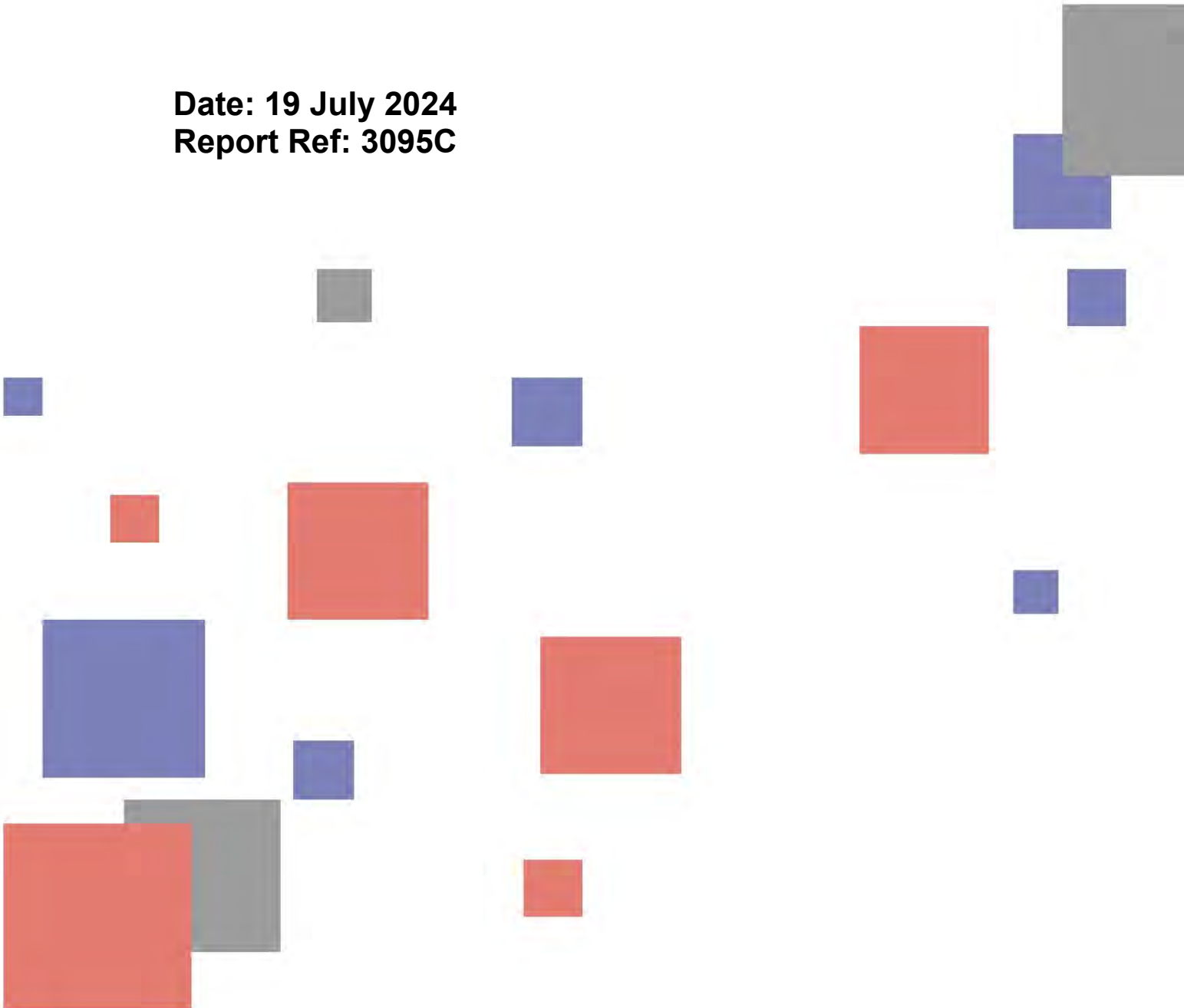


Report

Geotechnical Investigation for Coastal Erosion Vulnerability Assessment.

Onslow, Shire of Ashburton WA.

**Date: 19 July 2024
Report Ref: 3095C**



DOCUMENT HISTORY

DETAILS

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EXECUTIVE SUMMARY

A geotechnical investigation has been carried out as part of a coastal erosion assessment at Onslow in the Shire of Ashburton, Western Australia. During the investigation ground geophysical and intrusive geotechnical testing was conducted within two corridors totalling a 3230m of coastal beach and dune formation adjacent to the Onslow township which has been identified as an at-risk site to coastal inundation as requested by the Shire of Ashburton.

