

20 March 2026

Your Ref:
Our Ref: H25021Av2

CLE Town Planning & Design
2 Abbotsford Street
West Leederville WA 6007
ATTENTION: Eleni Thorman

Dear Eleni,

LANCELIN SOUTH LOCAL WATER MANAGEMENT STRATEGY ADDENDUM

This Local Water Management Strategy (LWMS) Addendum has been prepared by Hyd2o on behalf VIMG to provide updated stormwater modelling to inform the revised concept masterplan for Lancelin South being prepared by CLE Town Planning & Design.

Stormwater remodelling is provided in this report to support revisions to the local structure plan which have resulted in changes in the location and sizes of the sites stormwater management areas. The modelling in this report is intended to supersede previous modelled as detailed in the sites LWMS (RPS, 2010). For reference purposes, the previous stormwater plan from the LWMS (RPS, 2010) and previous structure plan are included as Appendix A.

Key principles and objectives of the approved LWMS remain current and valid for implementation. This addendum report therefore does not reproduce all elements of the previously approved LWMS (RPS, 2010).

It is intended to be read in conjunction with the previous document and provide only the relevant stormwater modelling revisions necessary to demonstrate overall compliance with the original LWMS's intent and inform the structure plan revision.

1. SITE CHARACTERISTICS

The site location is shown in Figure 1, and is located approximately 120 km north-west of Perth and 4 km south east of central Lancelin adjacent to existing and planned development areas. The site is generally described as having the following predevelopment characteristics:

- The majority of the site consists of coastal dune bushland vegetation. There are no existing buildings within the site (Figure 2).
- The topography is characteristic of undulating coastal sand dunes and ranges from around 4 mAHD towards the coastal areas in the west to 60 mAHD at the eastern boundary (Figure 2).
- The Geological Survey of WA (1978) 1:250,000 Geology Map indicates the shallow sub surface conditions beneath the site comprise of Safety Bay Sand. According to the Department of Primary Industries and Regional Development (DPIRD) Soil Landscape Mapping, the site is situated on top of the Quindalup Dune System, a known

geomorphic expression of the Safety Bay Sand geological unit. Figure 3 details the soil landscape subsystems in proximity to the site. Various geotechnical investigations for initial western stages of development in the area have indicated the site as characterised as having a mixture of varying grades of sand underlain by limestone at variable depths.

- With respect to hydraulic conductivity, testing was reported in the LWMS (RPS) at ten locations with rates ranging from 7 m/day to 45 m/day. Further testing for various UWMP's have been undertaken by Hyd2o (2 sites) and Douglas Partners (4 sites) with a similar range of rates ranging from 12 to 41 m/day.
- Predevelopment groundwater monitoring and mapping across the site was undertaken by RPS in 2010 (Figure 4). Groundwater levels at the site are at their lowest point at the western boundary (0.85 mAHD), with much of the central part of the site at 0.95 mAHD. Depth from natural surface to groundwater ranges between approximately 3 m at the western end to beyond 59 m towards the eastern boundary.
- Indicative predevelopment surface water catchment mapping is shown in Figure 5 based on identified major ridges within the site. Note that there are no defined waterways, watercourses, or drains within the site, and all surface water runoff currently infiltrates through the subsurface profile.
- There are no Bush Forever sites or classified wetlands within the site.

2. PROPOSED CONCEPT MASTERPLAN

A copy of the revised concept masterplan for the site is included as Figure 6.

Proposed land use within the site is generally consistent with that shown in the original LWMS (RPS, 2010), albeit with the realignment of roads, lots and POS across the site.

Changes have resulted in modifications to post development drainage routes and local catchment boundaries, with the associated revised calculations to define post development stormwater requirements detailed in Section 3.

3. REVISED STORMWATER MODELLING

Based on the revised concept masterplan and POS locations (Figure 6) and site earthworks model developed by Peritas, catchment boundaries and areas are identified in Figure 7. The total site comprises approximately 30 individual catchments with land use breakdown within each catchment as specified in Tables 1-5. This high number of catchments is considerably larger than the previous LWMS (RPS, 2010) and enables distributed infiltration and stormwater management at source consistent with water sensitive urban design principles.

All catchments will provide water quality treatment and infiltration of all stormwater from a 15mm event via biofiltration areas, as well as providing management of larger flood events up to the 1% Annual Exceedance Probability (AEP) event within POS area.

Revised stormwater modelling of the updated concept masterplan was undertaken using the PONDS shallow water table infiltration model. PONDS is a program designed for modelling groundwater/surface water interactions for the design of the stormwater infiltration areas based on the finite difference computer program MODFLOW developed

by the US Geological Survey. The design storms used within PONDS were calculated with reference to the methodology in Australian Rainfall and Runoff. The rainfall temporal pattern was assumed to be spatially uniform across the catchment. Storm durations modelled ranged from 1 to 72 hours.

The following key parameters were used in modelling to inform the revised stormwater modelling:

- The POS stormwater storage areas to include a biofiltration area sized to manage the 15mm event for water quality treatment, located within an overall flood storage area sized to retain and infiltrate the 1% annual exceedance probability (AEP) event.
- Side slopes of 1:6 for the POS flood storage infiltration areas and 1:0 for biofiltration.
- A maximum allowable storage depth less than 1.2 m for the 1% AEP event.
- A design groundwater level at the site for modelling purposes based on the LWMS mapped groundwater levels (RPS, 2010). Adopted groundwater levels at each storage location are shown in relation to the indicative storage inverts in Tables 1-5. These AAMGL levels are estimated to range from 0.85 mAHD in the west of the site to 1.0 mAHD in the east.
- Runoff rates calculated and applied based on Hyd2o's CURRV runoff calculator as detailed in Tables 1-5. Note runoff coefficient used for road reserve in current modelling differ from those adopted in the previous LWMS (RPS,2010) and are considered a refinement based on a more detailed assessment of likely rates. Hyd2o's CURRV runoff calculator is a standardised approach used by Hyd2o across all development projects to estimate runoff rates. In estimating runoff rates CURRV considers rainfall IFD's, land use breakdown, percentages of impervious and pervious areas within land use type and likely initial and continuing loss of soil types.
- Conservative rates of 5 m/day for flood storage area modelling, with no infiltration assumed for the initial sizing of biofiltration area and volume requirements.

Revised modelling results for each individual catchment are presented in Tables 1 to 5 and Appendix C, with estimated approximate storage areas shown in Figures 8 and 9 for the 15 mm biofiltration areas and 1% AEP areas respectively. Note areas in Figures 8 and 9 are shown approximately to scale to indicate the likely size of stormwater storage areas in relation to POS provisions.

The results indicate the proposed POS areas to be sufficient in size and location to manage storage runoff from the site post development up to the 1% AEP event for the revised concept plan.

Landscape concept plans prepared by LD total showing the integration of stormwater and POS areas are contained as Appendix D.

Table 1: Stormwater Modelling for Revised Local Structure Plan (Catchments 1-5)

Catchment	1a	1b	2	3	4	5
Lots (ha) @ 44%RO 1%AEP	12.33	10.41	7.62	5.14	7.51	9.68
POS (ha) @ 17%RO 1%AEP	2.22	0.58	1.72	1.87	0.66	1.59
Road Reserve (ha) @ 68%RO 15mm @ 85%RO 1%AEP	5.58	4.34	3.68	2.70	3.80	4.26
Total Area (ha)	20.13	15.33	13.02	9.71	11.97	15.53
Equiv Imp Area EIA (15mm) (ha)	3.79	2.95	2.50	1.84	2.58	2.90
Equiv Imp Area EIA (1% AEP) (ha)	10.55	8.37	6.77	4.87	6.65	8.15
15mm Event Biofiltration Area						
Volume Required (m ³)	569	443	375	276	387	435
Flood Depth (m)	0.30	0.30	0.30	0.30	0.30	0.30
TWL Elevation (mAHD)	2.80	1.80	42.80	33.80	28.80	12.80
Modelled Base & TWL Area (m ²)	1895	1475	1250	920	1290	1450
Flood Storage Parameters						
Base Area (m ²) ¹	2740	2740	1700	950	1575	1670
Approx Storage Invert (mAHD)	2.5	1.5	42.5	33.5	28.5	12.5
Design Groundwater Level (mAHD)	0.85	0.85	1.0	1.0	1.0	0.95
Side Slopes (v:h)	6	6	6	6	6	6
Infiltration Rate (m/d)	5.0	5.0	5.0	5.0	5.0	5.0
20% AEP Event Flood Storage						
Modelled Flood Depth (m)	0.59	0.44	0.59	0.65	0.60	0.64
TWL Elevation (mAHD)	3.09	1.94	43.09	34.15	29.10	13.14
TWL Area (m ²)	3902	3597	2494	1830	2491	3088
Volume (m ³)	1963	1404	1260	917	1235	1531
Critical Duration (hr)	3	1	3	3	3	3
1% AEP Event Flood Storage						
Modelled Flood Depth (m)	1.20	1.17	1.19	1.18	1.17	1.18
TWL Elevation (mAHD)	3.70	2.67	43.69	34.68	29.67	13.68
TWL Area (m ²)	5208	5141	3403	2637	3457	4377
Volume (m ³)	4758	4634	3032	2119	2937	3560
Critical Duration (hr)	3	24	3	3	3	3

1. Biofiltration area estimates are considered conservative. Where biofilter area requirements above exceed flood storage base areas shown, storage designs will require refinement at later stages of planning to suit.

Table 2: Stormwater Modelling for Revised Local Structure Plan (Catchments 6-10)

Catchment	6	7	8	9a	9b	10
Lots (ha) @ 44%RO 1%AEP	8.57	17.33	1.63	15.36	9.26	3.77
POS (ha) @ 17%RO 1%AEP	3.43	3.78	0.45	10.14	0.44	0.77
Road Reserve (ha) @ 68%RO 15mm @ 85%RO 1%AEP	3.92	7.74	0.88	8.05	4.66	2.52
Total Area (ha)	15.92	28.85	2.96	33.55	14.36	7.06
Equip Imp Area EIA (15mm) (ha)	2.67	5.26	0.60	5.47	3.17	1.71
Equip Imp Area EIA (1% AEP) (ha)	7.69	14.85	1.54	15.32	8.11	3.93
15mm Event Biofiltration Area						
Volume Required (m ³)	401	789	90	821	476	257
Flood Depth (m)	0.30	0.30	0.30	0.30	0.30	0.30
TWL Elevation (mAHD)	13.80	13.80	47.80	20.80	31.80	12.80
Base & TWL Area (m ²)	1335	2630	300	2735	1585	855
Flood Storage Parameters						
Base Area (m ²) ¹	1550	4000	170	4180	2280	750
Approx Storage Invert (mAHD)	13.5	13.5	47.5	20.5	31.5	12.5
Design Groundwater Level (mAHD)	0.95	0.95	1.0	0.95	0.95	0.95
Side Slopes (v:h)	6	6	6	6	6	6
Infiltration Rate (m/d)	5.0	5.0	5.0	5.0	5.0	5.0
20% AEP Event Flood Storage						
Modelled Flood Depth (m)	0.65	0.57	0.72	0.57	0.56	0.65
TWL Elevation (mAHD)	14.15	14.07	48.22	21.07	32.06	13.15
TWL Area (m ²)	2898	5552	582	5677	2984	1474
Volume (m ³)	1451	2736	287	2831	1492	738
Critical Duration (hr)	3	3	3	3	3	3
1% AEP Event Flood Storage						
Modelled Flood Depth (m)	1.19	1.18	1.18	1.20	1.19	1.17
TWL Elevation (mAHD)	14.69	14.68	48.68	21.70	32.69	13.67
TWL Area (m ²)	4110	7316	923	7440	3883	2141
Volume (m ³)	3369	6682	646	6941	3685	1703
Critical Duration (hr)	3	3	3	3	3	3

1. Biofiltration area estimates are considered conservative. Where biofilter area requirements above exceed flood storage base areas shown, storage designs will require refinement at later stages of planning to suit.

