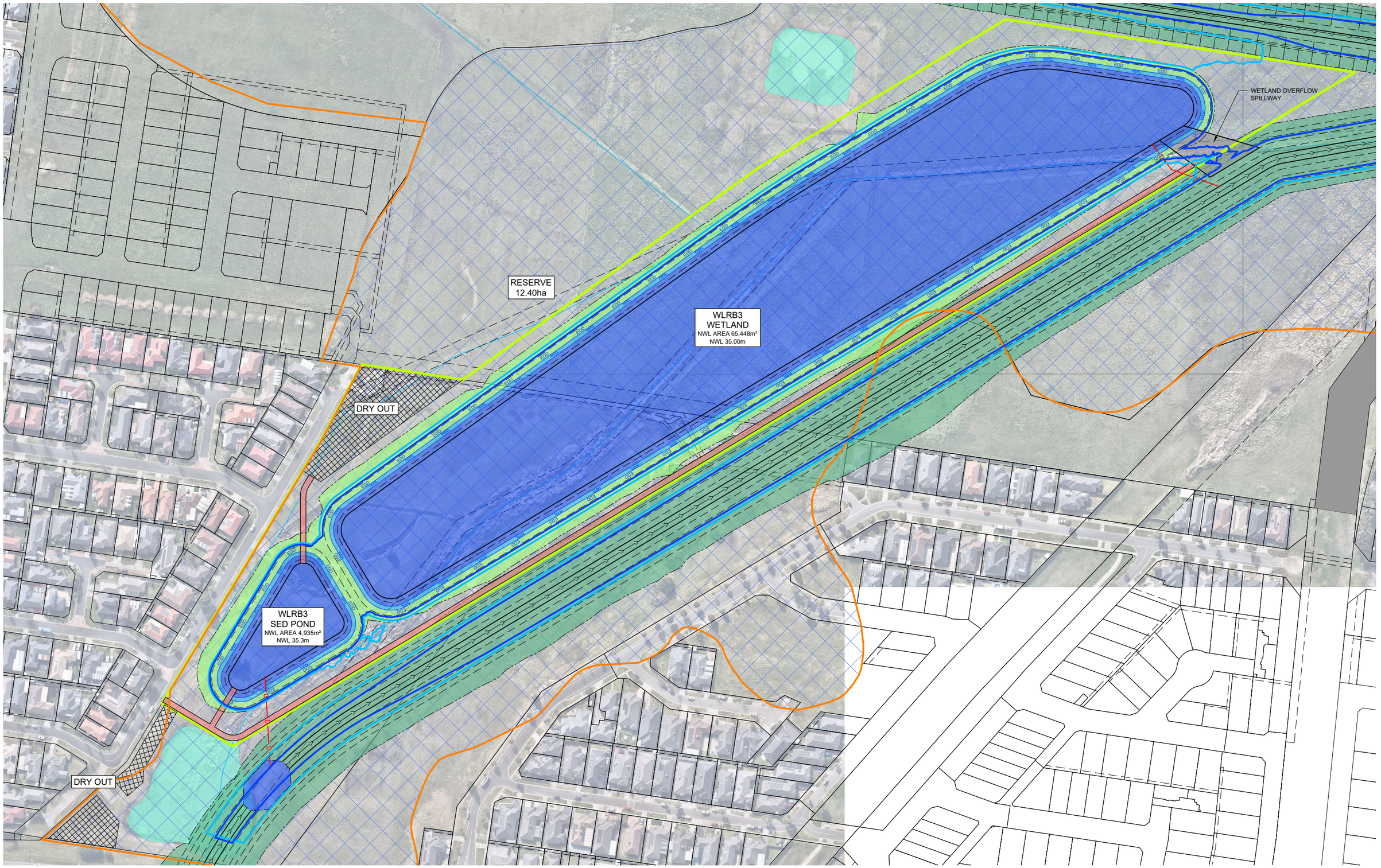

Croskell PSP

Drainage Scheme Strategy
1520 Thompsons Road, Cranbourne East
City of Casey

Basin / Wetland Concept Plan
WLRB3
Sketch No: 362-01_CON04
Rev: D
Date: 30/10/24

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Legend

- Croskell PSP
- Reserve Boundary
- 1000 Yr Flood Level
- 100 Yr Flood Level
- Main Drain
- Bypass Drainage
- VDP Cable Special Overlay Zone
- LSIO
- Basin
- EDD
- NWL
- Constructed Channel
- Sediment Dry Out
- Access Track / Share Path
- Culvert
- Road Reserve