The investigation scope consisted of acquiring multi-channel analysis of surface waves data as a series of specified transects either along-shore (parallel to the coast) or cross-shore (perpendicular to the coast). It should be noted that no aerial drone survey (topographic survey and aerial photogrammetry) was carried out due to the proximity to Onslow Airport.

The acquired MASW dataset was processed for the generation of seismic velocity sections along the transects showing variations in the seismic shear wave velocity of the subsurface material to a target depth of 10-15m below ground level. It should be noted that the seismic velocity sections were not calibrated with CPT data for the Onslow sites. Velocity ranges representing different material types and conditions for the generation of interpreted geological sections were based on other similar sites, consisting of loose to compacted sediment and variably weathered to fresh rock.

The interpreted geological sections have been compiled to develop subsurface models of the level to rock substrate (relative to AHD) and overlying sand thickness within the region between the foreshore and the settlement. This model will be used to assess the potential vulnerability of the site to erosion and future inundation risk, and whether there is a continuous rock barrier located below the ground surface of sufficient strength and height that may prevent the advancement of erosion to the settlement.

The following observations have been made:

- Interpreted rock substrata was observed along all of the transects and within the maximum target investigation depth of 10-15m below ground level.
- Interpreted top of rock substrata on the Onslow North transects ranges from -8.2mAHD to -2.4mAHD and averages approximately -3.3mAHD, and is overlain by an average of 6.4m of variably compacted sediment.
- Interpreted top of rock substrata on the Onslow South transects ranges from -9.6mAHD to -6.6mAHD and averages approximately -0.55mAHD, and is overlain by an average of 2.6m of variably compacted sediment.

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1 INTRODUCTION

At the request of The Government of Western Australia Department of Transport (DoT), GBG Group carried out a geotechnical investigation at Onslow, Shire of Ashburton in June 2024. During the investigation seismic geophysical testing and intrusive geotechnical testing was conducted within two corridors totalling 3230m of coastal beach and dune formation which has been identified as an at-risk site to coastal inundation as requested by the Shire of Ashburton.

The objective of the investigation was to provide detailed mapping of the extent, elevation and consistency/strength of the rock underlying the coastal beach and dune formation. In particular, the key outcome of the investigation was to develop a subsurface model of the level to competent rock substrate (relative to AHD) within the region between the foreshore and the settlement. This model will be used to assess the potential vulnerability of the site to erosion and future inundation risk, and whether there is a continuous rock barrier located below the ground surface of sufficient strength and height that may prevent the advancement of erosion to the settlement.

To achieve the project objectives, data from the following investigation methods was acquired, processed and analysed to obtain the required subsurface information within the anticipated geological conditions:

1. **Geophysical testing** by way of Multi-channel Analysis of Surface Waves (MASW) to obtain seismic shear wave velocity models related to variations in subsurface material stiffness.

2 INVESTIGATION SITE

The investigation was carried out within two corridors of coastal beach and dune formation the extents of which are shown as yellow dashed areas in Figure 1 as follows;

- Onslow South – 1830m section to the east of Onslow Road, from the north of Onslow Airport to the eastern end of Beadon Creek Road.
- Onslow North – 1400m section to the north of Second Avenue and Beadon Creek Road, from Hospital Road to Beadon Creek.

Data was acquired as a series of transects for the seismic geophysical testing and point locations for the intrusive geotechnical testing. These were positioned to best utilise existing roads, tracks, and beach whilst not impacting native vegetation and in order to ensure the most optimal, efficient and economical acquisition methodology. Data was not acquired where surface obstructions were present such as thick vegetation, steep topography or where the beach was inundated with seawater. Photographs showing the typical site conditions are provided in Figures 2 and 3.

Topography at the sites was generally flat to undulating and surface level ranged from -0.66mAHD to 6.57mAHD.



Figure 1: The extent of the geophysical investigation (yellow polygons) at Onslow South and Onslow North. Aerial imagery Google Earth Pro.



Figure 2: Site conditions at Onslow South along Onslow Road (left image) and unsealed foreshore road (right image).



Figure 3: Site conditions at Onslow North including nearshore dune (left image) and along shore (right image).

3 INVESTIGATION METHODOLOGY

3.1 FIELD SURVEY LOGISTICS

Geophysical data acquisition was carried out on 11 to 18 June 2024 by a two-person team from GBG Group consisting of qualified geophysicists. CPT data was not acquired at the Onslow sites as directed by the client. Where required, the site work was carried out under appropriate traffic and pedestrian management commissioned by the Shire of Ashburton.