Table 3: Stormwater Modelling for Revised Local Structure Plan (Catchments 11-14)

Catchment	11	12a	12b	13a	13b	14
Lots (ha) @ 44%RO 1%AEP	9.52	7.89	14.26	11.73	11.01	0.72
POS (ha) @ 17%RO 1%AEP	3.35	1.00	3.85	0.72	0.64	1.71
Road Reserve (ha) @ 68%RO 15mm @ 85%RO 1%AEP	5.28	4.46	6.72	5.97	4.87	1.52
Total Area (ha)	18.15	13.35	24.83	18.42	16.52	3.95
Equiv Imp Area EIA (15mm) (ha)	3.59	3.03	4.57	4.06	3.31	1.03
Equiv Imp Area EIA (1% AEP) (ha)	9.25	7.43	12.64	10.36	9.09	1.90
15mm Event Biofiltration Area						
Volume Required (m ³)	540	455	686	609	497	155
Flood Depth (m)	0.30	0.30	0.30	0.30	0.30	0.30
TWL Elevation (mAHD)	18.80	26.80	40.80	21.80	38.80	18.80
Base & TWL Area (m ²)	1800	1515	2285	2030	1655	515
Flood Storage Parameters						
Base Area (m ²) ¹	915	2100	3745	2700	2600	300
Approx Storage Invert (mAHD)	18.5	26.5	40.5	21.5	38.5	18.5
Design Groundwater Level (mAHD)	0.95	0.95	1.0	0.95	1.0	0.95
Side Slopes (v:h)	6	6	6	6	6	6
Infiltration Rate (m/d)	5.0	5.0	5.0	5.0	5.0	5.0
20% AEP Event Flood Storage						
Modelled Flood Depth (m)	0.75	0.55	0.54	0.59	0.56	0.68
TWL Elevation (mAHD)	19.25	27.05	41.04	22.09	39.06	19.18
TWL Area (m ²)	3768	2804	4707	3848	3351	693
Volume (m ³)	1761	1372	2298	1935	1975	358
Critical Duration (hr)	6	3	3	3	3	3
1% AEP Event Flood Storage						
Modelled Flood Depth (m)	1.20	1.17	1.19	1.20	1.20	1.19
TWL Elevation (mAHD)	19.70	27.67	41.69	22.70	39.70	19.69
TWL Area (m ²)	5558	3701	5977	5139	4319	1075
Volume (m ³)	3886	3379	5760	4688	4156	815
Critical Duration (hr)	3	3	3	3	3	3

1. Biofiltration area estimates are considered conservative. Where biofilter area requirements above exceed flood storage base areas shown, storage designs will require refinement at later stages of planning to suit.

Table 4: Stormwater Modelling for Revised Local Structure Plan (Catchments 15-20)

Catchment	15	16	17	18	19	20
Lots (ha) @ 44%RO 1%AEP	10.70	22.08	9.45	16.11	4.75	5.88
POS (ha) @ 17%RO 1%AEP	3.04	5.33	1.24	1.00	1.35	2.59
Road Reserve (ha) @ 68%RO 15mm @ 85%RO 1%AEP	5.07	10.37	4.86	7.27	2.33	2.91
Total Area (ha)	18.81	37.78	15.55	24.38	8.43	11.38
Equiv Imp Area EIA (15mm) (ha)	3.45	7.05	3.30	4.94	1.58	1.98
Equiv Imp Area EIA (1% AEP) (ha)	9.53	19.44	8.50	13.44	4.30	5.50
15mm Event Biofiltration Area						
Volume Required (m ³)	518	1058	495	741	237	297
Flood Depth (m)	0.30	0.30	0.30	0.20	0.30	0.30
TWL Elevation (mAHD)	2.80	2.80	7.80	1.70	51.80	11.80
Base & TWL Area (m ²)	1725	3525	1650	3705	790	990
Flood Storage Parameters						
Base Area (m ²) ¹	2880	7500	2450	7000	1000	1425
Approx Storage Invert (mAHD)	2.5	2.5	7.5	1.5	51.5	11.5
Design Groundwater Level (mAHD)	0.85	0.85	0.8	0.85	1.0	0.85
Side Slopes (v:h)	6	6	6	6	6	6
Infiltration Rate (m/d)	5.0	5.0	5.0	5.0	5.0	5.0
20% AEP Event Flood Storage						
Modelled Flood Depth (m)	0.52	0.39	0.54	0.26	0.62	0.58
TWL Elevation (mAHD)	3.02	2.89	8.04	1.76	52.12	12.08
TWL Area (m ²)	3618	8458	3172	7540	1576	2044
Volume (m ³)	1704	3156	1544	1889	807	1014
Critical Duration (hr)	3	1	3	1	3	3
1% AEP Event Flood Storage						
Modelled Flood Depth (m)	1.18	1.19	1.17	1.17	1.19	1.17
TWL Elevation (mAHD)	3.68	3.69	8.67	2.67	52.69	12.67
TWL Area (m ²)	4667	10560	4121	9584	2204	2773
Volume (m ³)	4471	10744	3836	9698	1913	2453
Critical Duration (hr)	24	24	3	24	3	3

1. Biofiltration area estimates are considered conservative. Where biofilter area requirements above exceed flood storage base areas shown, storage designs will require refinement at later stages of planning to suit.

Table 5: Stormwater Modelling for Revised Local Structure Plan (Catchments 21-26)

Catchment	21	22	23	24	25	26
Lots (ha) @ 44%RO 1%AEP	2.12	5.43	4.25	0.68	2.74	1.22
POS (ha) @ 17%RO 1%AEP	0.44	0.45	0.43	0.47	2.01	1.41
Road Reserve (ha) @ 68%RO 15mm @ 85%RO 1%AEP	1.00	2.50	1.61	0.41	2.19	0.89
Total Area (ha)	3.56	8.38	6.29	1.56	6.94	3.52
Equiv Imp Area EIA (15mm) (ha)	0.68	1.70	1.09	0.28	1.49	0.61
Equiv Imp Area EIA (1% AEP) (ha)	1.86	4.59	3.31	0.73	3.41	1.53
15mm Event Biofiltration Area						
Volume Required (m ³)	102	255	164	42	224	92
Flood Depth (m)	0.30	0.30	0.30	0.30	0.30	0.30
TWL Elevation (mAHD)	40.80	21.80	44.80	55.80	39.80	51.80
Base & TWL Area (m ²)	340	850	545	140	745	305
Flood Storage Parameters						
Base Area (m ²) ¹	300	1125	600	32.5	630	165
Approx Storage Invert (mAHD)	40.5	21.5	44.5	55.5	39.5	51.5
Design Groundwater Level (mAHD)	0.95	0.95	1.0	1.0	0.95	0.95
Side Slopes (v:h)	6	6	6	6	6	6
Infiltration Rate (m/d)	5.0	5.0	5.0	5.0	5.0	5.0
20% AEP Event Flood Storage						
Modelled Flood Depth (m)	0.67	0.60	0.67	0.79	0.66	0.73
TWL Elevation (mAHD)	41.17	22.10	45.17	56.29	40.16	52.23
TWL Area (m ²)	686	1681	1227	269	1271	575
Volume (m ³)	349	856	627	137	643	287
Critical Duration (hr)	3	3	3	6	3	3
1% AEP Event Flood Storage						
Modelled Flood Depth (m)	1.17	1.19	1.20	1.20	1.18	1.19
TWL Elevation (mAHD)	41.67	22.69	45.70	56.70	40.68	52.69
TWL Area (m ²)	1059	2329	1815	463	1864	912
Volume (m ³)	794	2049	1441	299	1478	644
Critical Duration (hr)	3	3	6	3	3	3

1. Biofiltration area estimates are considered conservative. Where biofilter area requirements above exceed flood storage base areas shown, storage designs will require refinement at later stages of planning to suit.

4. REFERENCES

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Western Australian Planning Commission (2025), Planning for Water Guidelines for the implementation of State Planning Policy 2.9 Water, December 2025

Should you have any queries regarding this report, please do not hesitate to contact Sasha Martens or Brian Lau of this office.

Yours sincerely,



Brian Lau
Environmental Hydrologist, Hyd2o

Attachments

Figure 1: Location Plan

Figure 2: Site Conditions Plan

Figure 3: Geotechnical Plan

Figure 5: Groundwater Plan

Figure 4: Surface Water Plan

Figure 6: Revised Concept Masterplan

Figure 7: Post Development Catchment Plan

Figure 8: 15mm Biofiltration Plan

Figure 9: Stormwater Management Plan

Appendix A: LWMS Extracts (RPS, 2010)

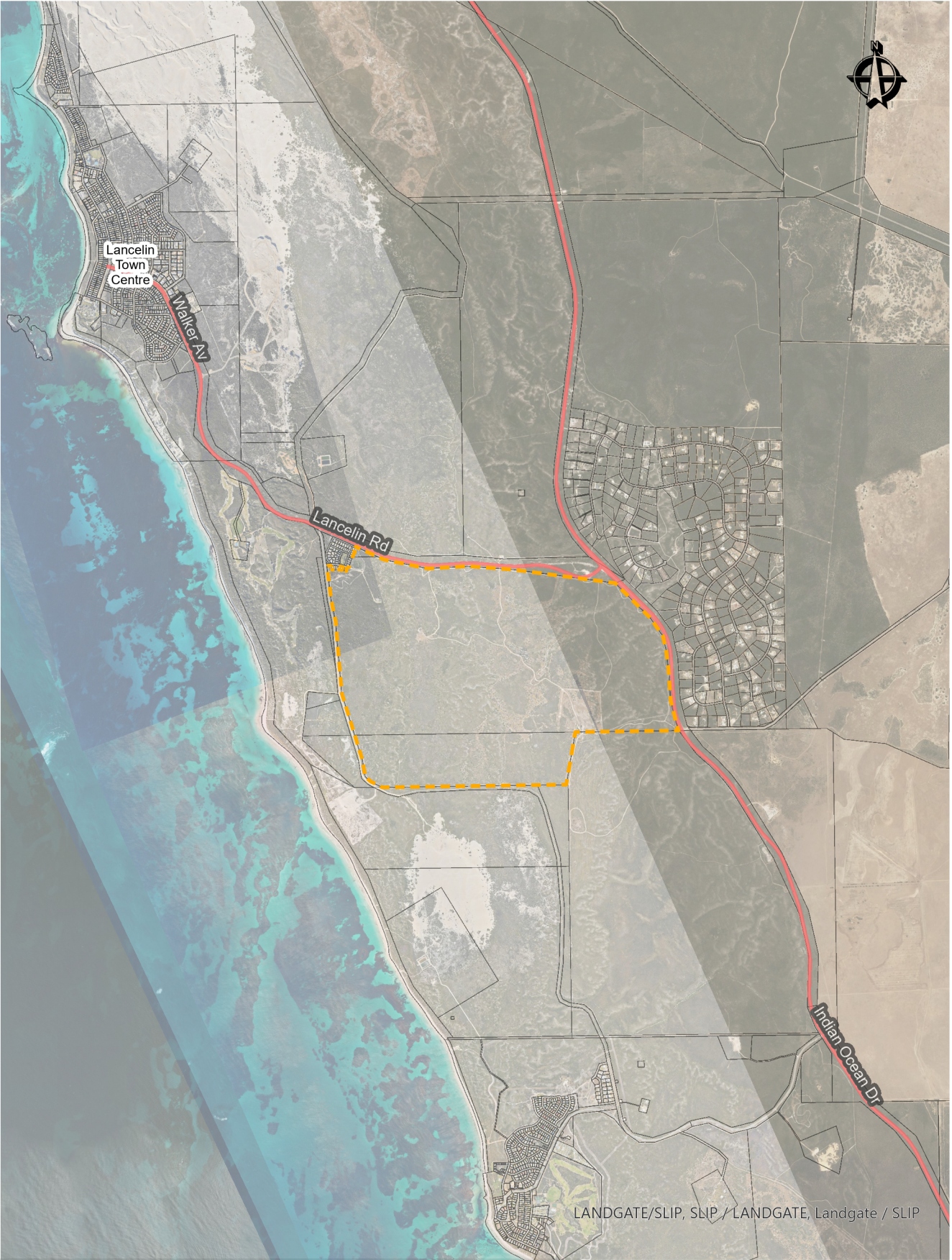
Appendix B : Engineering Plans (LDTtotal, 2025)

