kerosene lane – mandurah road

servicing report

Project No. 15-157

pritchard francis
civil and structural engineering consultants

table of contents

Revision	Description	Author	Date
0	Initial Issue	Effie Fox	10 November 2016

1 Introduction

On behalf of Infield Holdings, Pritchard Francis has completed an engineering services report on Lots 302 Mandurah Road and 309 Kerosene Lane in Baldivis.

The report summarises existing site conditions, geology, topography and site constraints along with sewer, water, stormwater, power, communications and gas services available to the site.

2 Site Conditions

2.1 Locality

This site is located within the City of Rockingham West of the Kwinana Freeway. The 7.1Ha site is bounded by Kerosene Lane to the north, Mandurah Road and Lake Cooloongup to the west and Fifty Road further to the south.

The site is currently partially cleared, with single residences to the west, The National Lifestyle Villages Tuart Lakes Complex to the South, Galati 'Paradiso' estate to the east and 4 individual lots proposed for development by project managers Terranovis to the north east of the subject site.

The subject site is located approximately 6kms south east of the City of Rockingham. Please refer to Appendix One for Locality Plan.

2.2 Geology

Based the Rockingham Geological Survey of Western Australia Chart 1986 the subject site is found to be predominately made up of pale yellowish brown, medium to course grained Tamala limestone and Safety Bay sand. The material properties of this soil include high permeability, low corrosion potential, medium to high slope stability, medium to high ease of excavation and varying bearing capacity. This type of soil is compatible with construction of roads and urbanisation.

On the eastern third of the property the site sand derived from Tamala Limestone. This sand displays physical properties such as high permeability, low corrosion potential, low-medium slope stability, high ease of excavation and a low-medium bearing capacity. This soil is also suitable for construction of roads and urbanisation. Some settlement under foundations can be expected with this type of soil.

The risk of actual acid sulphate soils (AASS) and potential acid sulphate soils (PASS) in this site are graded as low to no risk generally occurring at depths greater than 3m.

For Geological Survey and Acid Sulphate Soil maps for the site please refer to Appendix Two and Three.

2.3 Topography

Contours provided by the Department of Water Groundwater Atlas show that the site had two ridge lines running north-south across the site and approximately dividing the site into thirds. The western boundary has a very steep section ramping up to a maximum 22.0m AHD at a grade of approximately 6-8%. The second ridge line is not as steep, having a maximum height of 17.0m AHD and only a grade of 4%. The rest of the site is relatively flat with the low point being 9.0m AHD.

Please refer to Appendix Four for 1m Contour Map.

2.4 Groundwater Levels

According to the Department of Water Perth Groundwater Atlas the historical maximum ground water table level for the site is located at between 3.0m and 4.0m AHD with the eastern side of the site closer to the 4.0m maximum water table level.

Please refer to Appendix Five for the Historical Maximum Groundwater Table map.

2.5 Earthworks and Retaining

It is expected that a cut to fill balance (allowing for proof rolling and losses in compaction) will be able to be achieved so the need to import structural fill will be minimal.

As this area is undeveloped, clearing and grubbing will be required as there is dense bushland on the eastern side of the site.

Level sites terraced between retaining walls are proposed for finished earthworks design. This allows for level building lots which reduces the cost of dwelling construction costs.

2.6 2.6 Other Onsite Constraints

Access from Kerosene Lane is not allowed and when constructed, the subdivision will be accessed via the Terranovis managed development to the north, and the Paradiso Estate to the east.

3 Infrastructure

3.1 Stormwater Drainage

Currently, no stormwater infrastructure is located within, or services the subject site.

The sand on the subject site is graded as highly pervious; as such the majority of the rainfall will infiltrate the surface. In an extreme storm event the surface runoff from roads and lots smaller than 300m^2 will be collected and infiltrated on Public Open Space A. Where possible, stormwater will be infiltrated at the source to avoid unnecessary conveyance. Stormwater falling on properties can be infiltrated on site via the use of soakwells due to the pervious nature of the site.

A sketch of the stormwater system concept plan can be found in Appendix Seven.

3.2 Sewerage Reticulation

There are currently no Water Corporation sewers in the immediate vicinity to the subject site. The closest gravity sewers are located approximately 450m to the south east. The sewer to service the site will be extended from the Galati/Paradiso Estate to the east. It is expected that the connection will be approximately 650m long and will need to comply with planning for the area.

Please refer to Appendix Six for concept sketch of proposed sewer servicing for the site.

3.3 Water Reticulation

The nearest existing water main to the subject site, is a Ø250mm pipe located along Mandurah Road approximately 130m to the south of the property, there is also another existing Ø250mm pipe on Kerosene Lane. To connect to this pipe an approximately 1.5km extension will be required from the Paradiso development to the east. Depending on the timing of the development with respect to the Terranovis managed development to the north, it may also be possible to service the site from the north.

Please refer to Appendix Six for concept water reticulation design for the site. Further detailed design and Water Corporation approval will be required.

3.4 Gas Supply

There is a high pressure gas main located approximately 230m south of the subject site boundary along Mandurah road.

Please see Appendix Seven for gas location.

3.5 Electrical Supply

Overhead power is located all along the extents of Mandurah Road and Kerosene Lane on the development site side of the road. It is anticipated that the HV power supply on Kerosene Lane will be able to be connected into the subdivision transformer/switchgear without any further external upgrades.

Please see Appendix Seven for power location.

3.6 Communications

Copper communications are located on site servicing dwellings that are currently there. NBN rollout has not yet commenced in this area.

4 Conclusion

Pritchard Francis has been commissioned by Infield Holdings to undertake a pre-feasibility and engineering services study into Lots 302 Mandurah Road and 309 Kerosene Lane in Baldivis.

Based on our investigations, it is possible to service the site with sewer, water, stormwater, power, communications and gas by extending surrounding infrastructure. Final confirmation of service routes but is subject to detailed design, review and approval from governing bodies and residents.

appendices

appendix one:	locality map
appendix two:	geological survey map
appendix three:	acid sulphate soils map
appendix four:	1m contour map
appendix five:	historical max groundwater level map
appendix six:	proposed sewer and water connection plan
appendix seven:	other services plan