Prior to the commencement of data acquisition, a site assessment was carried out with representatives from the Shire of Ashburton. Potential concerns and issues including the placement of and access to the MASW transects were addressed and the initial indicative survey plan was adjusted, where necessary.

The site work for the investigation consisted of a total of 8224m of MASW profiling acquired as 10 along-shore transects (parallel to the coast) and 9 cross-shore transects (perpendicular to the coast). Details of the acquired MASW transects are provided in Table 1. The extent of the MASW transects overlaid onto aerial imagery is shown in Appendix A drawings 3095C-01 for Onslow South and 3095C-02 for Onslow North.

Table 1 – Acquired MASW Transects (Coordinates in GDA94, MGA Zone 50).

Transect ID	Orientation	Start Coordinate		End Coordinate		Length (m)
		East	North	East	North	
MASW01	Along-shore	305257.8	7605729	306570.91	7605646.4	1424
MASW02	Along-shore	305254.56	7605667.8	305314.17	7605640	72
MASW03	Along-shore	305319.1	7605612.1	305623	7605464	408
MASW04	Along-shore	305756.94	7605438	306008.1	7605319	336
MASW05	Along-shore	305998.53	7605325.4	306426.1	7605246	472
MASW06	Cross-shore	305439.72	7605559.5	305445.9	7605664	112
MASW07	Cross-shore	305617.5	7605507	305689.27	7605608.8	128
MASW08	Cross-shore	305825.89	7605428	305875	7605583.9	176
MASW09	Cross-shore	306130.83	7605333.1	305988.03	7605598.7	400
MASW10	Cross-shore	306476	7605233	306534.91	7605598.1	408
MASW11	Along-shore	305464.36	7603924.4	306374.1	7604811	1656
MASW12	Along-shore	306371.93	7604735.2	306480.5	7604663	144
MASW13	Along-shore	305256.47	7603988.4	305585.26	7604958.9	1048
MASW14	Along-shore	305876.7	7604907	306338.44	7604815	520
MASW15	Along-shore	306386.4	7604791	306484.93	7604677.1	160
MASW16	Cross-shore	305356.92	7604127	305486.1	7603991	272
MASW17	Cross-shore	305497.8	7604527	305602	7604444.8	144
MASW18	Cross-shore	305580.29	7604858.1	305721.3	7604750	200
MASW19	Cross-shore	305861.4	7604779	305880.72	7604904.3	144

3.2 MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

MASW is a seismic geophysical method that utilises phase and frequency information to calculate Shear wave (S-wave) velocities in vertical layer models averaged over an array of linearly spaced geophones. These 1D models can be laterally stacked to provide 2D cross-sections of S-wave velocity in layers. Under most circumstances it is an indicator of material stiffness and as such the method can be used to provide quantitative results on the compaction of the subsurface material.

MASW data was acquired using a Geode (Geometrics) seismograph connected to a receiver array of 24 geophones set at 1m intervals for a total array length of 23m. The receiver array was mobilised on a land streamer whereby the geophones are mounted on base plates attached to webbing, and either towed behind a 4WD vehicle or manually pulled by the field team. Seismic energy was generated using summed impacts from a PEG-40 (R.T. Clark) vehicle-mounted accelerated weight drop or softened steel sledgehammer with source points made at a constant offset from receiver array. MASW acquisition parameters are provided in Table 2. Photographs of MASW data acquisition are shown in Figure 4.

Table 2 – MASW Acquisition Parameters

Parameter	Value
Number of geophones	24
Geophone spacing	1 m
Array length	23 m
Geophone frequency	4.5 Hz
Record length	1 s
Sample interval	0.25 ms
Source	40kg AWD or 6.35kg sledgehammer
Source offset	4 m
Sounding interval	8m
Source stacks	3