Appendix C : Stormwater Modelling Summary

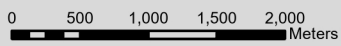
Appendix D: Landscape Plans (Peritas, 2025)

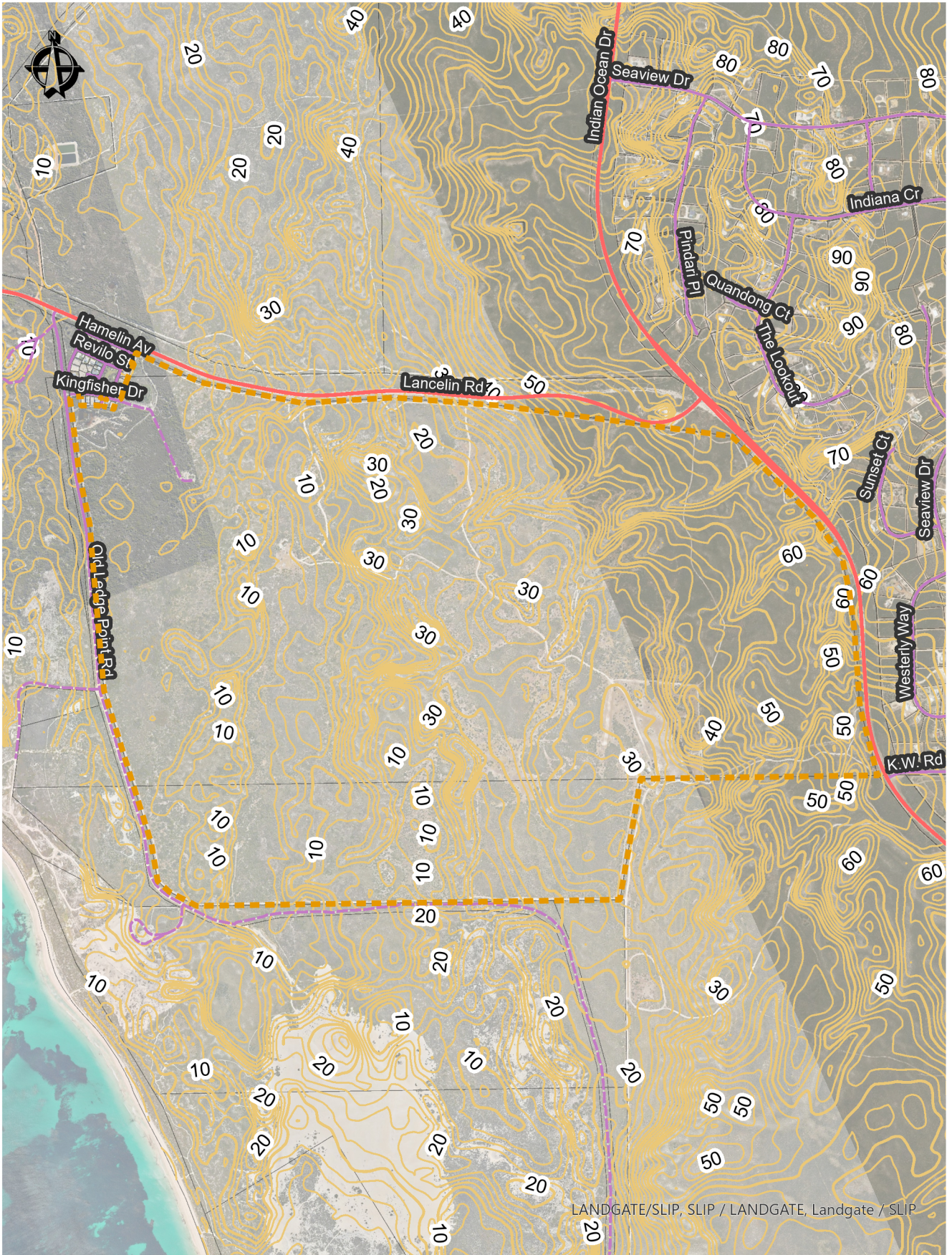
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FIGURES

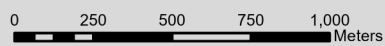


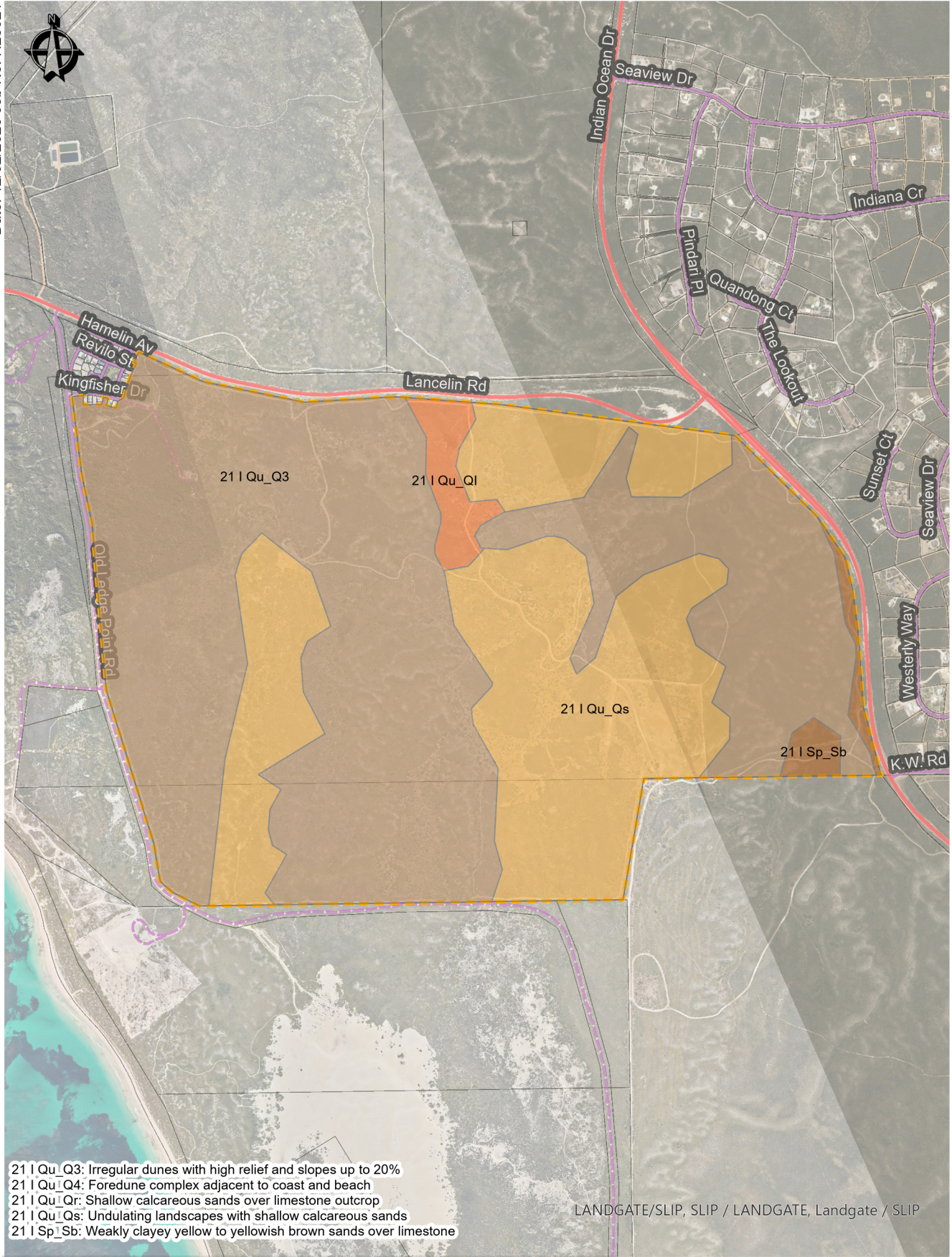
 Site





- Site
- 2 metre contours (DPIRD-072)









21 | Qu_Q3: Irregular dunes with high relief and slopes up to 20%
 21 | Qu_Q4: Fore-dune complex adjacent to coast and beach
 21 | Qu_Qr: Shallow calcareous sands over limestone outcrop
 21 | Qu_Qs: Undulating landscapes with shallow calcareous sands
 21 | Sp_Sb: Weakly clayey yellow to yellowish brown sands over limestone

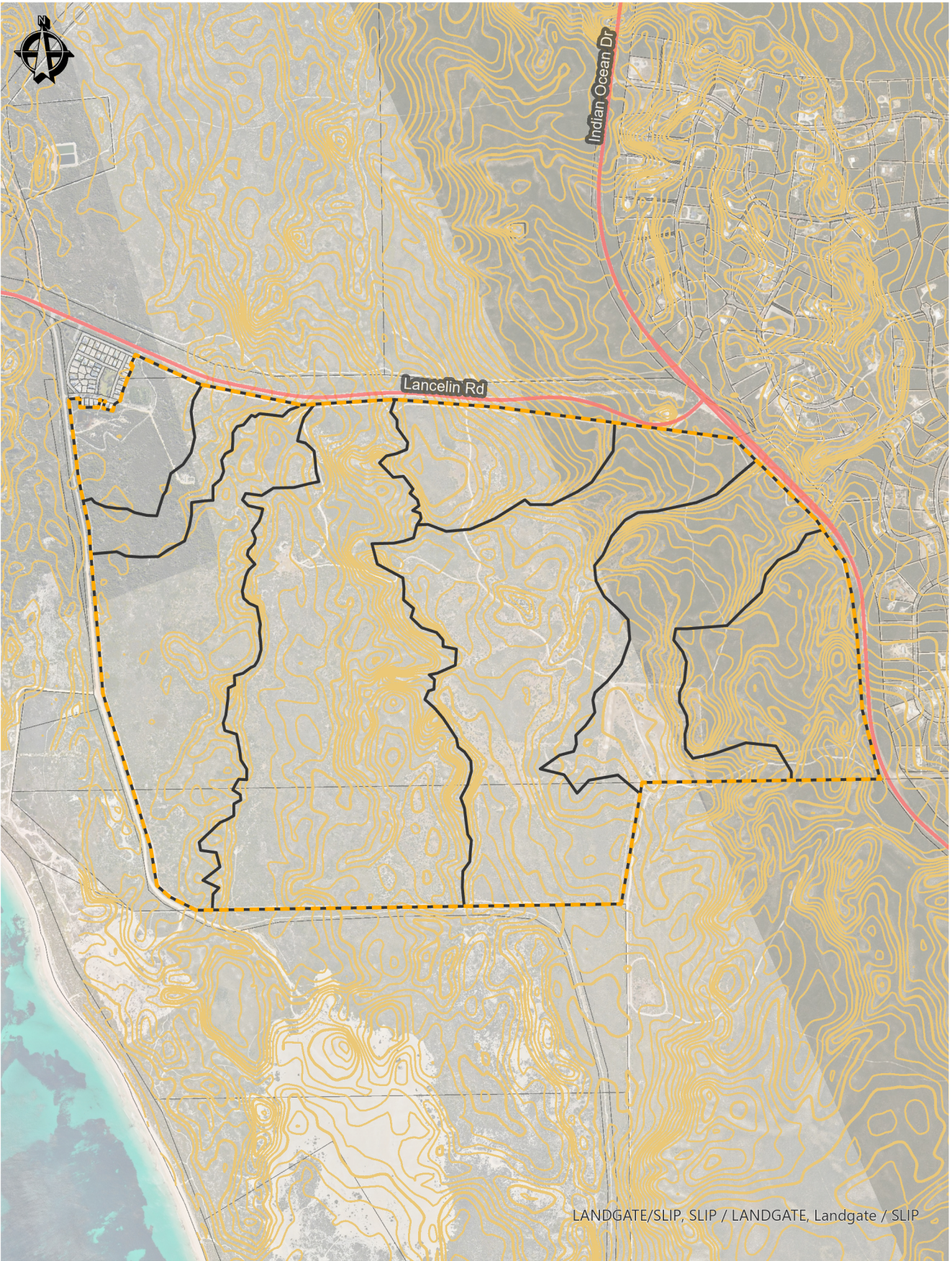
LANDGATE/SLIP, SLIP / LANDGATE, Landgate / SLIP