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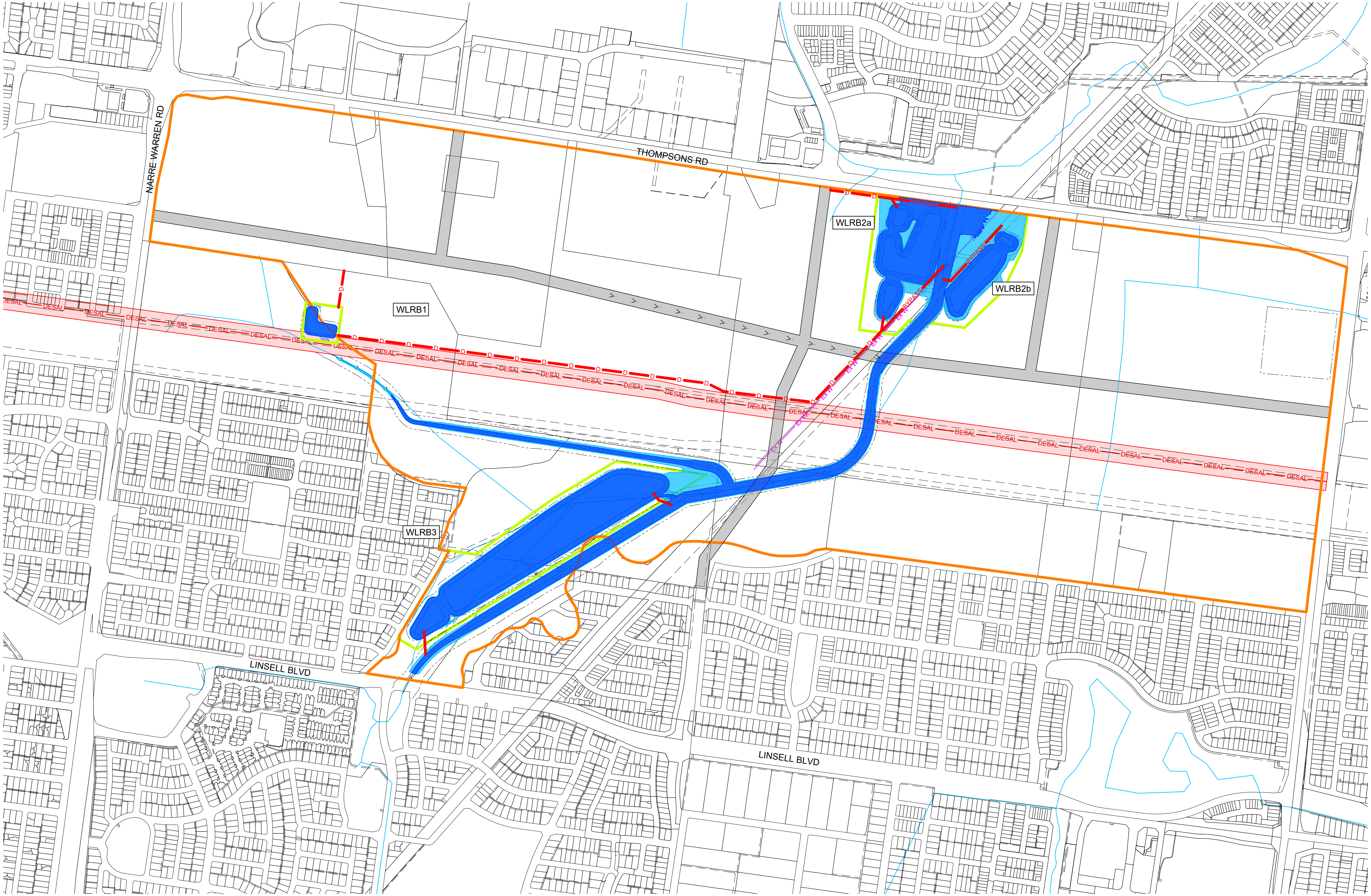

Croskell PSP

Drainage Scheme Strategy
1520 Thompsons Road, Cranbourne East
City of Casey

Flood Extents

Rev: D

Sketch No: 362-01_CON05
Date: 30/10/24

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Legend

- Croskell PSP
- Reserve Boundary
- 1000 Year Flood
- 100 Year Flood
- VDP Cable
- 50m Specific Controls Overlay
- Ex Water Main
- Ex Waterway
- SW Drainage