appendix one: locality map

LOCALITY MAP
INFIELD HOLDINGS - MANDURAH RD / KEROSENE LANE

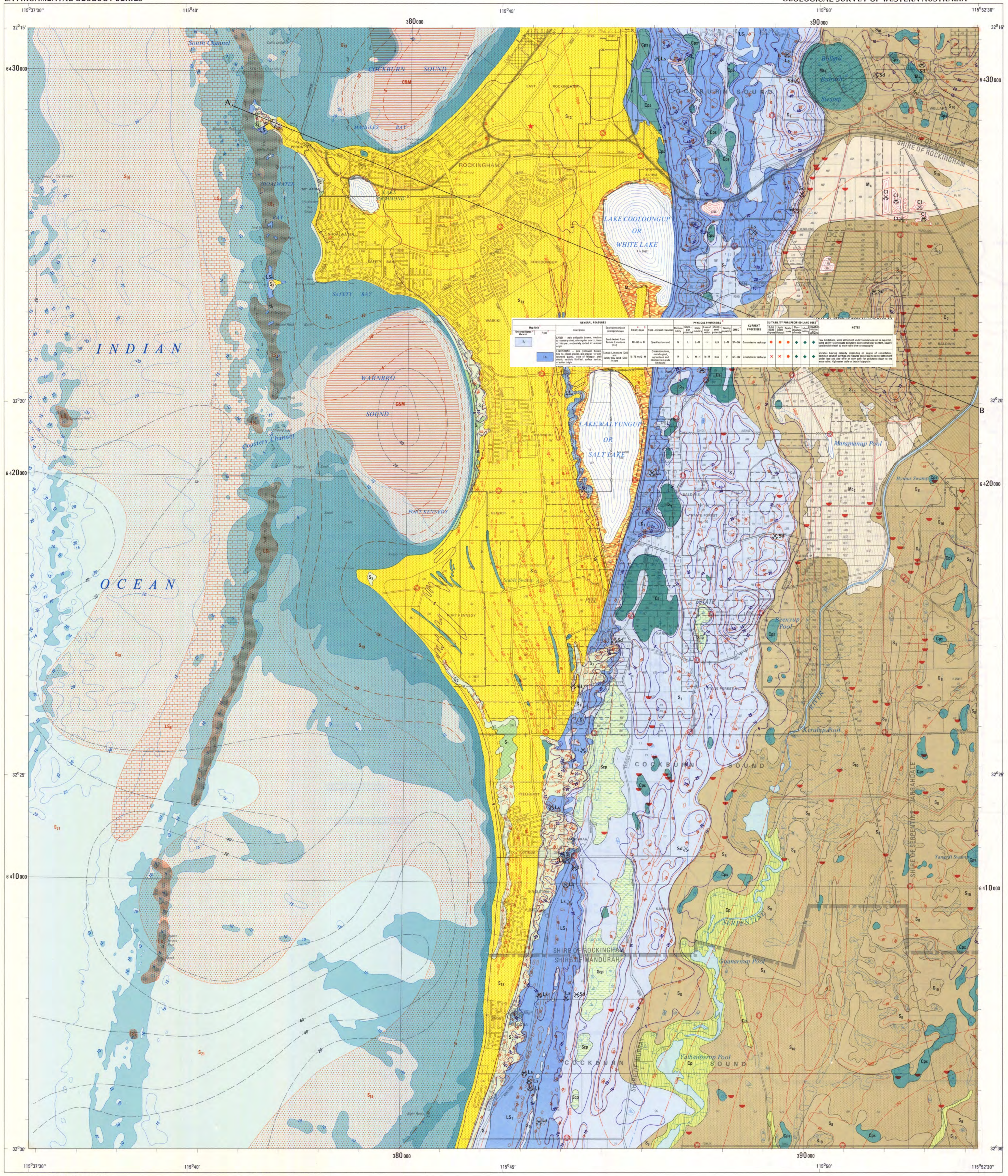
appendix two: geological survey map

ENVIRONMENTAL GEOLOGY SERIES

ROCKINGHAM

GEOLOGICAL SURVEY OF WESTERN AUSTRALIA

PART OF SHEETS 2033 II AND 2033 III



Age	Map Unit: Unconsolidated Material[2]	Map Unit: Rock[2]	Description	Equivalent unit on geological maps	Relief; slope[4,5]	Rock–mineral resources	Permeability	Corrosion potential	Slope stability	Ease of excavation	Shrink-swell potential	Bearing capacity	SMEC[7]	Current processes	Solid waste disposal[8]	Liquid waste disposal	Septic tanks	Construction of roads	Urban location	Excavation (mining and quarrying)	Notes
Cainozoic – Quaternary – Holocene	Cs_1		SANDY CLAY – dark grey[3] to black, firm, variable quartz sand content, occasionally some silt in matrix, of lacustrine origin	Swamp deposits (Qhw)	5 m; F	Diatomite, sand	L	M	L	H	M–H	L	CI–CH	Flooding	×	×	×	○	×	●	High water table, prone to flooding, clayey soils of low bearing capacity
	Cps		PEATY CLAY – dark grey and black, soft, variable organic content, some quartz sand in places, of lacustrine origin	Swamp deposits (Qhw)	5–15 m; F	Peat, diatomite	L	M–H	L	H	M–H	L	OH–CH	Flooding	×	×	×	○	×	●	High water table, prone to flooding, low bearing capacity, differential settlement may occur, most materials are compressible
	Ms_5		SANDY SILT – dark brownish grey silt, with disseminated fine-grained quartz sand, firm, variable clay content, of lacustrine origin	Swamp deposits (Qhw)	6 m; F	Sand, diatomite	L	L–M	L	H	L	L–M	ML	Flooding	×	×	×	○	×	●	High water table, prone to flooding, differential settlement may occur
	Scp		CLAYEY SAND – black, fine to medium-grained quartz sand with clay matrix, variable organic matter, of lacustrine origin	Swamp deposits (Qhw)	3 m; F	Sand	M	L–M	L	H	L	L–M	SW	Flooding	×	×	×	○	×	●	High water table, prdne to flooding, differential settlement of foundations may occur
	S_1		CALCAREOUS SAND – white, fine to medium-grained, sub-rounded quartz and shell debris, of eolian origin	Safety Bay Sand (mobile dunes) (Qhsm)	0–15 m; M	Limesand	H	L–M	L	H	N/A	L	SP–SW	Wind transportation	×	●	◆	×	×	●	Active blowouts and sand sheets, unvegetated, high lime content gives it considerable potential for fixing certain kinds of waste, like dissolved heavy metals, and neutralising acids, low bearing capacity, settlement is common and can be uneven
	S_2		CALCAREOUS SAND – as S_1	Safety Bay Sand (Qhs)	5–40 m; M–S	Limesand	H	L–M	L	H	N/A	L	SP–SW	Wind transportation	◆	●	◆	◉	×	×	Moderate to steep slopes, very susceptible to remobilisation where the sparse vegetation is removed, high lime content gives it considerable potential for fixing certain kinds of waste, like dissolved heavy metals, and neutralising acids, low bearing capacity, settlement is common and can be uneven
		LS_6	LIMESTONE – pale yellowish brown, weakly cemented, friable, medium-grained, sub-rounded quartz and shell debris, of eolian origin	Safety Bay Sand (Qhs)	5–20 m; M–S	Limesand	H	L–M	M	H	N/A	L–M	SP–SW	Wind transportation	×	●	◆	◉	×	×	Generally linear features with moderate to steep slopes, susceptible to remobilisation, low bearing capacity generally
	S_{13}		CALCAREOUS SAND – white, medium-grained, rounded quartz and shell debris, well sorted, of eolian origin	Safety Bay Sand (Qhs)	0–10 m; F	Limesand	H	L–M	M	H	N/A	L–M	SP	Marine erosion	×	×	◆	◆	◆	●	Low undulating relic foredune topography, variably thick sands overlying LS_1 type limestone at relatively shallow depth, generally high water table, variable bearing capacity dependent on degree of consolidation of sands
	Cp		PEATY CLAY – mid to dark grey, soft, water saturated clay with variable organic content, of alluvial origin	Alluvium (Qha)	0–2 m; F	Clay for brick, pipe and tile manufacture	L	L–M	L	H	L–M	L	CI	Flooding, stream flow, sediment transport	×	×	×	○	×	●	Confined to the lower reaches of the Serpentine River and a small valley in the southeast of the area, high water table, prone to flooding, low bearing capacity
	M_5		CALCAREOUS SILT – dark greyish brown silts and minor clays, shells and shell fragments and limestone are locally common, a recemented limestone is common on some low ridges	Lagoonal deposits (Qhg)	5 m; F	Marl, limestone	L	M	L	H	L	L	ML	Flooding	×	×	×	○	×	●	High water table, prone to flooding, differential settlement may occur
	S_7		SAND – pale yellowish brown, medium to coarse-grained, sub-angular quartz, trace of feldspar, moderately sorted, of residual origin	Sand derived from Tamala Limestone (Qts)	10–60 m; G	Specification sand	M	L	L–M	H	N/A	L–M	SP–SW	Groundwater recharge	●	●	●	◆	◆	◆	Few limitations, some settlement under foundations can be expected, some ability to attenuate pollutants due to small clay content, usually considerable depth to water table due to topography
		LS_1	LIMESTONE – pale yellowish brown, fine to coarse-grained, sub-angular to well-rounded quartz, trace of feldspar, shell debris, variably lithified, surface kankar, of eolian origin	Tamala Limestone (Qt) and Safety Bay Sand (Qhs) in part	5–75 m; G–M	Dimension stone, metallurgical, agricultural and construction grade limestone	H	L	M–H	M–H	N/A	V	SP–SW	Groundwater recharge	×	×	●	◆	◆	◆	Variable bearing capacity depending on degree of cementation, common solution cavities and fissures could lead to severe settlement under load and also offer an easy path for pollutants down to the water table. High water table on beach ridge plain
Cainozoic – Quaternary – Pleistocene	S_8		SAND – very light grey at surface, yellow at depth, fine to medium-grained, sub-rounded quartz, moderately well sorted, of eolian origin	Bassendean Sand (Qpb)	5–45 m; G	Construction and glass sand	H	L	L	H	N/A	M–H	SP–SW	Groundwater recharge, some wind transportation	●	×	●	◆	◆	◆	Well drained, when dry and vegetation free it could be remobilised, drainage disposal is only a problem in areas of high water table
	S_{10}		SAND – as S_8 as relatively thin veneer over C_2, M_4 and Mc_2	Thin Bassendean Sand over Guildford Formation (Qpb/Qpa)	5–20 m; F	Construction and glass sand	H	L	L	H	N/A	M–H	SP–SW	Groundwater recharge, some wind transportation	×	×	×	◆	◆	◆	Of variable thickness, the sand's physical properties are modified by the underlying material, generally high water table, prone to flooding in part
	C_2		CLAY – strong brown and dark grey clay, plastic in places, soft when wet, variable silt content in matrix, of alluvial origin	Guildford Formation (Qpa)	2–10 m; F	Clays for brick, pipe and tile manufacture	L	L	L–M	H	L–M	L–M	CI	Flooding, stream flow, sediment transport	×	×	×	◆	⊗	◆	High water table, prone to flooding in part, cohesion and shrinkage vary, alternate wetting and drying may cause swelling and shrinkage, dispersive in places
	M_4		SILT – very pale brown silt, soft when moist, firm when dry, low clay content, of alluvial origin	Guildford Formation (Qpa)	5–8 m; F	Clays for brick, pipe and tile manufacture	L	L	L–M	H	L–M	L–M	ML–MI	Some flooding	×	×	×	◆	⊗	◆	High water table, prone to flooding in part, potential in part for swelling and shrinkage
	Mc_2		CLAYEY SILT – dark greyish brown, mottled in part, soft when wet, plastic in part, blocky, variable clay content, of alluvial origin	Guildford Formation (Qpa)	2–5 m; F	Clays for brick, pipe and tile manufacture	L	L	L	H	L	L–M	ML	Some flooding	×	×	×	◆	×	◆	High water table, prone to flooding in part, some settlement of foundations may occur