Site

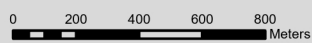
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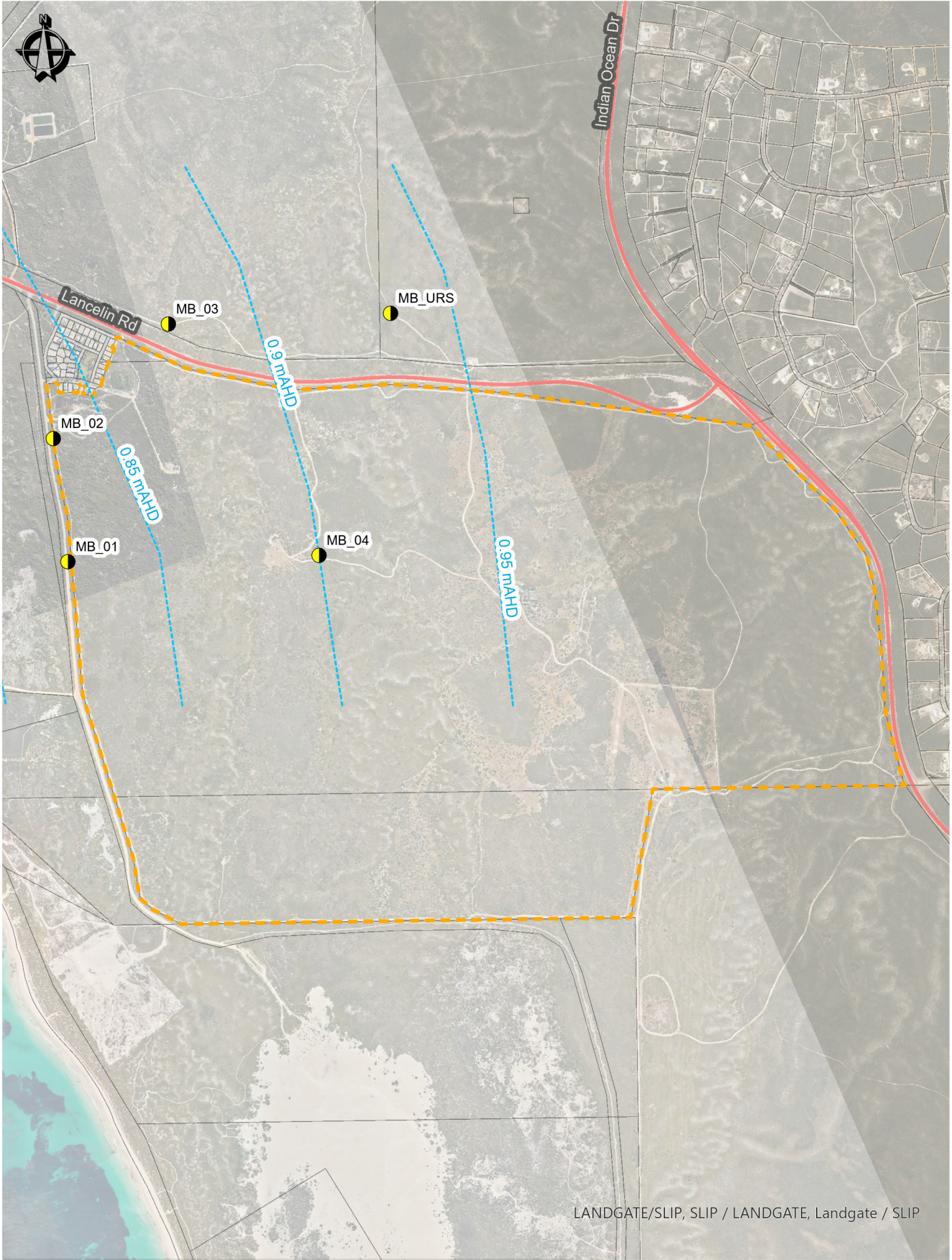
DPIRD Soil Landscape Mapping

 21 Qu_Q3	 21 Qu_Qs
 21 Qu_Q1	 21 Sp_Sb






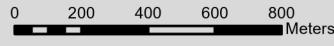
-  Site
-  Predevelopment Catchments

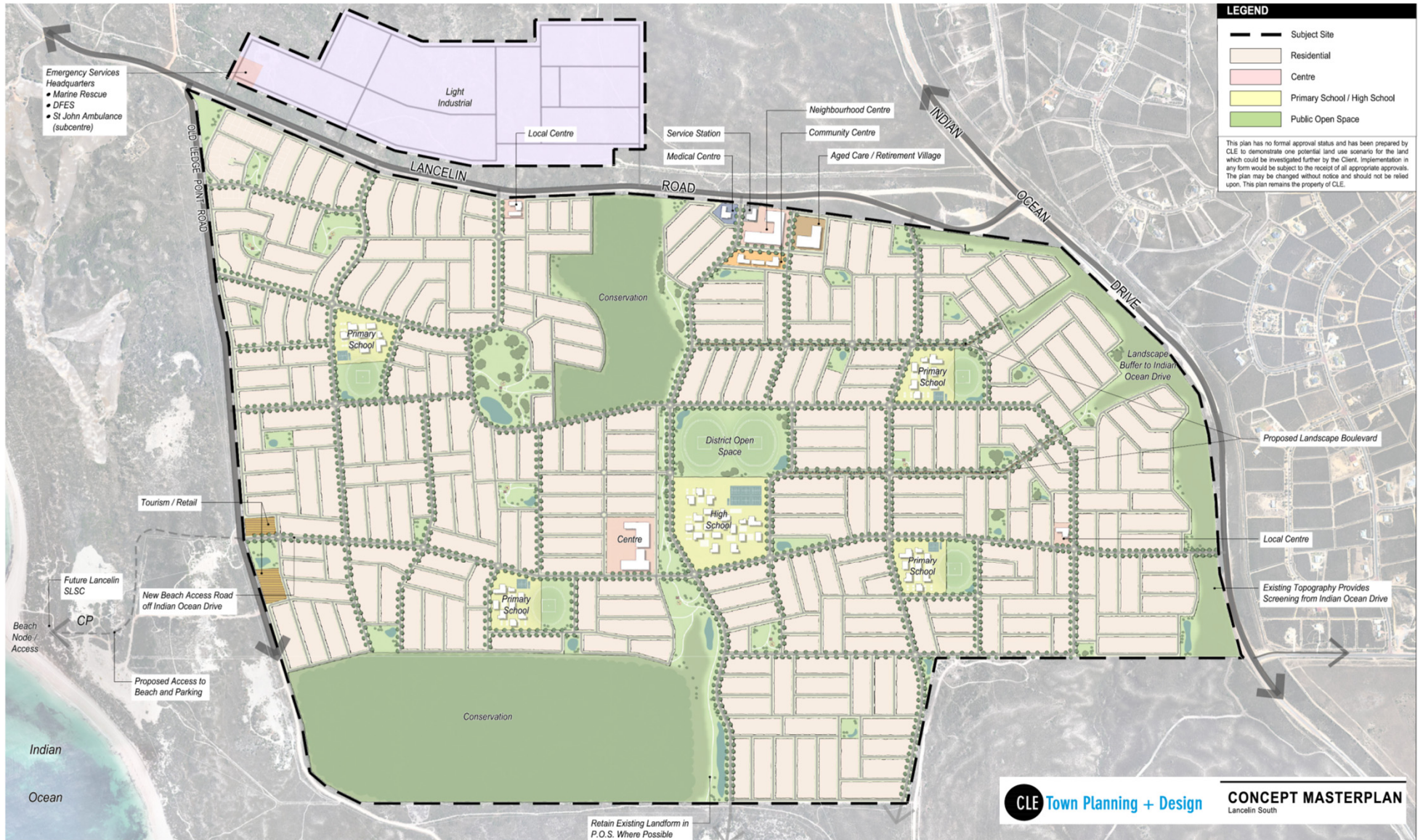




LANDGATE/SLIP, SLIP / LANDGATE, Landgate / SLIP

-  Site
-  Monitoring Bores (RPS, 2010)
-  AAMGL Contours (RPS, 2010)





Source : CLE Town Planning & Design, Concept Materplan March 2026



UWMP Catch1: 8.55 ha

UWMP Catch3: 30.24 ha

UWMP Catch2: 4.79 ha

UWMP Catch4: 35.17 ha

C1a 23.53 ha

C1b 15.34 ha

C18 25.48 ha

C15 22.25 ha

C16 37.79 ha

C17 19.01 ha

C20 11.38 ha

C14 13.94 ha

C6 15.92 ha

C5 15.52 ha

C11 22.09 ha

C10 8.38 ha

C21 3.57 ha

C9a 37.09 ha

C7 32.43 ha

C13a 18.44 ha

C22 8.39 ha

C26 3.53 ha

C9b 14.34 ha

C19 8.45 ha

C3 9.71 ha

C4 11.98 ha

C8 2.97 ha

C25 6.93 ha

C12a 13.34 ha

C13b 16.5 ha

C2 13.02 ha

C24 1.57 ha

C12b 24.84 ha

C23 6.29 ha

SLIP / LANDGATE, Landgate / SLIP

Site Boundary

Catchments

Non-Contributing Areas

Previously Modelled UWMP Catchments

Lots

Road Reserve

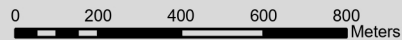
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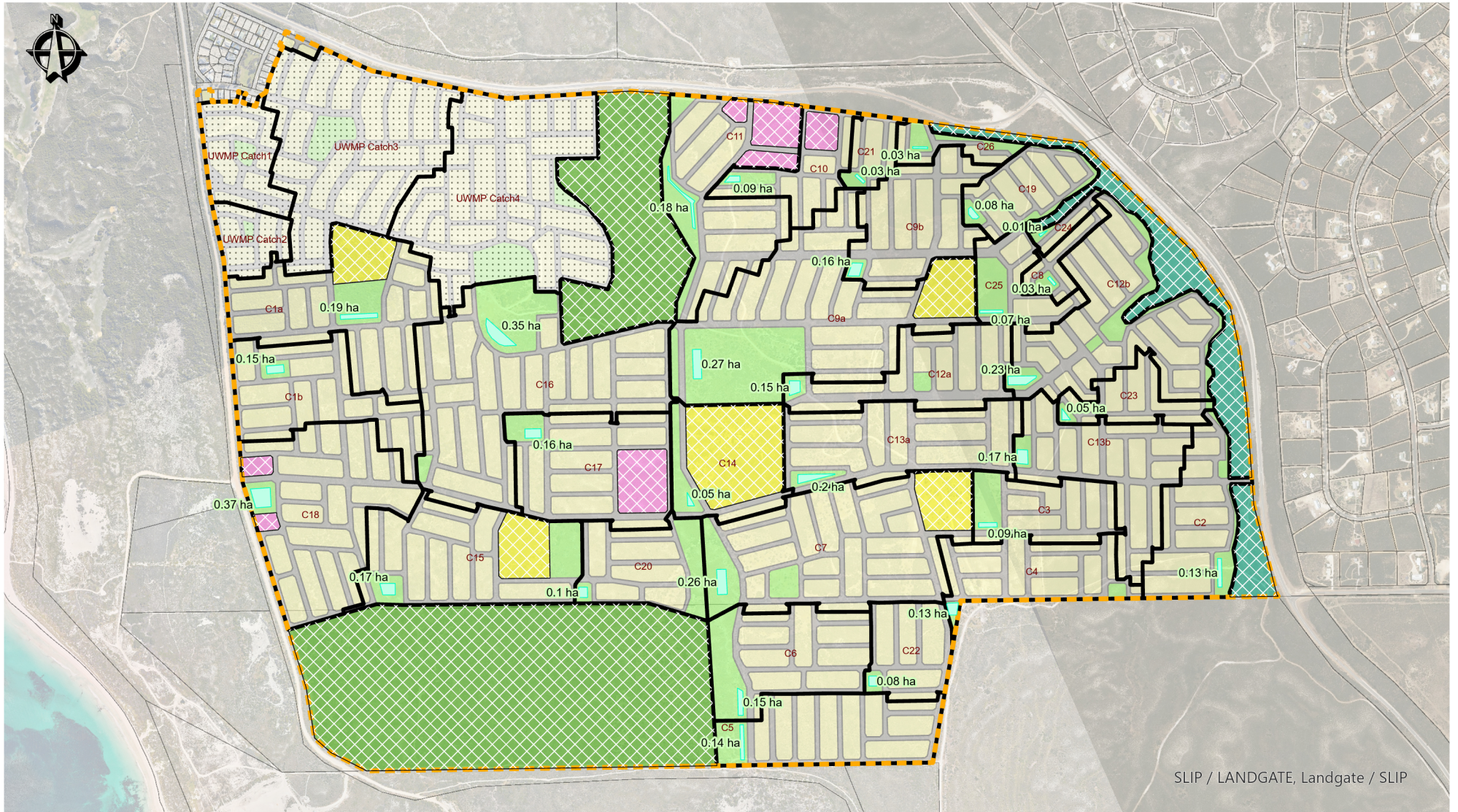
Visual Landscape Area