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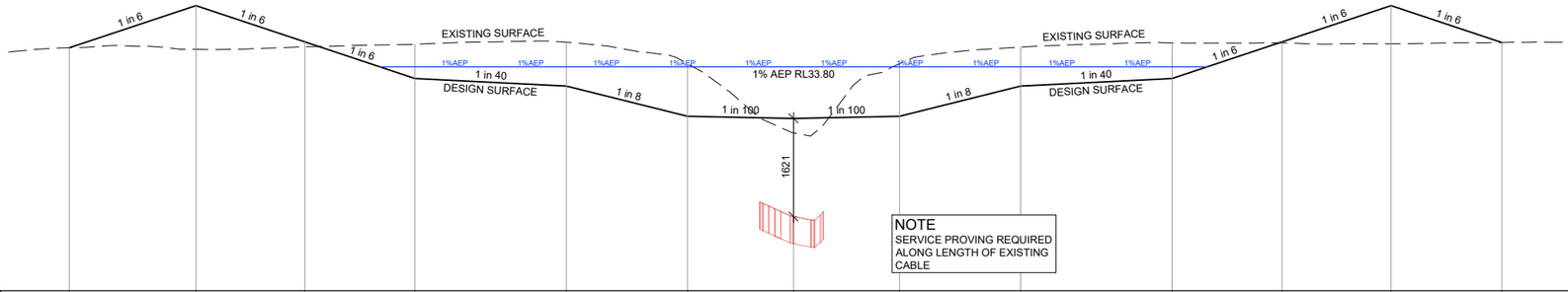

DATUM RL30.0

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EXISTING BASIN	34.014	33.989	34.031	34.073	34.105	33.751	32.609	33.751	34.025	34.096	34.095	34.080	34.102	
CHAINAGE	-23.914	-19.730	-16.130	-12.500	-7.500	-3.500	0.000	3.500	7.500	12.500	16.130	19.730	23.386	

SITE SECTION

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CON01

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Croskell PSP
Drainage Scheme Strategy
1520 Thompsons Road, Cranbourne East
City of Casey

Desal Cable Section

Sketch No: 362-01_CON06
Rev: A
Date: 30/10/24

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Appendix B – Melbourne Water Scheme criteria

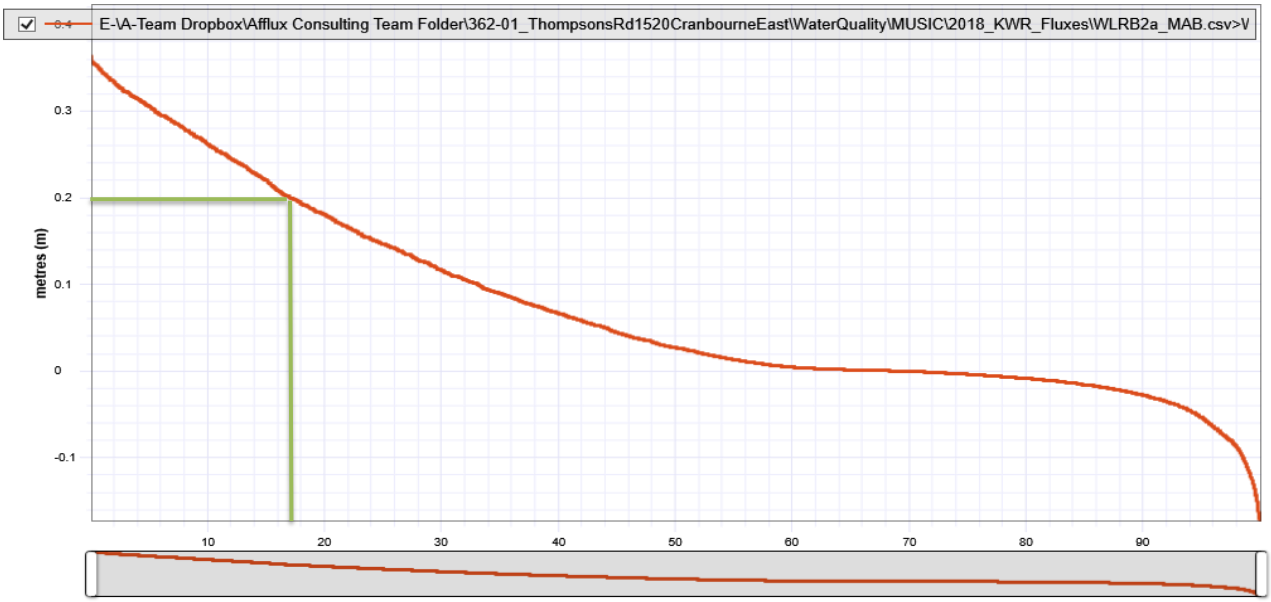
Report Name	Crosskell PSP - Initial Land Use
Estate/Project:	
Strategy Revision Number:	1
Strategy Revision Date:	30/10/2024