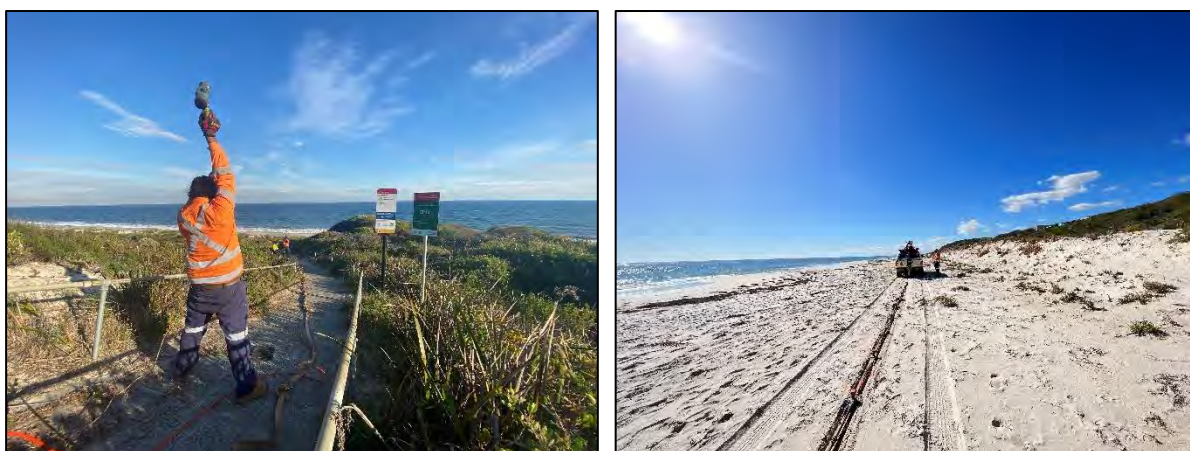


Figure 4: MASW data acquisition using a seismic streamer.

The MASW data was observed to be of high quality with the seismic records having high signal to noise ratio. The generated overtone images plotting phase velocity against frequency showed a prominent dispersion curve of the surface wave component. The MASW data was processed using SurfSeis version 6++ (Kansas Geological Survey, 2017) with the following processing routine:

1. Import acquired seismic data files and apply geometry including geophone spacing, source offset and sounding interval.
2. Generate overtone images giving the percentage intensity of phase velocity versus frequency for each seismic record (Figure 5, left image).
3. Pick the maximum intensity across the useful range of frequencies for each overtone image resulting in a dispersion curve.
4. Run the dispersion curves through a 10-layer inversion algorithm to produce 1D soundings plotting seismic S-wave velocity with depth (Figure 5, right image).

The S-wave velocity soundings were compiled with reference to distance along the transects and gridded with Surfer version 25 (Golden Software, 2023). The resulting contoured cross-sections show the variation in the modelled S-wave velocity of the subsurface material in metres per second laterally along each of the transects and with elevation.

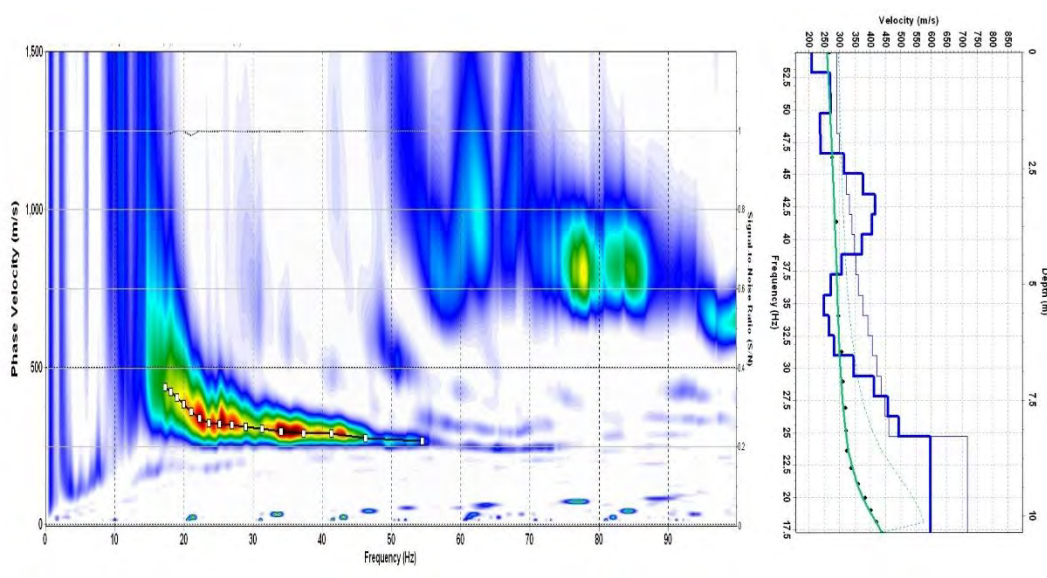


Figure 5: MASW overtone image with high signal to noise ratio and picked dispersion curve.

3.3 SPATIAL POSITIONING

Spatial positioning of the acquired geophysical transects was achieved using Reach RS2 (Emlid) GNSS receivers with a coordinate recorded for each MASW sounding location. Coordinates of the geophysical transects have been provided in GDA94, MGA zone 50 for horizontal component and Australian Height Datum (mAHD) for vertical component. An accuracy of +/-0.2m is expected for both vertical and horizontal components.