School

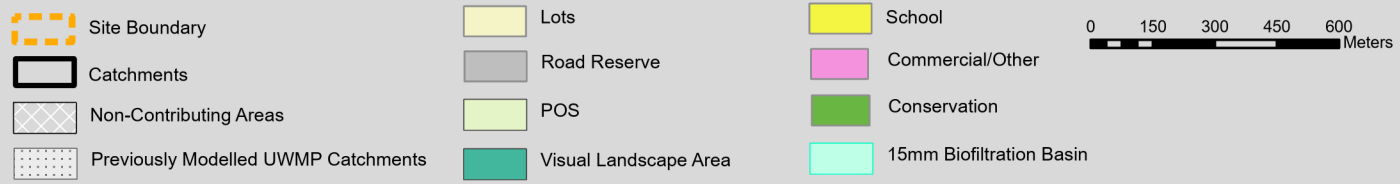
Commercial/Other

Conservation

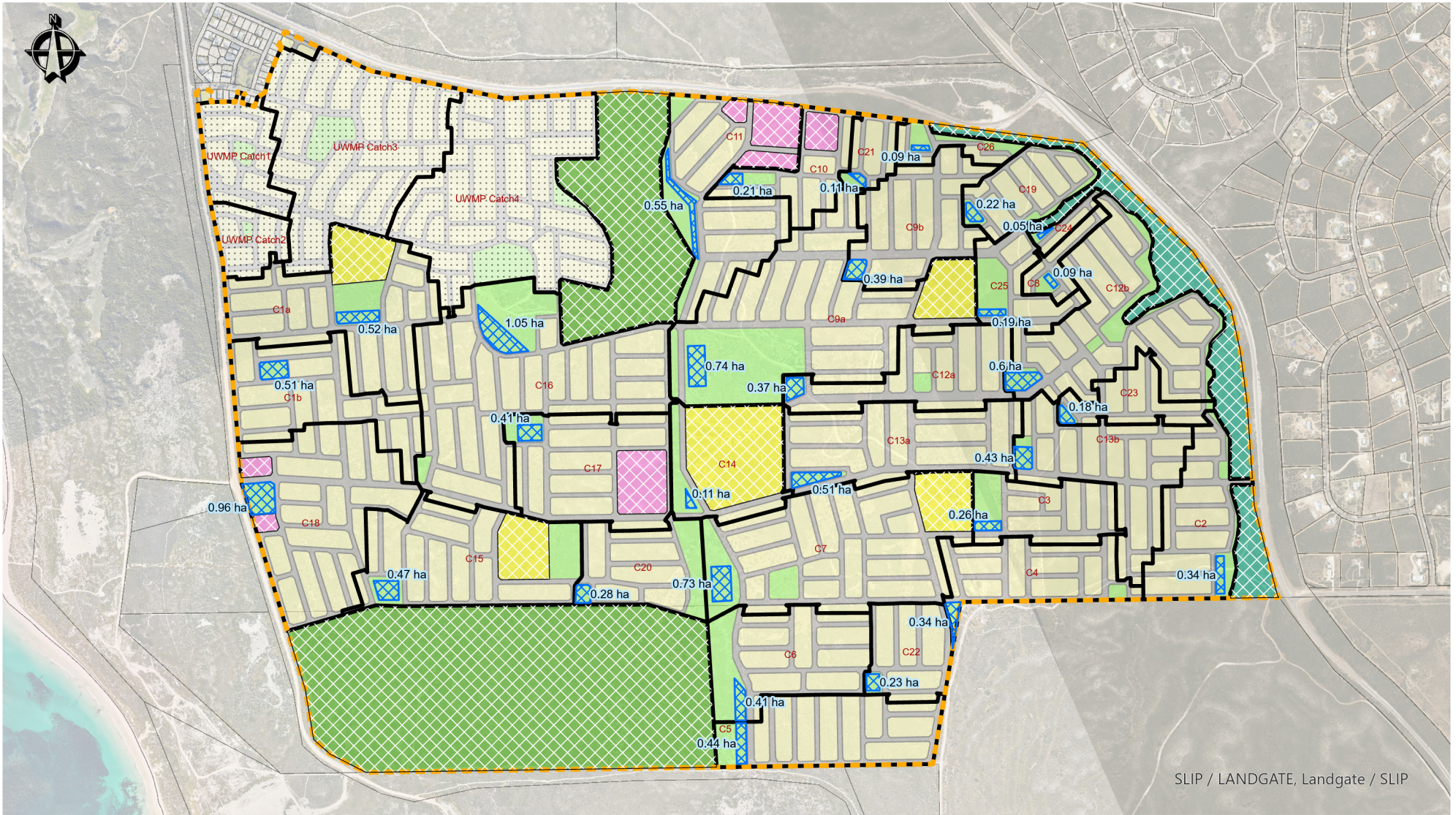




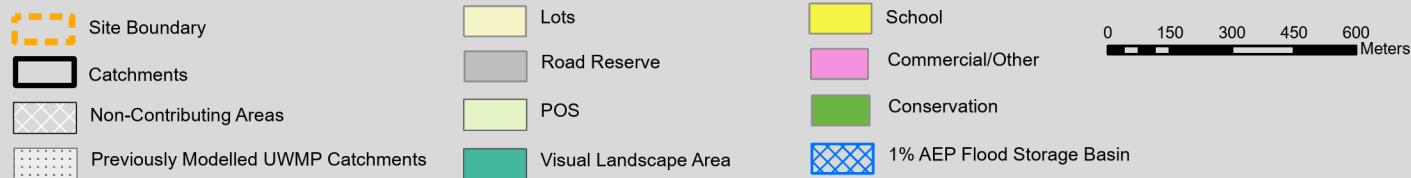
SLIP / LANDGATE, Landgate / SLIP



Lancelin South Estate LWMS Addendum
15mm Biofiltration Management Plan
Figure 8



SLIP / LANDGATE, Landgate / SLIP



APPENDIX A
LWMS Extracts (RPS, 2010)

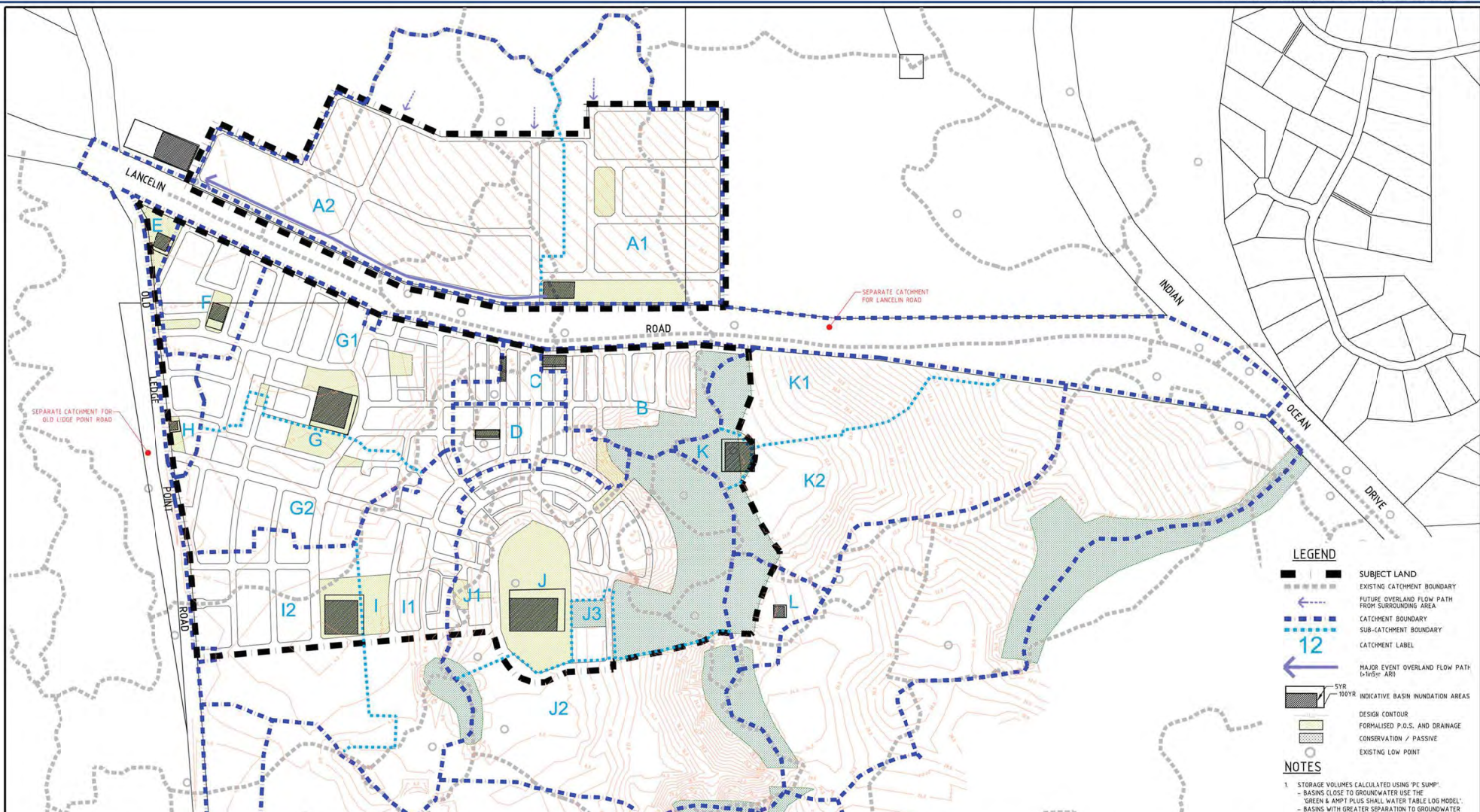


LEGEND

- LOW DENSITY RESIDENTIAL
- RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- SCHOOLS / COMMUNITY
- RETAIL / COMMERCIAL - VILLAGE CENTRE
- RETAIL / COMMERCIAL - LOCAL CENTRE
- PUBLIC OPEN SPACE (to be developed)
- PUBLIC OPEN SPACE (to be retained as natural vegetation)
- VEGETATION TO BE RETAINED IN LOTS
- MIXED BUSINESS - COMPOSITE INDUSTRIAL
- MIXED BUSINESS - SERVICE COMMERCIAL
- MIXED BUSINESS - LIGHT INDUSTRY
- REGIONAL DUAL USE PATHWAYS
- COASTAL ACCESS POINTS