REFERENCES

1 See Lithological Classification

2 The terms unconsolidated material and rock are used in the sense of the engineering terms "soil" and "rock"

3 Colours were derived from Standard Soil Colour Charts, notation omitted

4 Maximum and minimum elevation of the unit with respect to Australian Height Datum

5 Slopes expressed qualitatively
F–flat .... <3°
G–gentle .... 3°–10°
M–moderate ...... 10°–20°
S–steep .... >20°
The dominant slope of each unit is given

6 H .... high
M .... moderate
L .... low
V .... variable
N/A .... not applicable
Properties vary with degree of weathering

7 Snowy Mountains Engineering Corporation Soil Classification which describes soils in terms of grain size, grading characteristics and compressibility
For rocks the symbols refer to the weathered products

8 × activity undesirable for the environment
● possible problems for the environment
○ possible problems for the activity
◆ activity compatible with unit

The data contained on this sheet are provided for preliminary studies and are not intended as a substitute for detailed on-site investigation

This map should not be used for navigation purposes

LITHOLOGICAL CLASSIFICATION

UNCONSOLIDATED MATERIAL

A single capital letter denotes the main lithology of the soil unit followed, if required, by lower case letters denoting qualifying lithologies in decreasing order of importance – left to right.

C .... clay
M .... silt
S .... sand
P .... organic material

ROCK

Double capital letters denote lithological symbols of rocks

LS .... limestone

Different mappable units of similar lithologies are shown by the lithological symbol followed by an Arabic number.

SYMBOLS

GEOLOGY
- geological boundary

HYDROGRAPHY
- perennial stream with direction of flow
- seasonal stream with direction of flow
- marsh
- lake
- isohyet (mm), figure on high side of line
- depth to groundwater, metres
- isohaline (mg/l T.D.S.)
- area inundated during floods
- bathymetric contour in metres

BOREHOLES, WELLS AND OTHER WORKS
- observation borehole, Metropolitan Water Authority
- storage reservoir, dam or tank
- solid waste disposal site, active
- drain
- tailing pond, water-filled excavation

MINERAL RESOURCES
- quarry or pit, active
- quarry or pit, inactive
- mineral occurrence
- Cl ..... clay
- Sd ..... sand
- Ls ..... limestone

TOPOCADASTRAL INFORMATION
- road, classification as shown
- railway
- Metropolitan Regional Scheme boundary
- townsite boundary
- local authority boundary
- state forest boundary
- agricultural area boundary
- power line
- contour in metres

The Australian Map Grid covers Australia and the Territories administered by Australia. Zones are 6° wide plus ½° overlap. A.M.G. zones are numbered from zone 47 with central meridian 99°E to zone 58 with central meridian 165°E. The origin of each zone is the intersection of the central meridian with the equator. On this map ticks on the sheet edge represent 1000 metre intervals on the superimposed A.M.G. Zone 50.

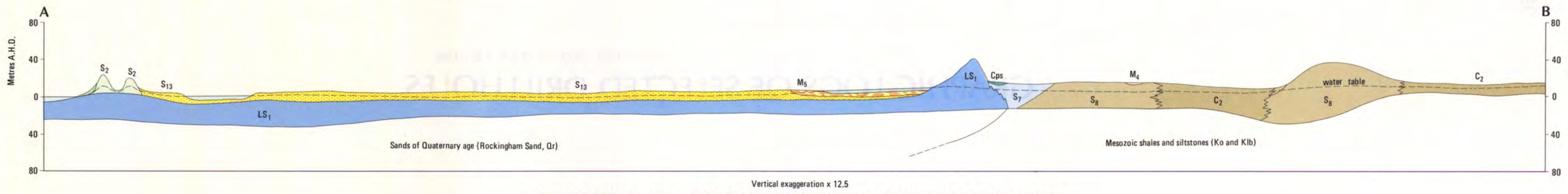
OFFSHORE GEOLOGY

- LS_1 – Submarine reef – limestone, as LS_1 (in main reference)
- S_{13} – BECHER/ROCKINGHAM BANK UNIT: sand – moderately sorted carbonate lithoskels and lithoclasts with minor amounts of quartz, average grain size 0.1 – 0.3 mm (in main reference)
- S_{19} – SHEET UNIT: sand – well sorted, medium-grained carbonate lithoskels and lithoclasts with minor skeletal fragments of molluscs and algae
- C&M – BASIN UNIT – muds and silts – homogenous, calcareous muds and silts predominantly of calcite with a minor proportion of granite, occasional large skeletal fragments of echinoids and pelecypods
- LS_6 – Zone of submerged beach rock: limestone (as LS_1), north trending ridges 3–4 m high, 100–200 m apart, flanked and linked by tabular masses of seaward-sloping beach rocks
- S_{21} – INNER SHELF UNIT: sand – rocky surface of limestone with veneer (2-3m) of well sorted mixed quartz (10-40%) and carbonate sands, generally filling hollows, local variations in clast/skeletal debris can be expected
- –20– Distribution of detrital quartz grains in the superficial sediments (percentage)
- –10– Holocene sediment isopachs (metres)

Searle J.D., 1984. Quantitative modelling, sediment transport system, Perth Sector, Rottnest Shelf. Final report for Project 80/2039, Marine Science and Technologies Grant Scheme, Department of Geology, University of Western Australia.