Colour code this comments version	MW
Colour code closed out items	

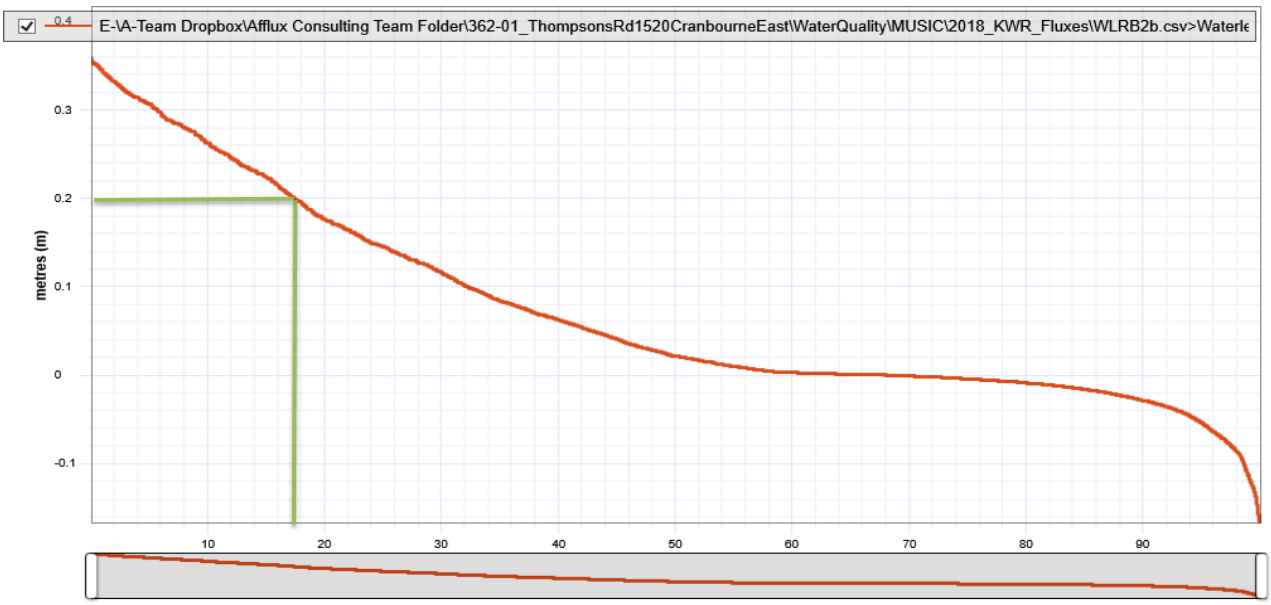
Consultant Reference	Afflux Consulting
Melbourne Water Reference	