Figure 3

Lancelin South Structure Plan Area



LEGEND

- SUBJECT LAND
- EXISTING CATCHMENT BOUNDARY
- FUTURE OVERLAND FLOW PATH FROM SURROUNDING AREA
- CATCHMENT BOUNDARY
- SUB-CATCHMENT BOUNDARY
- CATCHMENT LABEL
- MAJOR EVENT OVERLAND FLOW PATH (1-in-5yr ARI)
- 5yr 100% INDICATIVE BASIN INUNDATION AREAS
- DESIGN CONTOUR
- FORMALISED P.O.S. AND DRAINAGE
- CONSERVATION / PASSIVE
- EXISTING LOW POINT

NOTES

1. STORAGE VOLUMES CALCULATED USING 'PE SUMP' - BASINS CLOSE TO GROUNDWATER USE THE 'GREEN & AMPY PLUS SHALLOW WATER TABLE LOG MODEL' - BASINS WITH GREATER SEPARATION TO GROUNDWATER USE THE 'LOGGED BASE MODEL'.
2. IMPERVIOUS AREA TAKEN AS 0.8 X ROAD RESERVE AREA. FOR SURROUNDING AREAS ROAD RESERVE AREA HAS BEEN APPROXIMATED AS BEING 25% OF THE BROADWAY AREA.
3. E.I.A. FOR THE PIPED DRAINAGE (UP TO 5yr) SHALL BE KEPT TO A MAXIMUM SIZE OF 90m. SUB-CATCHMENT BOUNDARIES HAVE BEEN SHOWN TO REFLECT THIS AND WILL BE PROVIDED WITH SEPARATE OUTFALLS. A COMBINED 5yr STORAGE AREA HAS BEEN SHOWN ON THE PLAN ALONG WITH THE 100% STORAGE AREA FOR THE TOTAL CATCHMENT.
4. TWL (TOP WATER LEVEL) AREA IS THE REQUIRED FLAT AREA WITHIN THE P.O.S.
5. AN INFILTRATION RATE OF 2m/day AND A GROUNDWATER LEVEL OF 100mm HAS BEEN ADOPTED FOR ALL BASINS AND IS SUBJECT TO FURTHER GEOTECH INVESTIGATION.

LANCERLIN SOUTH BASIN DESIGN DATA										
Catchment	Catchment Area (Ha)	Estimated Impervious Area (Ha)	ARI (years)	Depth to G.W.L. (m)	Storage Volume (m ³)	Water Depth (m)	Basin TWL Area (m ²)	% of POS Area For Drainage (%)	REFER TO NOTE	
A1	6.6	5.3	1	13.0	1,448	0.59	2,964	12.7		
			5	2,340	0.86	3,453	14.8			
A2	10.0	8.0	1	2.0	2,785	0.51	6,109	14.8		
			5	8,295	0.89	7,095				
A (A1+A2)	16.6	13.3	10	2.0	9,111	0.68	12,294			
			100	14,255	1.16	14,056	100.0	(II)		
B	3.1	2.5	1	8.0	676	0.56	1,518			
			5	1,990	0.81	1,846				
			10	1,220	0.88	1,943				
			100	1,850	1.16	2,358	100.0			
C	1.2	0.9	1	6.0	249	0.66	603	66.3		
			5	400	0.87	780	85.7			
			10	450	0.94	843	90.7			
			100	667	1.16	1,060	100.0			
D	2.1	1.7	1	6.0	451	0.62	1,019	91.6		
			5	725	0.85	1,287				
			10	816	0.92	1,349				
			100	1,219	1.19	1,684	100.0			

LANCERLIN SOUTH BASIN DESIGN DATA										
Catchment	Catchment Area (Ha)	Estimated Impervious Area (Ha)	ARI (years)	Depth to G.W.L. (m)	Storage Volume (m ³)	Water Depth (m)	Basin TWL Area (m ²)	% of POS Area For Drainage (%)	REFER TO NOTE	
E	1.7	1.4	1	2.0	446	0.55	1,076	9.9		
			5	1,131	0.80	1,798	35.1			
			10	889	0.76	1,613	14.8			
			100	1,387	1.04	1,959	18.3			
F	2.2	1.7	1	2.0	620	0.58	1,390	27.1		
			5	1,190	0.74	2,101	41.0			
			10	1,147	1.14	2,729	53.3			
G1	6.6	5.3	1	2.0	1,795	0.47	4,293	14.4	(II)	
			5	3,483	0.82	5,058	17.0			
G2	4.3	3.4	1	2.0	1,148	0.48	2,776	9.3	(II)	
G (G1+G2)	10.9	8.7	10	2.0	6,013	0.70	9,643	32.4		
			100	11,015	1.18	11,211	37.6	(II)		
H	0.5	0.4	1	2.0	97	0.53	306	10.5		
			5	160	0.71	415	14.2			
			10	203	0.80	475	16.3			
			100	296	0.98	609	20.9			

LANCERLIN SOUTH BASIN DESIGN DATA										
Catchment	Catchment Area (Ha)	Estimated Impervious Area (Ha)	ARI (years)	Depth to G.W.L. (m)	Storage Volume (m ³)	Water Depth (m)	Basin TWL Area (m ²)	% of POS Area For Drainage (%)	REFER TO NOTE	
I1	5.3	4.2	1	2.0	1,586	0.53	3,304	11.6	(II) & (I)	
			5	2,817	0.89	3,999	14.0			
I2	5.4	4.3	1	2.0	1,544	0.52	3,401	11.9	(II) & (I)	
			5	2,891	0.88	4,106	14.4			
I (I1+I2)	10.7	8.6	10	2.0	5,921	0.70	9,448	33.0		
			100	10,838	1.19	11,033	38.6	(II) & (I)		
J1	5.6	4.5	1	2.0	1,439	0.57	3,736	5.2	(II) & (I)	
			5	3,037	0.87	4,345	5.0			
J2	9.0	7.9	1	2.0	3,512	0.58	6,770	9.3	(II) & (I)	
			5	5,759	0.89	7,611	10.5			
J3	0.3	0.2	1	2.0	56	0.57	199	0.3	(II) & (I)	
			5	90	0.71	268	0.4			
J (J1+J2+J3)	15.8	12.6	10	2.0	8,504	0.64	14,458	19.9		
			100	15,628	1.11	16,323	22.5	(II) & (I)		
K1	3.9	3.1	1	17.0	893	0.60	1,815	48.4	(II) & (I)	
			5	1,274	0.86	2,186	58.3			
K2	7.4	5.9	1	17.0	1,430	0.60	3,204	85.4	(II) & (I)	
			5	2,430	0.89	3,750	100.0			
			10	4,445	0.81	6,565				
K (K1+K2)	11.3	9.1	10	17.0	6,714	1.13	7,410	100.0	(II) & (I)	

LANCERLIN SOUTH BASIN DESIGN DATA										
Catchment	Catchment Area (Ha)	Estimated Impervious Area (Ha)	ARI (years)	Depth to G.W.L. (m)	Storage Volume (m ³)	Water Depth (m)	Basin TWL Area (m ²)	% of POS Area For Drainage (%)	REFER TO NOTE	
L	1.2	0.9	1	22.0	255	0.62	631		(I)	
			5	22.0	410	0.84	809			
			10	22.0	461	0.90	864			
			100	22.0	664	1.13	1,094	100.0		

NOTES

- (I) CATCHMENT INCLUDES APPROXIMATE FUTURE IMPERVIOUS AREA
- (II) COMBINED SUB-CATCHMENT 5yr STORAGE AREAS HAVE BEEN SHOWN ON THE PLAN
- (III) DOWNSTREAM BASIN INCLUDES EXCESS RUNOFF FROM UPSTREAM SUB-CATCHMENTS DURING >5yr EVENTS



Figure 15
Concept Drainage Plan

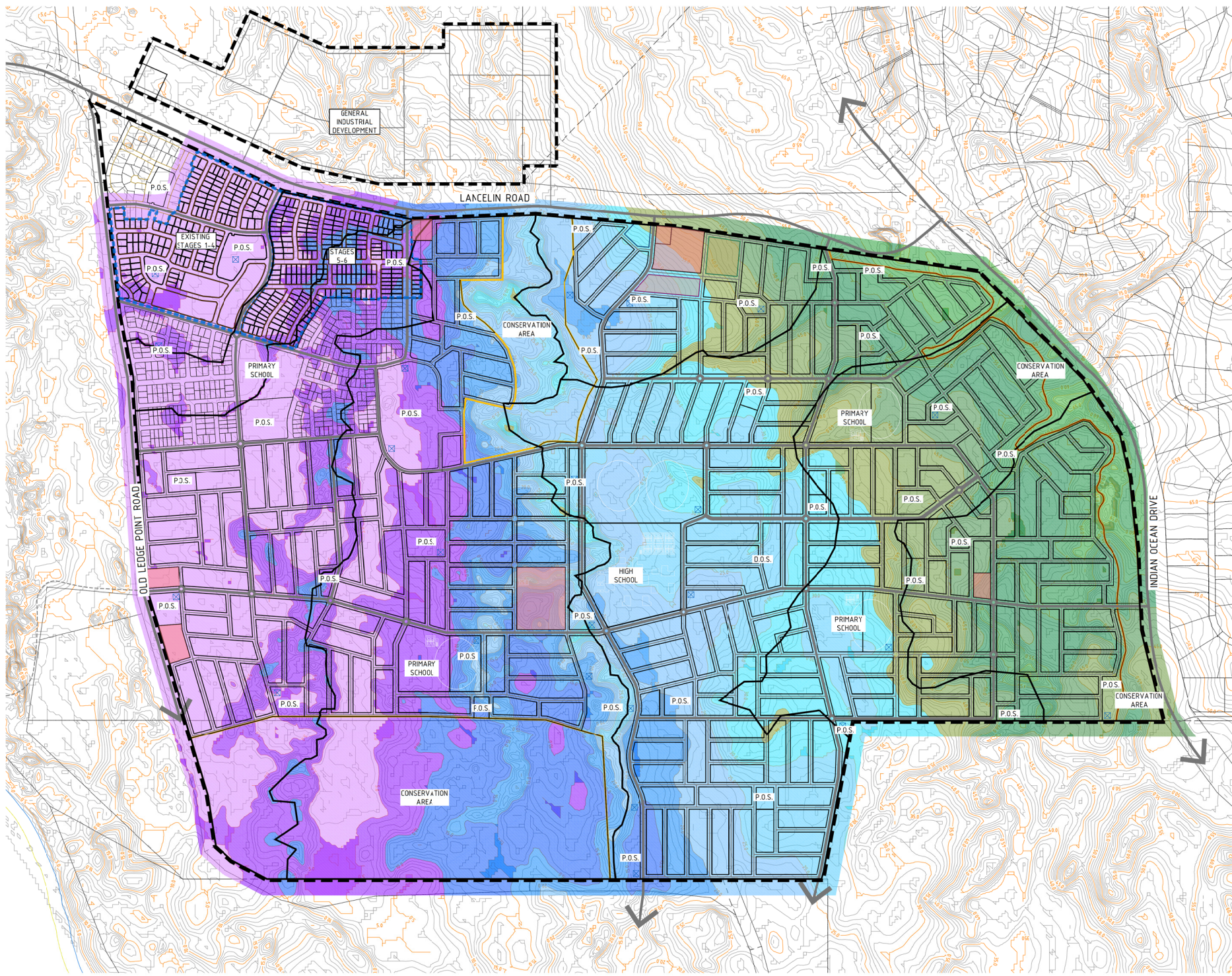
APPENDIX B

Engineering Plans (Peritas, 2025)



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 - EXISTING MINOR CONTOURS (1.0m INTERVALS)
 - STORMWATER CATCHMENT BOUNDARIES
 - SITE BOUNDARY

ISOPACH LEGEND

Lower_value	Upper_value	Colour
0	to 5	m
5	to 10	m
10	to 15	m
15	to 20	m
20	to 25	m
25	to 30	m
30	to 35	m
35	to 40	m
40	to 45	m
45	to 50	m
50	to 55	m
55	to 60	m
60	to 65	m
65	to 70	m
70	to 75	m
75	to 80	m
80	to 85	m
85	to 90	m
90	to 95	m
95	to 100	m
100	to 105	m
105	to 110	m