SCALE 1 : 50 000

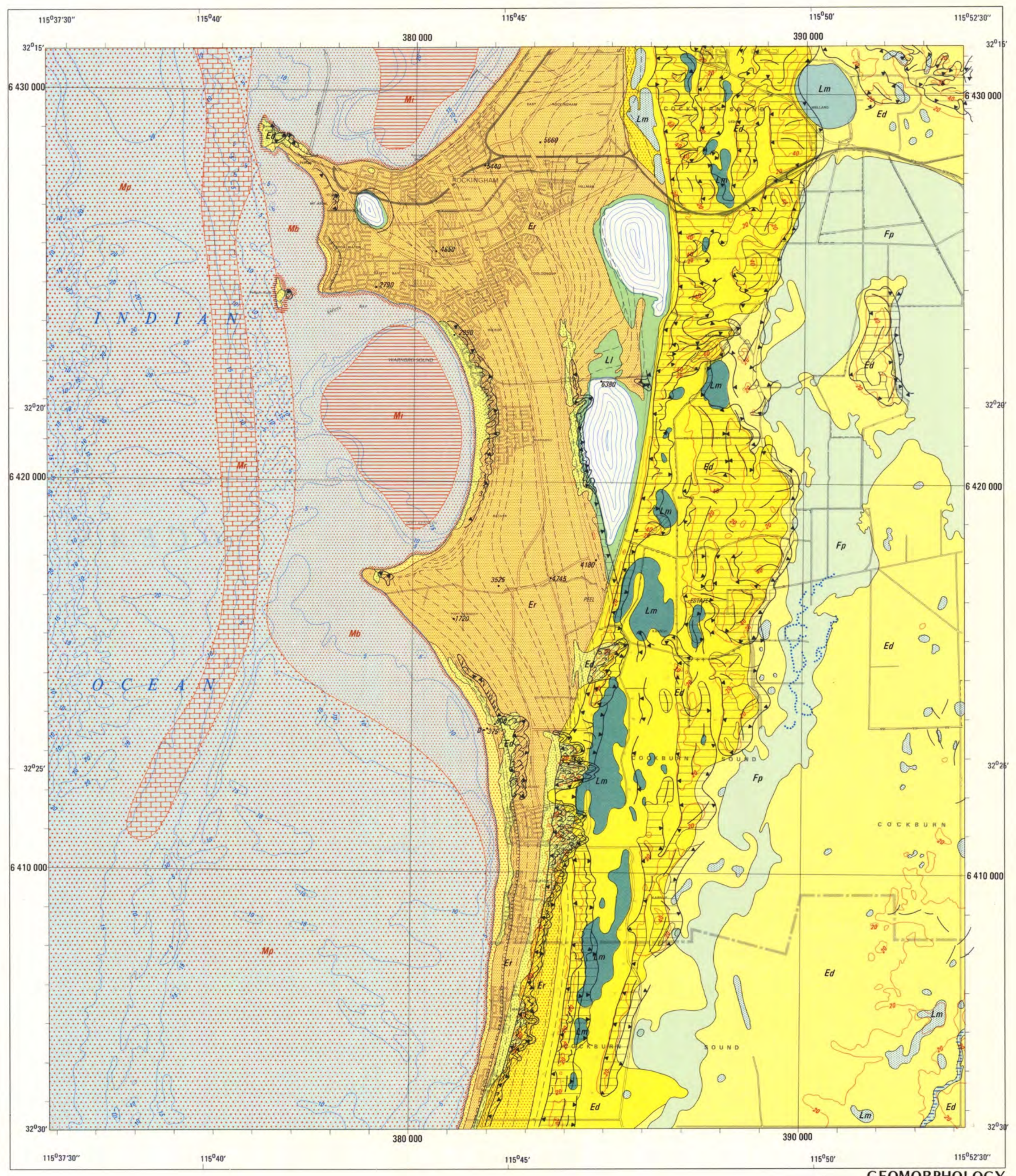
0 1 2 3 4 5 6 KILOMETRES



Vertical exaggeration x 12.5

SCHEMATIC CROSS–SECTION TO SHOW THE RELATIONSHIP OF THE UNITS

INDEX TO SHEETS WITHIN THIS SERIES



GEOMORPHOLOGY

SCALE 1 : 100 000

0 1 2 3 4 5 6 KILOMETRES

GEOMORPHOLOGICAL CLASSIFICATION

- Ed – Parabolic and nested parabolic dunes, Quindalup Dunes
- Er – Relic foredune plain, high level, Holocene
- Er – Relic foredune plain, low level, Holocene
- Er – Relic foredune plain, Pleistocene/Holocene
- Ed – Degraded surface of eolian origin, Spearwood Dunes
- Ed – Degraded surface of eolian origin, Bassendean Dunes
- Lm – Marsh in interbarrier depression, high level
- Lm – Marsh in interbarrier depression, low level
- Lm – Marsh in interdunal swale
- Lm – Marsh on alluvial plain
- Ll – Lagoon
- Fp – Alluvial plain
- Fp – Flood plain
- Mb – Submarine bank
- Mp – Submarine shelf
- Mi – Submarine basin
- Mr – Zone of submerged beach rock
- Lake

The geomorphological classification comprises a single capital letter which denotes the origin of the material and a lower case letter which represents the morphology.

ORIGIN	MORPHOLOGY	
E .... eolian	d .... dune	p .... plain
L .... lacustrine	r .... ridge	i .... interbarrier depression
F .... fluvial	m .... marsh	b .... bank
M .... marine	l .... lagoon	

e.g. Er ...... eolian ridge   Ll ...... lagoon

SLOPES
- 0°–3°
- 3°–10°
- 10°–20°
- 20°–30°

FEATURES
- Prominent ridge
- Sharp convex break of slope
- Sharp concave break of slope
- Oxbow or cutoff channel
- Relic foredune trend lines
- Erosional scarp
- • 5660 Sample site with reported age in years (Woods, Searle, 1983)

Rocky coast with hard cliffs and small sandy beaches. The impact of medium scale dynamic changes and storm patterns is unlikely to alter the shoreline position by any great extent.

Sandy coast. Storm and erosion cycles have the greatest impact on these coasts. Without protection, large scale erosion during stormy years is likely to occur. Once erosion does start there is little to stop it. Preservation of the dunes and their vegetation is important in facilitating recovery following storm onset and beach erosion.

Published by and available from Geological Survey of Western Australia, 66 Adelaide Terrace, Perth. Cartography by the Mapping Branch, Surveys and Mapping Division, Department of Mines. Topographic base from compilations by the Department of Lands and Surveys. Cadastral base from Town Planning Department, Metropolitan Region Scheme Map, 1981. Bathymetry from Public Works Department Hydrographic Series. Printed by Government Printing Office, Perth, 1985.