Item	Reviewer (initials)	Reference (SHEET)	Category (see below)	Reviewer Comment		Designer Response
				Date	Comment	Response
					Melbourne Water Submission Review Comments (23 Sept 2024)	
1					Water quality asset in the west (former WLRB1)	We have sized this at 6.5Ha. IF the 2024 guidelines are used we get a size closer to 9ha
2					Western VDP crossing	We have used the W4G culverts and find no flow over the VDP for a 1% AEP
3					West to East diversion pipe	We have used the 2x 1500 RCPs as per W4G. These take the entire flow if an adequate inlet is used
4					. Climate change approach	We have tested the basin with 2x Q100, this would cover off any climate scenario though note this would overtop Thompsons Road unless further design interventions. See flood assumptions tab
5					Groundwater	Groundwater will be present in all 4 wetland locations. This is just an engineering constraint and can be dealt with via standard methods as now agreed with SRW
6					WLRB2-W design	See updated drawings and flood levels
7					High flow bypass	High flow bypasses shown. Note on WLRB3 we have limited the inflow to 2m³/s maximum.
8					Inundation frequency	See Flow Exceedence Curves tab. All below 20% @ 0.2m. Note prelminary no custom curves
9					Sediment drying area	As shown. Far exceed requirements
10					Flow diversion pooling area	As shown.
11						
12					**Croskel PSP requiremetns**	
13					Flood protection is to be provided for properties within the PSP	This is achieved in the design and matches the Cardon Original culvert design
14					New developments are not to further exacerbate existing flooding conditions for downstream/neighbouring properties	This is achieved in the design and matches the Cardon Original culvert design
15					New developments are to achieve appropriate best practice stormwater quality treatment for flows generated from their property to mitigate impacts on downstream environments	This is achieved . See Wetland Calcs Tab
16					To optimise drainage land requirements within the existing Urban Floodway Zone area and Melbourne Water owned land	All assests have been maximised withing the existing flood zones and minimised outside of these zones
17					Proposed constructed waterways to provide safe drainage and flood protection and to incorporate environmental, cultural and amenity values	Constructed waterways have been placed on logical alignments
18					Main stem of Ti Tree Ck is to be an open channel	Achieved
19					Western tributary into Ti Tree Ck is to be an open channel	Achieved
20					Climate Change effects to be included in the Development Services Scheme design	Sensitivity testing has been included. It is noted that climate change effects on wetlands (most likely reductions in area) have not been tested
21					Protect/minimise impacts on existing environmental and waterway values	Achieved
22					Meet critical and other agency asset operational requirements to ensure constructability (i.e. water supply mains, transmission infrastructure and Victorian Desalination Project assets)	Desal crossing has been achieved at or above the existing invert with a higher channel. The two water supply mains crossings have a number of crossing options that can be further evaluated at detailed design stage
					DEECA advice on VDP assets	Crossing depth has been maintained. See waterway cross section
					Minimise works over the cable reserve	Achieved
					Do not increase volume of stormwater over the cable, unless approved by DEECA	Achieved through W4G bypass pipes. Note a minimum of a sediment basin is reccomended at the diversion location to both reduce pipe sediment, but also to aid inlet functions
					Therefore for large catchments in the west and central, flows are to be retarded upstream of VDP assets.	Not required with W4G pipe diversions
					A design requirement for the VDP assets is that the post-development peak flow rate across the assets does not exceed the pre-development peak flow rate.	Achieved through diversion and minimal development on central catchment (ie no change in flow due to relative change area)
					Achieve the principles as set out in the Melbourne Water Principles for Provision of Waterway and Drainage Services for Urban Growth (i.e. equity, cost/performance balance)	Reasonably equitable land take with maximised assets within existing flood zones
					Other requirements (Need to refer to the Drainage Strategy Concept report for additional information)	As above
					Maximise drainage within existing Urban Floodway Zone	Achieved
					No detrimental impact to performance, operation, maintenance or access to Melbourne Water supply mains	Achieved
					Ongoing asset ownership considerations:	All proposed assets are MW owned and maintained.
					If an asset is servicing a catchment <60ha, it will be vested to Council	No major assets proposed
					If an asset is servicing a catchment >60ha, it will be vested to Melbourne Water	All proposed assets are MW owned and maintained.
					Consideration of the implementation and delivery of assets post PSP gazettal	Providing the western sediment basin provides the best opportunity for development in the west of the precinct without relying on the construction of all downstream assets. It would remove sediment, providing the temporary treatment needed for a new development, and with some augmentation could provide opportunity to retard flows back to pre-developed rates. The more dispersed nature of the drainage scheme assets means there is no need for staging of the PSP.
					Melbourne Water will not consider assets that clearly demonstrate a shifting of assets from one property to another without meeting the above objectives	

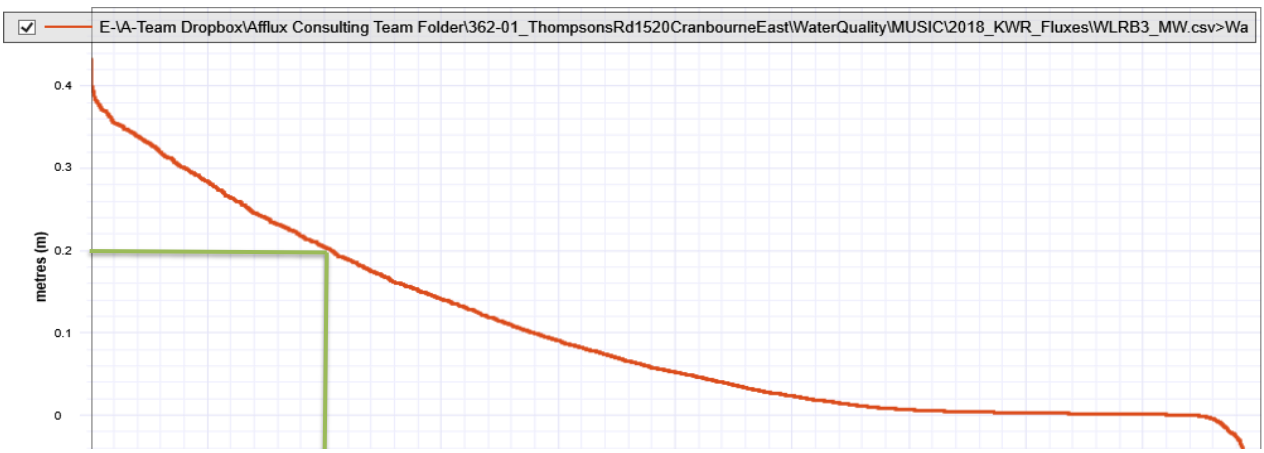
WLRB2a (MAB)