15000 AT B1



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B	ISSUED FOR INFORMATION	DA 07/02/25
C	ISSUED FOR INFORMATION	LR 24/02/25
D	ISSUED FOR INFORMATION	LR 24/02/26



PERTH: 14/03/2019 MELBOURNE: 08/08/2019
 A: 14/03/2019 FOR BURSWOOD WA 1000 K: 1/04/2019 MELBOURNE VIC 3044
 E: ENG.MEL@PERITASGROUP.COM.AU E: ENG.MEL@PERITASGROUP.COM.AU



DESIGNED	CHECKED	DATE
DAVRES	C.OLIVER	A.SMITH
REVISION DATA	DATE	DATE
LC04/AHD		AS SHOWN @ B1
25/02/25		

PROJECT:
CONCEPT MASTERPLAN
LANCELIN SOUTH

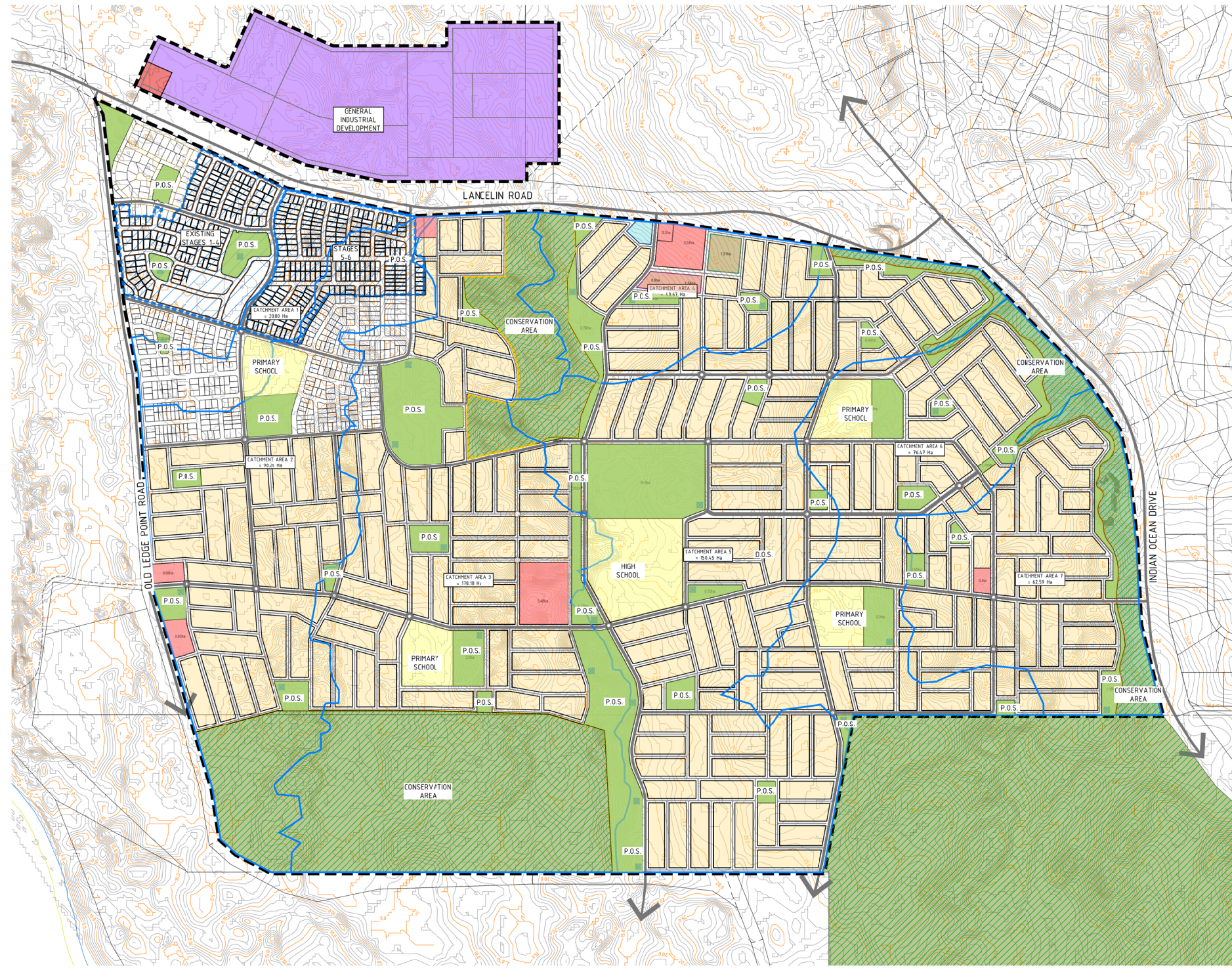
TITLE:
ISOPACH PLAN

PROJECT NUMBER	ORGANISATION	REV.
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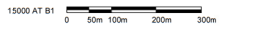


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- 30.0 EXISTING MAJOR CONTOURS (5.0m INTERVALS)
- EXISTING MINOR CONTOURS (1.0m INTERVALS)
- EXISTING STORMWATER CATCHMENT BOUNDARIES
- PUBLIC OPEN SPACES
- SCHOOL SITES
- NEIGHBOURHOOD CENTRES
- CONSERVATION AREAS
- SITE BOUNDARY



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VIMG

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LEAD/VAHD	PROJECT NO.	AS SHOWN @ B1
		25/02/25

PROJECT: CONCEPT MASTERPLAN LANCELIN SOUTH

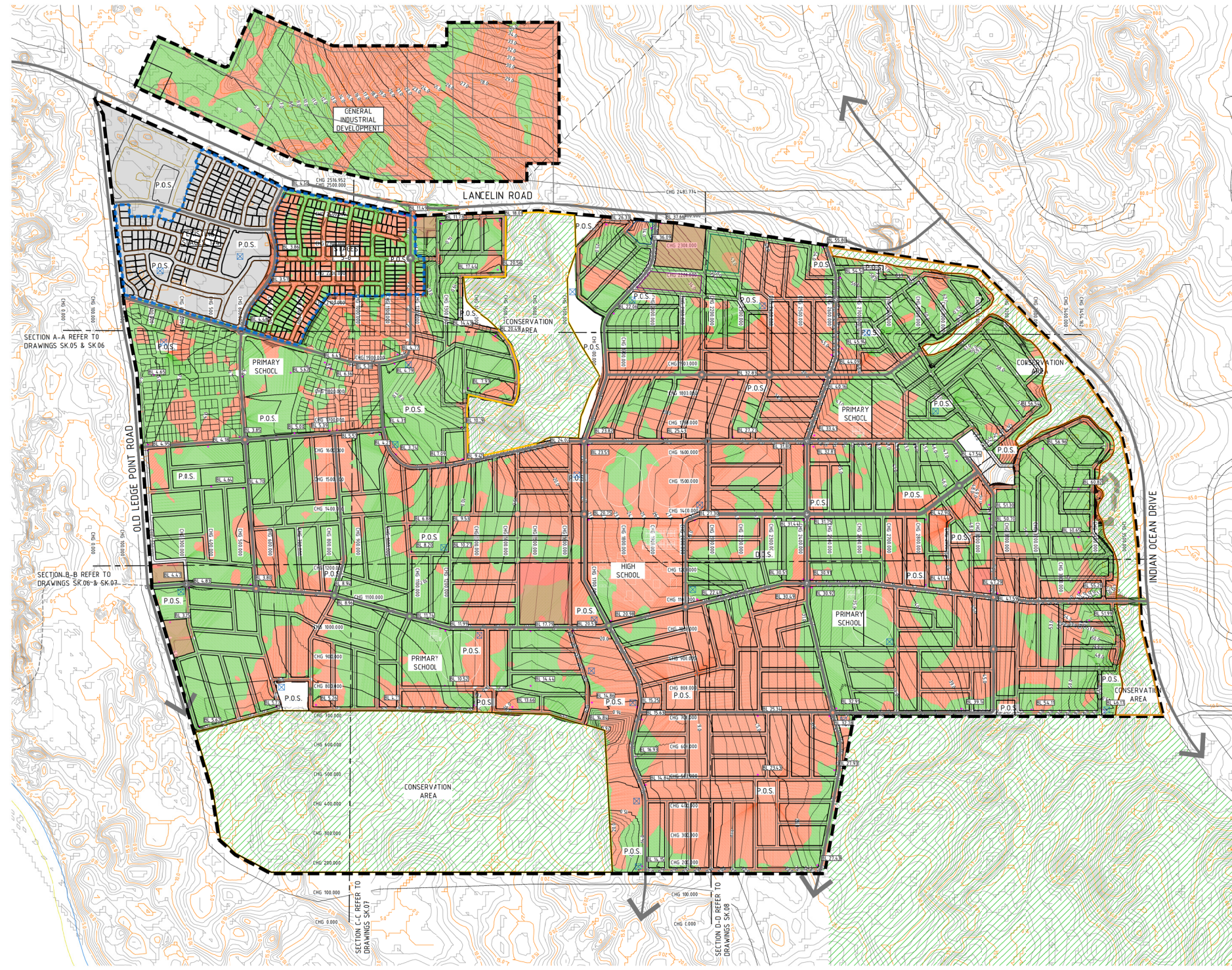
EXISTING STORMWATER CATCHMENT PLAN

PROJECT NUMBER	ORGANISATION	REV.
PC24490	CI-SK.02	D



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 - 30.0 EXISTING MAJOR CONTOURS (1.0m INTERVALS)
 - 30.0 BULK EARTHWORK MAJOR CONTOURS (5.0m INTERVALS)
 - 31.0 BULK EARTHWORK MAJOR CONTOURS (1.0m INTERVALS)
 - 31.0 BULK EARTHWORK MINOR CONTOURS (1.0m INTERVALS)
 - (BL X XX) BULK EARTHWORK LEVELS
 - AREA OF CUT
 - AREA OF FILL
 - CONSERVATION AREAS
 - SITE BOUNDARY

CUT AND FILL VOLUME CALCULATIONS

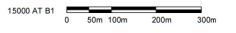
TOTAL CUT	-7,558,923.144 m ³
TOTAL FILL	5,285,545.121 m ³
TOTAL BALANCE	-2,273,378.023 m ³
EXCESS OF CUT OVER FILL	2,273,378.023 m ³

SECTION A-A REFER TO DRAWINGS SK.05 & SK.06

SECTION B-B REFER TO DRAWINGS SK.06 & SK.07

SECTION C-C REFER TO DRAWINGS SK.08

SECTION D-D REFER TO DRAWINGS SK.08



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D	ISSUED FOR INFORMATION	LR 26/02/26



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 MELBOURNE: 14/0000000 POOLBURWOOD, WA 6100
 ENQ: 08 9437 7777
 ENQ: 08 9437 7777
 ENQ: 08 9437 7777



DESIGNED	CHECKED	DATE
DAYRES	C.OLIVER	A.SMITH
LCG/A/AMD		AS SHOWN @ B1

CONCEPT MASTERPLAN
LANCIELIN SOUTH

BULK EARTHWORKS PLAN

PROJECT NUMBER:	DCG NUMBER:	REV:
PC24490	CI-SK.04	D

APPENDIX C
Stormwater Modelling Summary

Lancelin LWMS Addendum

Hyd2o Modelling Result Summary , with adjusted 15mm POS areas to 0.3m depth



xxxx total area of inundation for specified event
 xx % percentage of contributing catchment area (excluding commercial,conservation, and schools)