Bibliographic Reference : Gozzard J.R. 1983 Rockingham part Sheets 2033 III and 2033 II. Perth Metropolitan Region, Environmental Geology Series, Geological Survey of Western Australia.

HON. DAVID PARKER, M.L.A.
MINISTER FOR MINERALS AND ENERGY

A.F. TRENDALL, DIRECTOR, GEOLOGICAL SURVEY

PERTH METROPOLITAN REGION
1 : 50 000 ENVIRONMENTAL GEOLOGY SERIES
ROCKINGHAM
PART OF SHEETS 2033 II AND 2033 III

appendix three: acid sulphate soils map

The acid sulfate soils maps set out in Planning Bulletin No. 64 cover the Swan Coastal Plain and are provided as a guide to the location of acid sulfate soil layers occurring at different depths in this area. They have been prepared on the basis of geological origin, depth to groundwater, and partial 'ground-truthing'.

The maps have been prepared by the Department of Environment and the Department for Planning and Infrastructure on this basis in good faith, exercising all due care and attention. No representation or warranty, expressed or implied, is made as to the relevance, accuracy, completeness or fitness for purposes of these maps in respect of any particular user's circumstances. Users of these maps should satisfy themselves concerning their application to their situation, and where necessary seek expert advice.

The acid sulfate soils maps set out in Planning Bulletin No. 64 will be periodically updated as new information becomes available and the State Government's acid sulfate soil mapping program progresses.

Users should check the Policies and Planning Bulletins page on the Western Australian Planning Commission's website at www.wapc.wa.gov.au to ensure that they have the most up to date version of the mapping.

Alternative versions of this mapping and the associated digital data can be obtained from the Department for Planning and Infrastructure as follows:

Geographic Information Officer

Phone: 08 9264 7827
Fax: 08 9264 7838
Email: mapping@dpi.wa.gov.au

N

0 2 4 6

Kilometres

Produced by Project Mapping Section, Planning Information - Mapping and Spatial, Department for Planning and Infrastructure, on behalf of the Department of Environment and the Western Australian Planning Commission, Perth, W. A. November 2003

ntw-map18\ \plan_imp\plan_reform\acid_sulphate\ maps\Review_Oct03\pmr_south_Oct03.dgn

Cadastral Data supplied by Department of Land Information, Western Australia

LEGEND

- High risk of actual acid sulfate soil (AASS) & potential acid sulfate soil (PASS) <3m from surface
- Moderate to low risk of AASS and PASS occuring generally at depths of >3m
- Low to no risk of AASS and PASS occuring generally at depths of >3m
- Local Government Boundary

WESTERN AUSTRALIAN PLANNING COMMISSION

GDA

COCKBURN SOUND

GARDEN ISLAND

Naval Base

Mandogalup

KWINANA FREEWAY

Wungong

ALBANY HWY

Oakford

Byford

Kwinana

THOMAS ROAD

Medina

Leda

Wellard

Rockingham

READ

Mundijong

MUNDIJONG ROAD

HIGHWAY

STREET

ENNIS

ROAD

Baldivis

WARNBRO SOUND

Warnbro

WARNBRO AVENUE

MANDURAH

SOUTHERN

Jarrahdale

KARNUR ROAD

Serpentine

Port Kennedy

SOUND AVENUE

GREAT

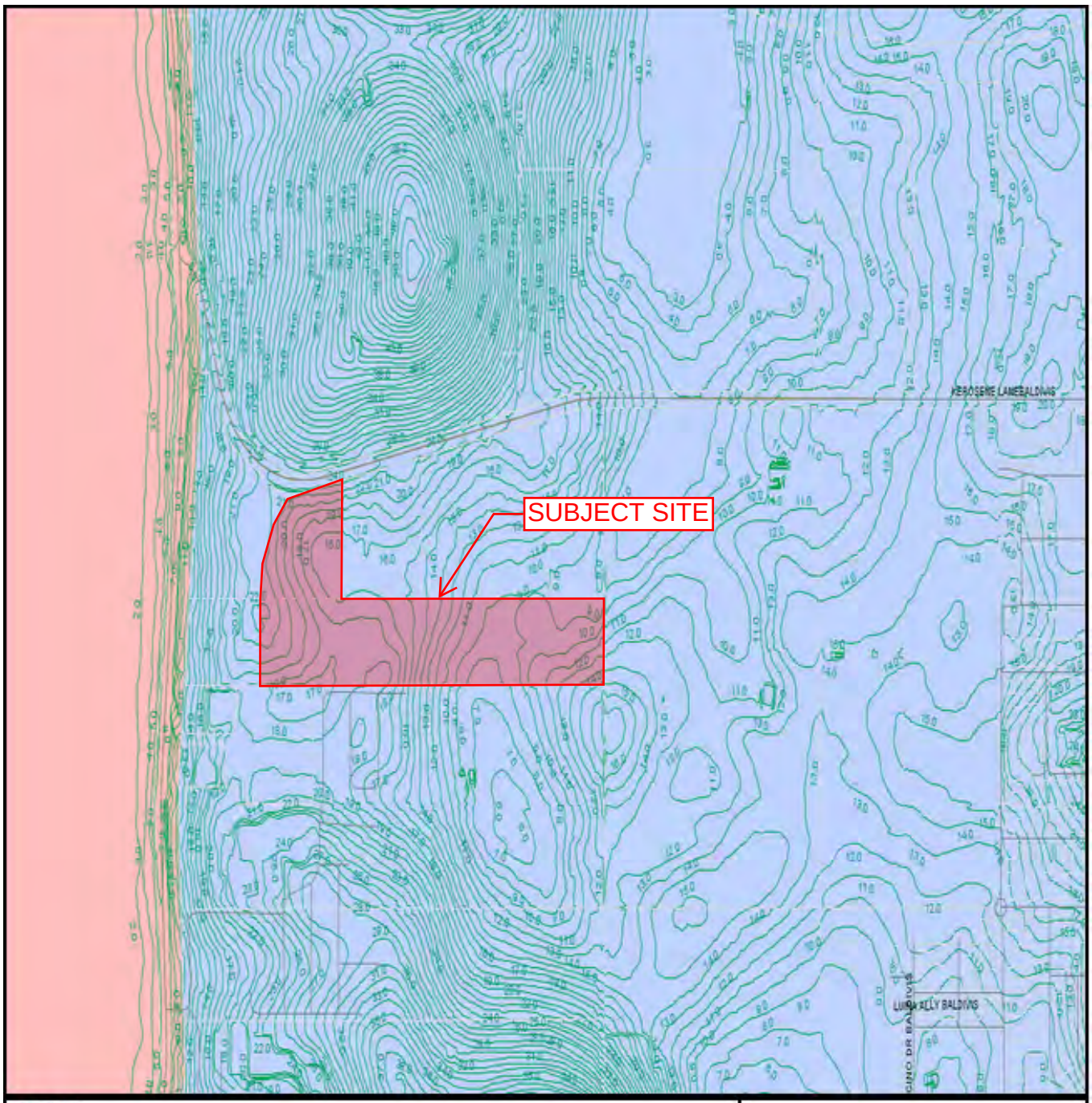
Karnup

Singleton

Planning Bulletin Number 64

Figure 4: South Metropolitan Region Scheme Acid Sulfate Soils

appendix four: 1m contour map



LEGEND

PLANNING AND CADASTRE
Cadastre - DLI
Freehold
Crown Reserve
State Forest
Marine Park
Crown Lease
Lease / Reserve
Lease on State Forest
Lease on Marine Park
Public Roads
Unallocated Crown Land
Water