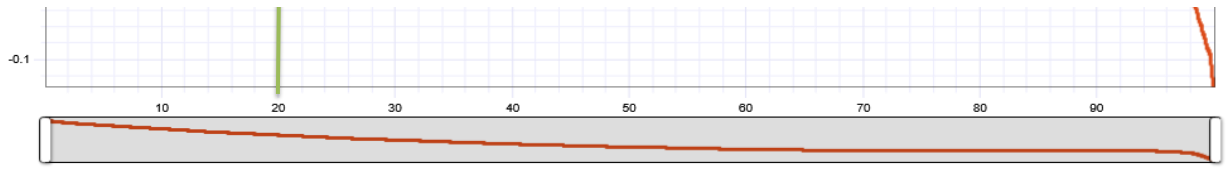


WLRB2b_East



WLRB3_MW




-0.1
10
20
30
40
50
60
70
80
90

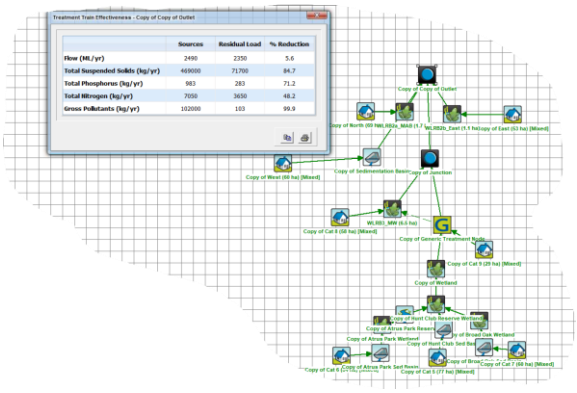
Values based on issued drawings

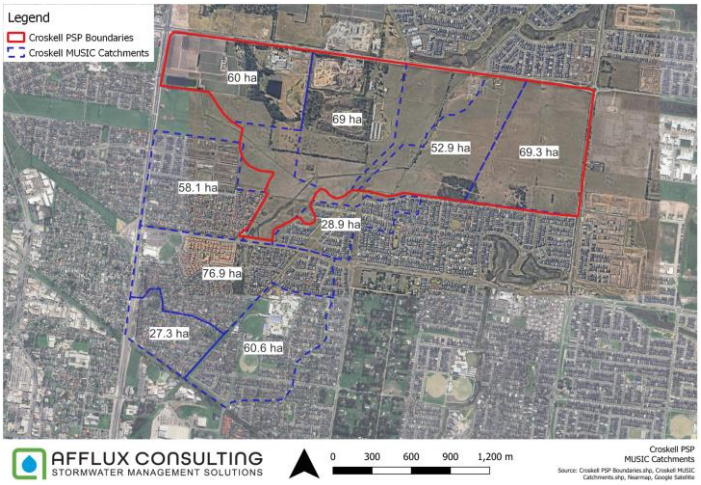
Sediment pond	Area (m²)	Depth	Volume (m³)	NWL
WLRB1	4330	1.35	5845.5	40
WLRB2a North	2350	1.35	3172.5	28.5
WLRB2a South	2924	1.35	3947.4	28.5
WLRB2b	1394	1.35	1881.9	29.5
WLRB3	4935	1.35	6662.3	35.3