Catchment	1a	1b	2	3	4	5	6	7	8	9a	9b	10	11	12a	12b	13a	13b	14	15	16	17	18	19	20	21	22	23	24	25	26
Lots (ha) @ 44%RO 1%AEP	12.33	10.41	7.62	5.14	7.51	9.68	8.57	17.33	1.63	15.36	9.26	3.77	9.52	7.89	14.26	11.73	11.01	0.72	10.70	22.08	9.45	16.11	4.75	5.88	2.12	5.43	4.25	0.68	2.74	1.22
POS (ha) @ 17%RO 1%AEP	2.22	0.58	1.72	1.87	0.66	1.59	3.43	3.78	0.45	10.14	0.44	0.77	3.35	1.00	3.85	0.72	0.64	1.71	3.04	5.33	1.24	1.00	1.35	2.59	0.44	0.45	0.43	0.47	2.01	1.41
Road (ha) @ 68%RO 15mm, 85%RO 1%AEP	5.58	4.34	3.68	2.70	3.80	4.26	3.92	7.74	0.88	8.05	4.66	2.52	5.28	4.46	6.72	5.97	4.87	1.52	5.07	10.37	4.86	7.27	2.33	2.91	1.00	2.50	1.61	0.41	2.19	0.89
Total Area (ex Conserv,Schools,Commercial)	20.13	15.33	13.02	9.71	11.97	15.53	15.92	28.85	2.96	33.55	14.36	7.06	18.15	13.35	24.83	18.42	16.52	3.95	18.81	37.78	15.55	24.38	8.43	11.38	3.56	8.38	6.29	1.56	6.94	3.52
Equiv Imp Area EIA (15mm) (ha)	3.79	2.95	2.50	1.84	2.58	2.90	2.67	5.26	0.60	5.47	3.17	1.71	3.59	3.03	4.57	4.06	3.31	1.03	3.45	7.05	3.30	4.94	1.58	1.98	0.68	1.70	1.09	0.28	1.49	0.61
Equiv Imp Area EIA (1% AEP) (ha)	10.55	8.37	6.77	4.87	6.65	8.15	7.69	14.85	1.54	15.32	8.11	3.93	9.25	7.43	12.64	10.36	9.09	1.90	9.53	19.44	8.50	13.44	4.30	5.50	1.86	4.59	3.31	0.73	3.41	1.53
Storage Parameters																														
Base Area (m2)	2740	2740	1700	950	1575	1670	1550	4000	170	4180	2280	750	915	2100	3745	2700	2600	300	2880	7500	2450	7000	1000	1425	300	1125	600	32.5	630	165
Approx Storage Invert (mAHD)	2.5	1.5	42.5	33.5	28.5	12.5	13.5	13.5	47.5	20.5	31.5	12.5	18.5	26.5	40.5	21.5	38.5	18.5	2.5	2.5	7.5	1.5	51.5	11.5	40.5	21.5	44.5	55.5	39.5	51.5
Side Slopes (v:h)	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Infiltration Rate (m/d) : Flood Storage Modelling	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
15mm Event Biofiltration Area (assumed nested within overall storage with 0.3m design depth, 1:0 batters to minimise area)																														
15mm Event Total Volume (m³)	569	443	375	276	387	435	401	789	90	821	476	257	540	455	686	609	497	155	518	1058	495	741	237	297	102	255	164	42	224	92
Flood Depth (m)	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.20	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
TWL Elevation (mAHD)	2.80	1.80	42.80	33.80	28.80	12.80	13.80	13.80	47.80	20.80	31.80	12.80	18.80	26.80	40.80	21.80	38.80	18.80	2.80	2.80	7.80	1.70	51.80	11.80	40.80	21.80	44.80	55.80	39.80	51.80
TWL Area (m²)	1895	1475	1250	920	1290	1450	1335	2630	300	2735	1585	855	1800	1515	2285	2030	1655	515	1725	3525	1650	3705	790	990	340	850	545	140	745	305
20% AEP Event Flood Storage																														
Modelled Flood Depth (m)	0.59	0.44	0.59	0.65	0.60	0.64	0.65	0.57	0.72	0.57	0.56	0.65	0.75	0.55	0.54	0.59	0.56	0.68	0.52	0.39	0.54	0.26	0.62	0.58	0.67	0.60	0.67	0.79	0.66	0.73
TWL Elevation (mAHD)	3.09	1.94	43.09	34.15	29.10	13.14	14.15	14.07	48.22	21.07	32.06	13.15	19.25	27.05	41.04	22.09	39.06	19.18	3.02	2.89	8.04	1.76	52.12	12.08	41.17	22.10	45.17	56.29	40.16	52.23
TWL Area (m²)	3902	3597	2494	1830	2491	3088	2898	5552	582	5677	2984	1474	3768	2804	4707	3848	3351	693	3618	8458	3172	7540	1576	2044	686	1681	1227	269	1271	575
Volume (m³)	1963	1404	1260	917	1235	1531	1451	2736	287	2831	1492	738	1761	1372	2298	1935	1975	358	1704	3156	1544	1889	807	1014	349	856	627	137	643	287
Critical Duration (hr)	3	1	3	3	3	3	3	3	3	3	3	3	6	3	3	3	3	3	3	1	3	1	3	3	3	3	3	6	3	3
1% AEP Event Flood Storage																														
Modelled Flood Depth (m)	1.20	1.17	1.19	1.18	1.17	1.18	1.19	1.18	1.18	1.20	1.19	1.17	1.20	1.17	1.19	1.20	1.20	1.19	1.18	1.19	1.17	1.17	1.19	1.17	1.17	1.19	1.20	1.20	1.18	1.19
TWL Elevation (mAHD)	3.70	2.67	43.69	34.68	29.67	13.68	14.69	14.68	48.68	21.70	32.69	13.67	19.70	27.67	41.69	22.70	39.70	19.69	3.68	3.69	8.67	2.67	52.69	12.67	41.67	22.69	45.70	56.70	40.68	52.69
TWL Area (m²)	5208	5141	3403	2637	3457	4377	4110	7316	923	7440	3883	2141	5558	3701	5977	5139	4319	1075	4667	10560	4121	9584	2204	2773	1059	2329	1815	463	1864	912
Volume (m³)	4758	4634	3032	2119	2937	3560	3369	6682	646	6941	3685	1703	3886	3379	5760	4688	4156	815	4471	10744	3836	9698	1913	2453	794	2049	1441	299	1478	644
Critical Duration (hr)	3	24	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	24	24	3	24	3	3	3	3	6	3	3	3

42830 1.0%

87857 2.0%

118156 2.7%

APPENDIX D

Landscape Plans (LD Total, 2025)

Lancelin South - Landscape Master Plan

Legend

- E1 Existing POS - NW Triangle
- E2 Existing POS - NW Rectangle

- U1 POS U1
- U2 POS U2
- U3 POS U3
- U4a POS U4a
- U4b POS U4b

- 1a POS 1a
- 1b POS 1b
- 2a POS 2a
- 2b POS 2b
- 3 POS 3
- 4a POS 4a
- 4b POS 4b
- 5 POS 5
- 6 POS 6
- 7a POS 7a
- 7b POS 7b
- 8 POS 8
- 9a-1 POS 9a-1
- 9a-2 POS 9a-2
- 9b POS 9b
- 10 POS 10
- 11a POS 11a
- 11b POS 11b

- 12a-1 POS 12a-1
- 12a-2 POS 12a-2
- 12b-1 POS 12b-1
- 12b-2 POS 12b-2
- 12b-3 POS 12b-3
- 13a POS 13a
- 13b POS 13b
- 14 POS 14
- 15a POS 15a
- 15b POS 15b
- 16a POS 16a
- 16b POS 16b
- 16c POS 16c
- 17 POS 17
- 18 POS 18
- 19a POS 19a
- 19b POS 19b
- 20a POS 20a
- 20b POS 20b
- 21 POS 21
- 22 POS 22
- 23a POS 23a
- 23b POS 23b

- 24 POS 24
- 25 POS 25
- 26a POS 26a
- 26b POS 26b
- 37 POS 37

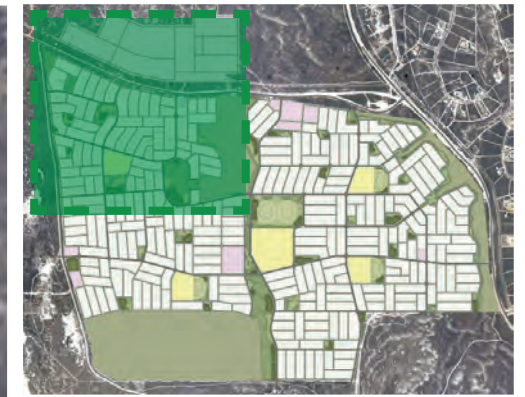


Lancelin South - Landscape Master Plan



LEGEND

- Benches/seating
- Play equipment
- Shade over play
- Shelter & Picnic setting
- Circulation Footpaths
- Native revegetation and tree planting
- Open turf areas
- Drinking fountain
- Bin



Location Plan - Not to Scale

Existing POS

Existing POS

POS U3

- Benches/seating
- Play equipment
- Shade over play
- Shelter & Picnic setting
- Circulation Footpaths
- Native revegetation and tree planting
- Open turf areas
- Drinking fountain
- Bin

POS U1

- Benches/seating
- Circulation Footpaths
- Native revegetation and tree planting

POS U4b

- Benches/seating
- Circulation Footpaths
- Native revegetation and tree planting

POS U2

- Benches/seating
- Circulation Footpaths
- Native revegetation and tree planting

POS 1a

- Benches/seating
- Play equipment
- Shade over play
- Shelter & Picnic setting
- Circulation Footpaths
- Native revegetation and tree planting
- Open turf areas
- Drinking fountain
- Bin

POS U4a

- Benches/seating
- Circulation Footpaths
- Native revegetation and tree planting

POS 16a

- Benches/seating
- Play equipment
- Shade over play
- Shelter & Picnic setting
- Circulation Footpaths
- Native revegetation and tree planting
- Open turf areas
- Drinking fountain
- Bin

POS 16c

- Benches/seating
- Circulation Footpaths
- Native revegetation and tree planting

Lancelin South - Landscape Master Plan

POS 26-a

POS 21

POS 10

POS 11a

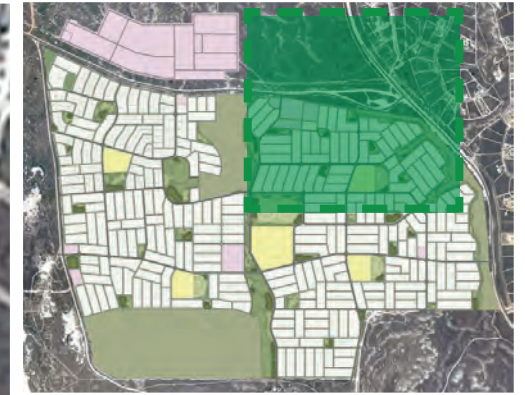
POS 11b

POS 25

POS 9b

LEGEND

- Benches/seating
- Play equipment
- Shade over play
- Shelter & Picnic setting
- Circulation Footpaths
- Native revegetation and tree planting
- Open turf areas
- Drinking fountain
- Bin



Location Plan - Not to Scale



POS 26b

POS 19b

POS 19a

POS 24

POS 8

POS 12b-1

Lancelin South - Landscape Master Plan

POS 9a-2

POS 1b

POS 17

POS 18

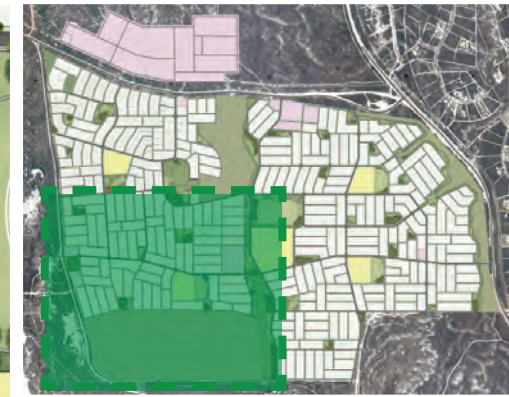
POS 16b

POS 15a

POS 15b

POS 20a

POS 5



Location Plan - Not to Scale

POS 9a-1

POS 14

POS 20b

POS 7a

POS 6

LEGEND



Lancelin South - Landscape Master Plan

POS 12b-3

POS 12a-1

POS 12a-2

POS 13a

POS 3

POS 7b

POS 22

POS 4b



Location Plan - Not to Scale

POS 12b-2

POS 2a

POS 23a

POS 2b

POS 4a

POS 13b

LEGEND

- Benches/seating
- Play equipment
- Shade over play
- Shelter & Picnic setting
- Circulation Footpaths
- Native revegetation and tree planting
- Open turf areas
- Drinking fountain
- Bin