GEOSCIENTIFIC INFORMATION
Acid Sulfate - DoE
High
Medium
Low
Darling Scarp- DoE
GW contours, May 2003 - DoE
GW contours, Historical max - DoE

GEOSCIENTIFIC INFORMATION
Groundwater Salinity - DoE
TDS Level (mg/L)
0 - 500
500 - 1000
1000 - 1500
1500 - 3000
3000 - 7000
Unknown
Groundwater Risk - DoE
Iron staining risk
Development risk
Low risk
Surface Geology - DoE
Base Superficial Formations - DoE
WIN Groundwater Sites - DoE

ENVIRONMENT
PDWSA - DOE
Policy Use - P1
Policy Use - P2
Policy Use - P3
Policy Use - not assigned

INLAND WATERS
Hydrography - DoE
Geomorphic Wetlands - DoE
Conservation
Resource Enhancement
Multiple Use
No longer a wetland
Not Assessed

ELEVATION
Contours 1m / 5m - DLI

UTILITIES AND COMMS
Drains - WC

TRANSPORTATION
Roads - DLI, GMD

LOCATION
Streetsmart Grid - DLI
Localities - DLI

N

300 m
Approx. when reproduced at A4
Geocentric Datum of Australia 1994

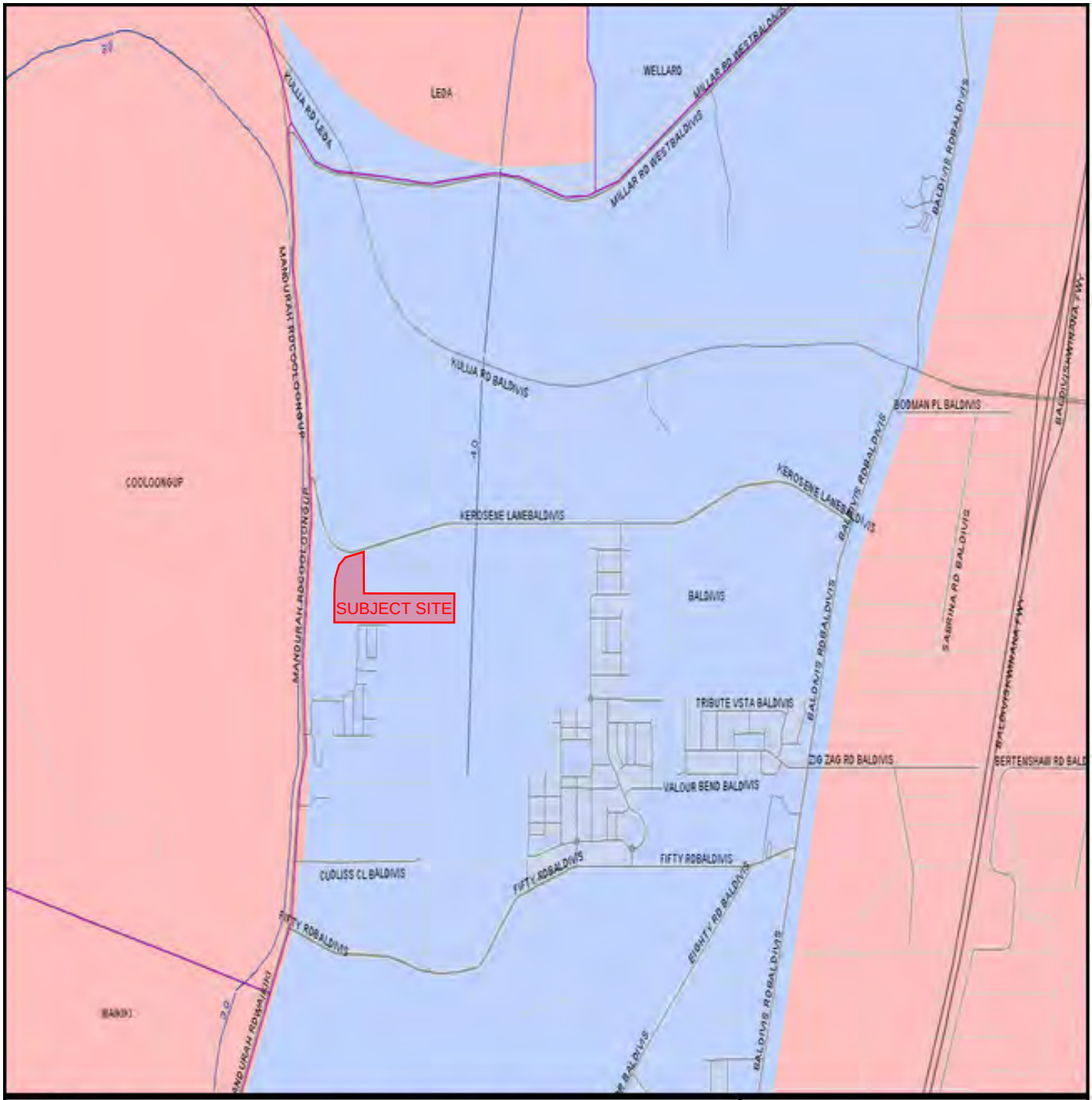
Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.

Created at 10:46 on 13 Jan 2015

Contact: Groundwater Information Line
Phone: (08) 6364 6565
Email: groundwater@water.wa.gov.au

1m CONTOUR CHART

appendix five: historical max groundwater level map



LEGEND

PLANNING AND CADASTRE
Cadastre - DLI
Freehold
Crown Reserve
State Forest
Marine Park
Crown Lease
Lease / Reserve
Lease on State Forest
Lease on Marine Park
Public Roads
Unallocated Crown Land
Water

GEOSCIENTIFIC INFORMATION
Acid Sulfate - DoE
High
Medium
Low
Darling Scarp- DoE
GW contours, May 2003 - DoE
GW contours, Historical max - DoE

GEOSCIENTIFIC INFORMATION
Groundwater Salinity - DoE
TDS Level (mg/L)
0 - 500
500 - 1000
1000 - 1500
1500 - 3000
3000 - 7000
Unknown
Groundwater Risk - DoE
Iron staining risk
Development risk
Low risk
Surface Geology - DoE
Base Superficial Formations - DoE
WIN Groundwater Sites - DoE

ENVIRONMENT
PDWSA - DOE
Policy Use - P1
Policy Use - P2
Policy Use - P3
Policy Use - not assigned

INLAND WATERS
Hydrography - DoE
Geomorphic Wetlands - DoE
Conservation
Resource Enhancement
Multiple Use
No longer a wetland
Not Assessed