F&G Calcs

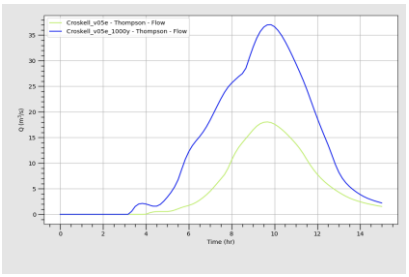
Source	Parameter	WLRB1	WLRB2a	WLRB2b	WLRB3
Contributing Catchment	Area (ha)	60	69	53	58
Melbourne Water requires R = 95% for a 125 micrometer particle	Target	Very fine sand	Very fine sand	Very fine sand	Very fine sand
Pond shape assumption (Figure 10.5)	λ	0.26	0.26	0.26	0.26
	n	1.351351351	1.351351351	1.351351351	1.351351351
From Table 1	Vs (m/s)	0.011	0.011	0.011	0.011
Use rational method to obtain 1 Year ARI flow for sub catchment	Q (m³/s)	2.3	2.51	2.05	1.6
Area of basin	A (m²)	**2200**	**2400**	**2000**	**1500**
	Vs	10.52173913	10.51792829	10.73170732	10.3125
	Q/A				
EDD	de (m)	0.35	0.35	0.35	0.35
Depth of permanent pool	dp (m)	1	1	1	1
Lower of 1m or dp	d* (m)	1	1	1	1
	(de+dp)	1	1	1	1
	(de+d*)				
Fraction of Initial Solids Removed	R =	0.95	0.95	0.95	0.95

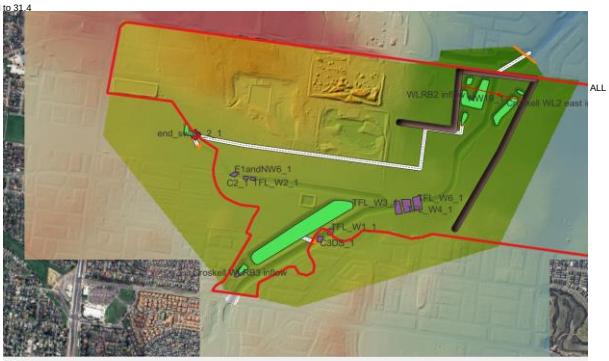
Wetland	Area (m²)	Depth Av(m)	Volume (m³)	NWL (mAHD)
WLRB2a (MAB)	17,331	0.4	6,932	28.5
WLRB2b (East)	11,012	0.4	4,405	29.5
WLRB3 (MW)	65,448	0.4	26,179	35



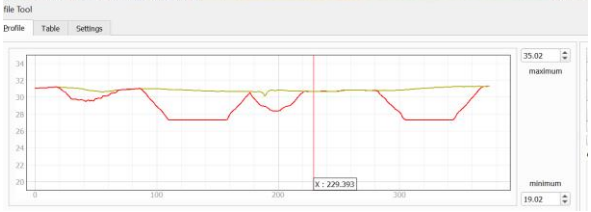


Parameter	Value	
Cardno Culverts Design WSE	30.6m AHD	Note Cardno used a flow of 31m³/s but in ARR87 so differing volumes.
Design Q100 Flood Level	30.6 mAHD	
Design 2x Q100 Level	31.35 mAHD	Road low point is ~30.6, this would require footpath to be raised to 31.4
Flow Assumptions		
MW outflow RORB (Q100)	16.47 m³/s	
Thompson RD Flood Model Inflow/Outflow		
Q100	18.04 m³/s	
2xQ100	37.03 m³/s	





ALL IWL's set to NWL as shown



Cardno

Thompsons Road Upgrade Hydraulic Modelling
Thompsons Road Cranbourne East

Figure 5-3 shows the peak flows developed for the 1% AEP event at the main culvert crossing of Thompsons Road. The critical flow for the 1% AEP is 31 m³/s in the 2 hour rainfall event.

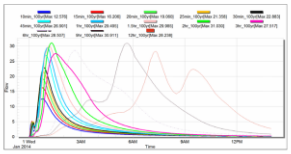


Figure 5-3 1% AEP event inflow hydrograph

Table 5-1 below shows a comparison between the 1% AEP peak flow results using different methods.

Table 5-1 1% AEP Peak Flow Results

XP SWMM	WBNM RORB Model	Rational Method
31.0 m3/s	22.9 m3/s	31.6 m3/s

As can be seen from the table above, the 1% AEP flow form the MW RORB model is much smaller than that obtained from the XP SWMM model. A Rational Method calculation was undertaken as a further comparison to understand the difference and it produced a result that was similar to that from the XP SWMM model.

As this is a road design, it was decided that the conservative value of 31 m3/s (obtained from the XP SWMM model) would be adopted for this analysis.