ELEVATION
Contours 1m / 5m - DLI

UTILITIES AND COMMS
Drains - WC

TRANSPORTATION
Roads - DLI, GWD

LOCATION
Streetsmart Grid - DLI
Localities - DLI

N

800 m
Approx. when reproduced at A4
Geocentric Datum of Australia 1994

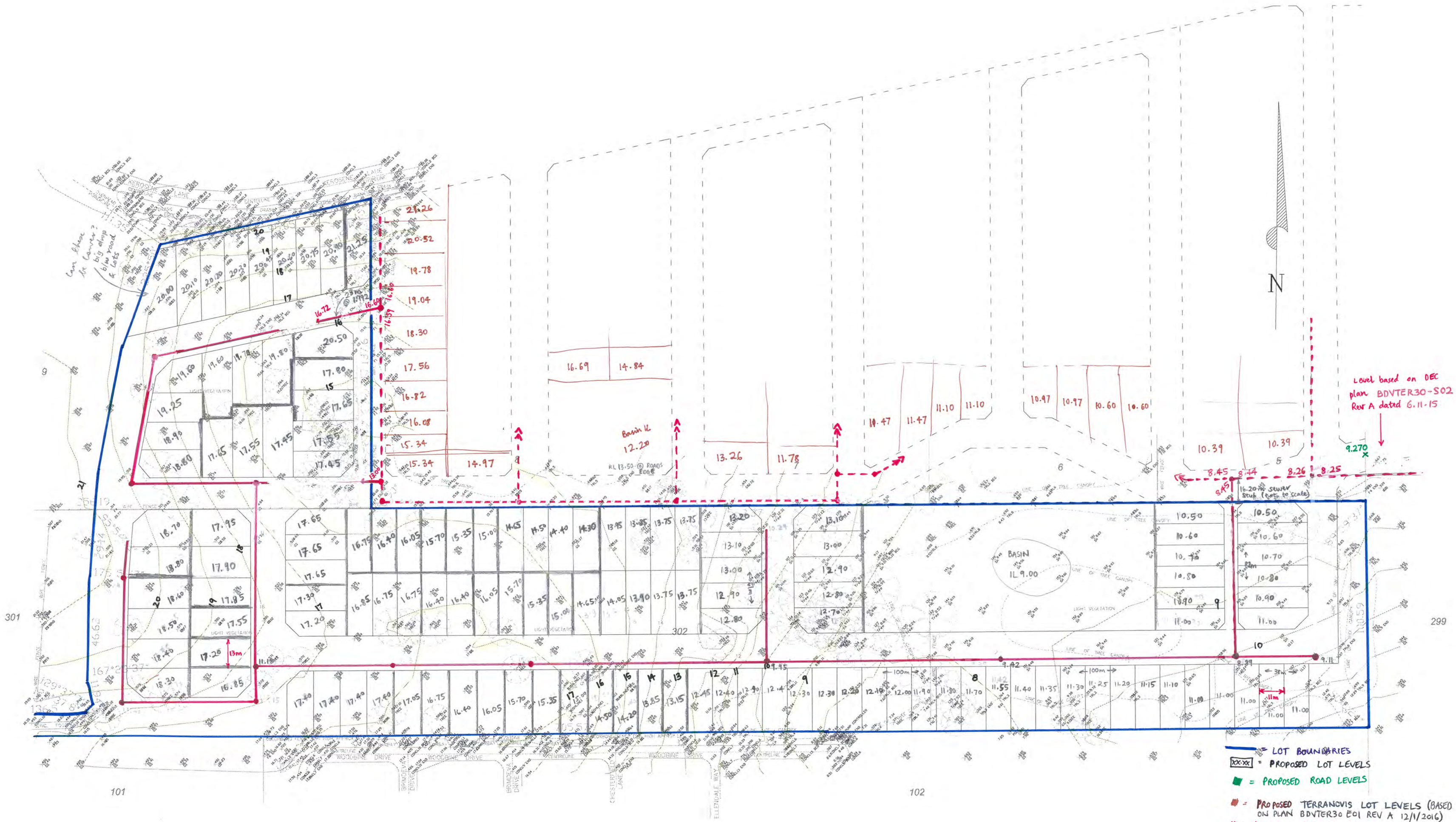
Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.

Created at 10:37 on 13 Jan 2015

Contact: Groundwater Information Line
Phone: (08) 6364 6565
Email: groundwater@water.wa.gov.au

HISTORICAL MAX GROUNDWATER LEVELS

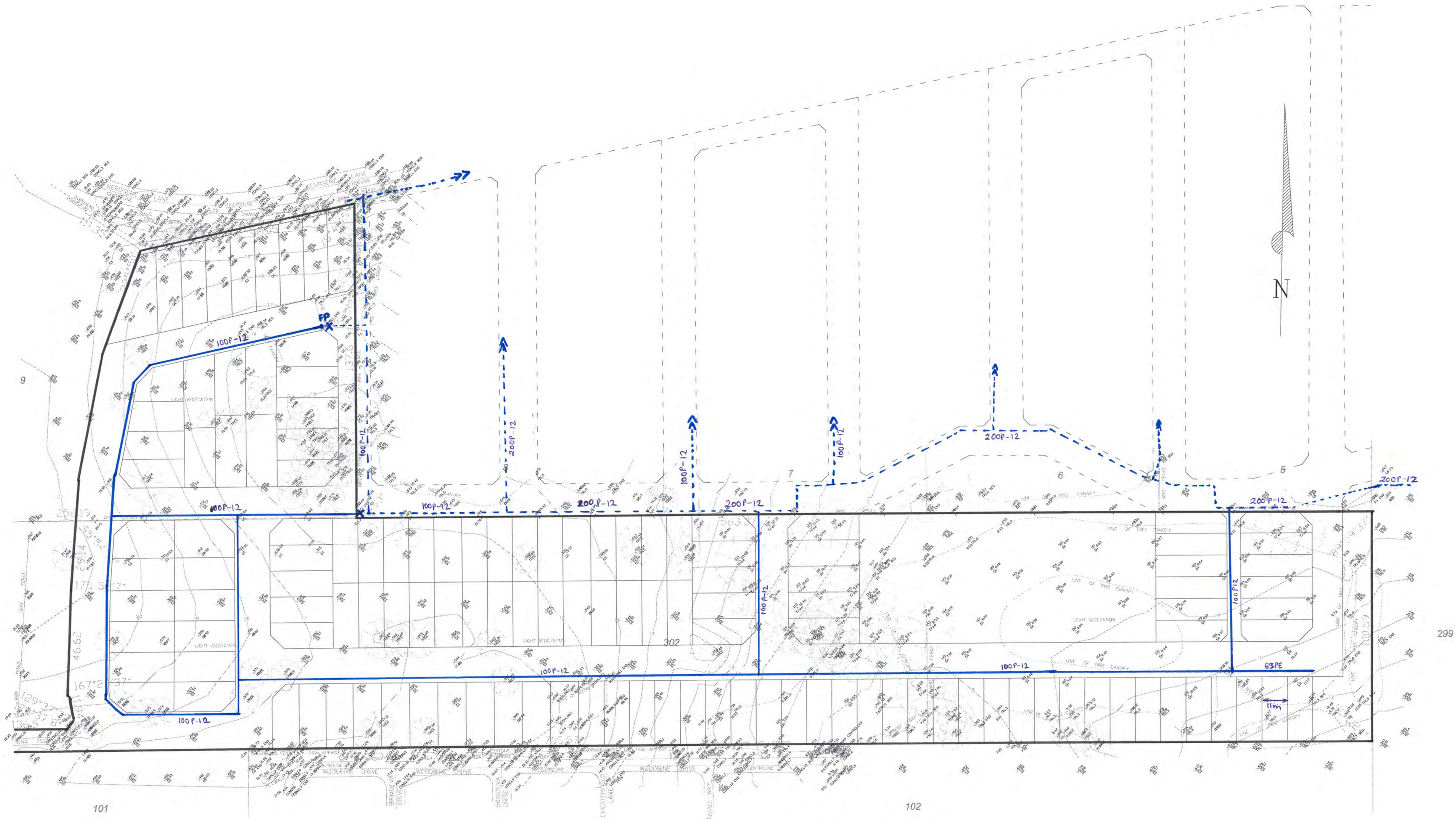
appendix six: proposed sewer and water connection plan