Appendix C – Estimated Scheme Costs

Melbourne Water Option 4

Construction Costs

		Units	Construction Rate	DSS Cost
NW Catchment Diversion Structure	1	Item	$ 150,000	$ 150,000
NW Catchment Diversion Pipe (2x1500)				
0 to 2.5	2.8	Lin.m	$ 2,979	$ 8,341
2.5 to 3.5	783.3	Lin.m	$ 2,981	$ 2,335,017
3.5 to 4.5	606.5	Lin.m	$ 2,984	$ 1,809,796
4.5 to 5.5	250.5	Lin.m	$ 3,100	$ 776,550
> 5.5	150.4	Lin.m	$ 3,200	$ 481,280
Pits	15	item	$ 65,000	$ 975,000
Western Waterway	1213	Lin.m	$ 500	$ 606,500
WLRB2 West	14.988	ha	$ 1,800,000	$ 26,978,400
WL2 East	5.57	ha	$ 2,000,000	$ 11,140,000
SB1	0.1	ha	$ 2,000,000	$ 200,000
WLRB3	7.41	ha	$ 1,800,000	$ 13,329,360
Main Waterway	2280	Lin.m	$ 750	$ 1,710,000
WLRB4	10.2	ha	$ 1,800,000	$ 18,360,000
DSS Swales	717	lin.m	$ 3,000	$ 2,151,000
Sub Total				**$ 81,011,245**
9% Allowance for Design, const, PM	9%			$ 7,291,012

Land Costs

	Land Zone	Land Area (ha)	Land Value	DSS Cost
NW Catchment Diversion Structure	Residential	0.05	$ 2,000,000	$ 100,000
WLRB2 West	Employment	8.9	$ 3,000,000	$ 26,700,000
	Encumbered	6.088	$ 750,000	$ 4,566,000
WL2 East	Employment	1.348	$ 3,000,000	$ 4,044,000
	Encumbered	4.222	$ 750,000	$ 3,166,500
SB1	Residential	0.1	$ 2,000,000	$ 200,000
WLRB3	MW Owned	4.89	$ -	$ -
	Encumbered	2.51	$ 750,000	$ 1,882,500
WLRB4	Employment	10.2	$ 3,000,000	$ 30,600,000
DSS Swales	Encumbered	2.151	$ 750,000	$ 1,613,250
Sub Total				**$ 72,872,250**
10% DSS Scheme Admin		10%	$ 161,174,507	$ 16,117,451
Scheme Total				**$ 177,291,957**
Scheme Rate	ha	330		**$ 537,248.36**

MAB Proposal (increased WLRB3 and convert WLRB1 to SB1)

Construction Costs

		Units	Construction Rate	DSS Cost
SB1	0.1	Item	$ 3,000,000	$ 300,000
Diversion pipe inlet pit	1	Item	$ 200,000	$ 200,000
NW Catchment Diversion Pipe (2x1500)				$ -
0 to 2.5	2.8	Lin.m	$ 2,979	$ 8,341
2.5 to 3.5	783.3	Lin.m	$ 2,981	$ 2,335,017
3.5 to 4.5	606.5	Lin.m	$ 2,984	$ 1,809,796
4.5 to 5.5	250.5	Lin.m	$ 3,100	$ 776,550
> 5.5	150.4	Lin.m	$ 3,200	$ 481,280
Pits	15	item	$ 65,000	$ 975,000
Western Waterway	1213	Lin.m	$ 500	$ 606,500
WLRB2 West/East	13.07	ha	$ 1,800,000	$ 23,526,000
WLRB3	12.40	ha	$ 1,800,000	$ 22,320,000
Main Waterway	2280	Lin.m	$ 750	$ 1,710,000
WLRB4	10.2	ha	$ 1,800,000	$ 18,360,000
DSS Swales	717	lin.m	$ 3,000	$ 2,151,000
Sub Total				**$ 75,259,485**
9% Allowance for Design, const, PM	9%			$ 6,773,354

Land Costs

	Land Zone	Land Area (h	Land Value	DSS Cost
SB1	Residential	0.1	$ 2,000,000	$ 200,000
WLRB2 West	Employment	1.413	$ 3,000,000	$ 4,239,000
	Encumbered	6.088	$ 750,000	$ 4,566,000
WL2 East (incl pipe track)	Employment	1.348		
	Encumbered	4.222	$ 2,000,000	$ 8,444,000
WLRB3	MW Owned	4.89	$ -	$ -
	Encumbered	7.51	$ 750,000	$ 5,630,250
WLRB4	Employment	10.2	$ 3,000,000	$ 30,600,000
DSS Swales	Encumbered	2.151	$ 750,000	$ 1,613,250
Sub Total				**$ 55,292,500**
10% DSS Scheme Admin		10%	$ 137,325,338	$ 13,732,534
Scheme Total				**$ 151,057,872**
Scheme Rate	ha	330		**$ 457,751.13**