E/WORKS 3
SEWER CONCEPT

LIMITED IN DEPTH TO 60.96 METRES
TOTAL AREA OF LOT 9 IS 3.9887 ha AS PER DIAGRAM 31197
TOTAL AREA OF LOT 302 IS 5.8352 ha AS PER DEPOSITED PLAN 74994
AHD OBTAINED FROM SSM ROCKINGHAM 33A, CHECKED ON SSM ROCKINGHAM 30B

FEATURE SURVEY OF LOTS 9(26) KEROSENE LANE, BALDIVIS & 302(615) MANDURAH ROAD, BALDIVIS	CLIENT: GOLDSPHERE CORPORATION	Site survey only location of boundary pegs or fences in relation to the boundary is not guaranteed
SCALE: 1:1250@A2 DIAGRAM: 31197 & DEPOSITED PLAN: 74994	C/T: 1513/61 & 2674/250 LOCAL AUTHORITY: CITY OF ROCKINGHAM	
TUSCOM SUBDIVISION CONSULTANTS Pty. Ltd. (08 9316 8388) DATE: 10/7/2015 DATUM: AHD PROJECTION: PCG94 CHECKED: AW		SURVEYOR: CY DRAWN: CY



LIMITED IN DEPTH TO 60.96 METRES
TOTAL AREA OF LOT 9 IS 3.9887 ha AS PER DIAGRAM 31197
TOTAL AREA OF LOT 302 IS 5.8352 ha AS PER DEPOSITED PLAN 74994
AHD OBTAINED FROM SSM ROCKINGHAM 33A, CHECKED ON SSM ROCKINGHAM 30B

FEATURE SURVEY OF LOTS 9(26) KEROSENE LANE, BALDIVIS & 302(815) MANDURAH ROAD, BALDIVIS — CLIENT: GOLDSPHERE CORPORATION

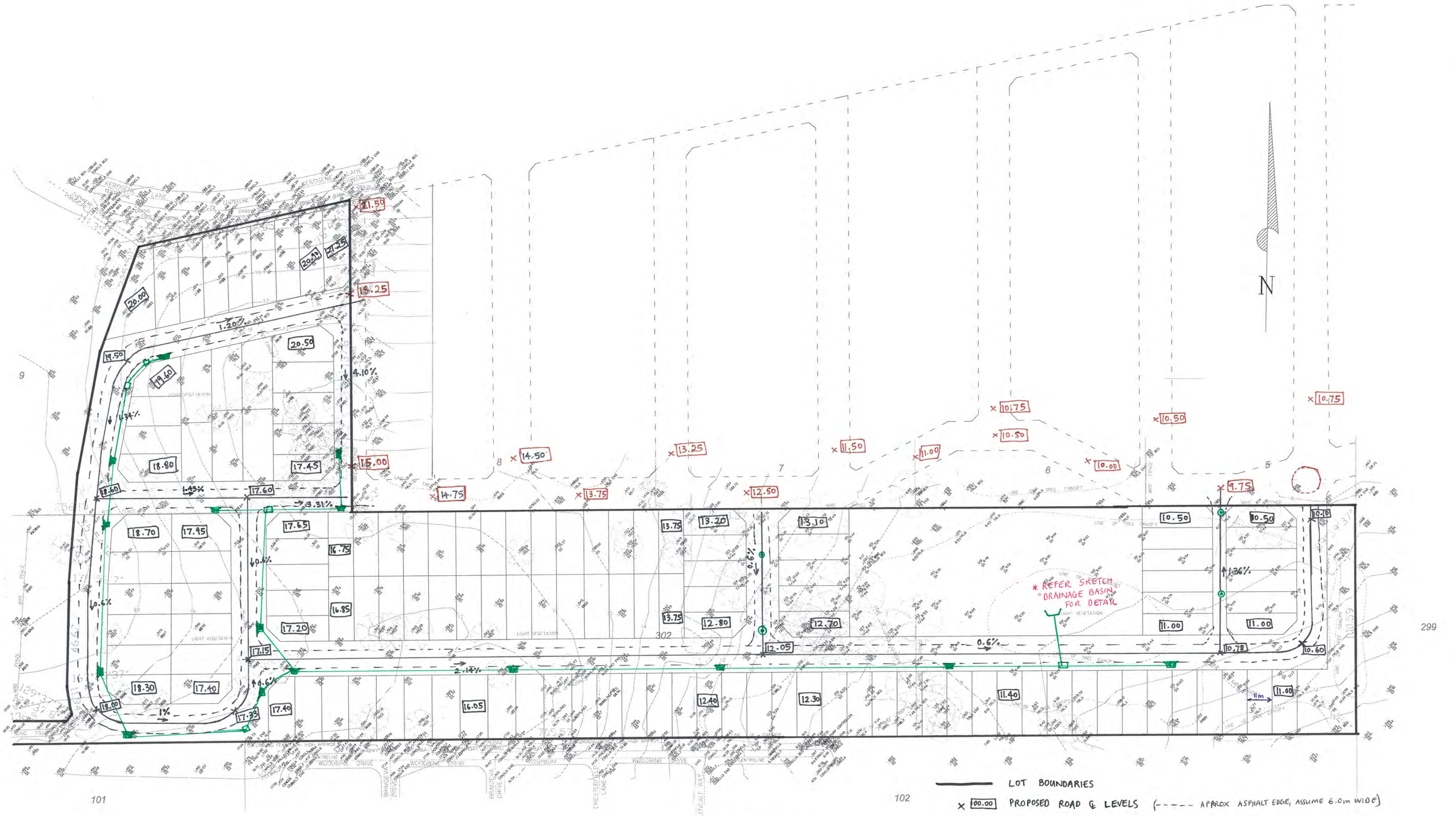
SCALE: 1:1250@A2 — DIAGRAM: 31197 & DEPOSITED PLAN: 74994 — C/T: 1512/61 & 2674/250 — LOCAL AUTHORITY: CITY OF ROCKINGHAM

TUSCOM SUBDIVISION CONSULTANTS Pty. Ltd. (08 9316 8388) — DATE: 10/7/2015 — DATUM: AHD — PROJECTION: PCG94 — CHECKED: AW

site survey only location of buildings pegs or fences in relation to the boundary is not guaranteed

SURVEYOR: CY — DRAWN: CY

appendix seven: other services plan



DRAINAGE CONCEPT & PROPOSED ROAD LEVELS

LIMITED IN DEPTH TO 60.96 METRES
TOTAL AREA OF LOT 9 IS 3.9887 ha AS PER DIAGRAM 31197
TOTAL AREA OF LOT 302 IS 5.8352 ha AS PER DEPOSITED PLAN 74994
AHD OBTAINED FROM SSM ROCKINGHAM 33A, CHECKED ON SSM ROCKINGHAM 30B

FEATURE SURVEY OF LOTS 9(26) KEROSENE LANE, BALDIVIS & 302(815) MANDURAH ROAD, BALDIVIS — CLIENT: GOLDSPHERE CORPORATION

SCALE: 1:1250@A2 — DIAGRAM: 31197 & DEPOSITED PLAN: 74994 — C/T: 1512/61 & 2674/250 — LOCAL AUTHORITY: CITY OF ROCKINGHAM

TUSCOM SUBDIVISION CONSULTANTS Pty. Ltd. (08 9316 8388) — DATE: 10/7/2015 — DATUM: AHD — PROJECTION: PC094 — CHECKED: AW

Site survey only location of boundary pegs or fences in relation to the boundary is not guaranteed

SURVEYOR: CY — DRAWN: CY

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