A reduced level of 0.0m AHD is considered to be the Mean Sea Level (MSL) for the purpose of this investigation. This relationship for Mean Sea Level was established by the Geoscience Australia Survey in 1971 (<http://www.ga.gov.au/scientific-topics/positioning-navigation/geodesy/datums-projections/australian-height-datum-ahd>).

4 RESULTS AND INTERPRETATION

4.1 PRESENTATION OF RESULTS

The results of the geotechnical investigation at Onslow, Shire of Ashburton are presented in Appendices B and C of this report as follows:

Appendix B – Geophysical and Interpreted Sections

- **3095C-03** - Transect 1 (0-700m) seismic S-wave velocity model and interpreted geological section.
- **3095C-04** - Transect 1 (700-1424m) seismic S-wave velocity model and interpreted geological section.
- **3095C-05** - Transect 2 and Transect 3 seismic S-wave velocity model and interpreted geological section.
- **3095C-06** - Transect 4 seismic S-wave velocity model and interpreted geological section.
- **3095C-07** - Transect 5 seismic S-wave velocity model and interpreted geological section.
- **3095C-08** - Transect 6, Transect 7 and Transect 8 seismic S-wave velocity model and interpreted geological section.
- **3095C-09** - Transect 9 seismic S-wave velocity model and interpreted geological section.
- **3095C-10** - Transect 10 seismic S-wave velocity model and interpreted geological section.
- **3095C-11** - Transect 11 (0-700m) seismic S-wave velocity model and interpreted geological section.
- **3095C-12** - Transect 11 (700-1400m) seismic S-wave velocity model and interpreted geological section.
- **3095C-13** - Transect 11 (1400-1656m) and Transect 12 seismic S-wave velocity model and interpreted geological section.
- **3095C-14** - Transect 13 (0-600m) seismic S-wave velocity model and interpreted geological section.
- **3095C-15** - Transect 13 (600-1048m) seismic S-wave velocity model and interpreted geological section.
- **3095C-16** - Transect 14 and Transect 15 seismic S-wave velocity model and interpreted geological section.

- **3095C-17** - Transect 16 seismic S-wave velocity model and interpreted geological section.
- **3095C-18** - Transect 17, Transect 18 and Transect 19 seismic S-wave velocity model and interpreted geological section.
-

Appendix C – Modelled Level to Surface, Top of Rock and Sand Thickness

- **3095C-19 and 3095C-20.** Contoured modelled level to top of rock north area and Contoured modelled level to top of rock south area.
- **3095C-21 and 3095C-22.** Contoured modelled sand thickness / Depth to Top of Rock north area and Contoured modelled sand thickness / Depth to Top of Rock south area in mBGL.
- **3095C-23 and 3095C-24.** Class post map modelled level to top of rock north area and Class post map modelled level to top of rock South area
- **3095C-25 to 3095C-26.** Class post map modelled sand thickness / Depth to Top of Rock north area and Class post map modelled sand thickness / Depth to Top of Rock south area in mBGL.

4.2 SEISMIC SHEAR WAVE VELOCITY SECTIONS

The seismic S-wave velocity (V_s) sections modelled from the MASW data acquired along the along-shore and cross-shore transects are presented at the top of each drawing in Appendix B. These sections show variations in the modelled V_s as per the colour scale with velocity ranging from 150m/s to 1000m/s representing a wide range of material types and conditions.

Seismic S-wave velocity is governed by the elastic properties of the medium that the wave propagates through as shown in the equation below. In particular, it is primarily a function of soil density, void ratio and effective stress. As such calculated values can provide a useful guide to the subsurface material condition with increasing velocity an indication of increasing material stiffness.

Seismic S-wave velocity

$$V_s = \sqrt{\frac{G}{\rho}}$$

where; G = Shear modulus,
 ρ = In-situ material density

4.3 INTERPRETED GEOLOGICAL SECTIONS

Below the seismic S-wave velocity sections are the interpreted geological sections based on detectable seismic velocity contrasts, however have not been correlated with CPT data. Four classes have been defined representing different subsurface material conditions as follows:

1. **Very low seismic S-wave velocity** ($V_s < 250\text{m/s}$). Representing the lowest seismic velocities modelled during the investigation, this class is interpreted as sediment of low compaction from either the beach or dune formation.
2. **Low seismic S-wave velocity** ($V_s 250\text{-}350\text{m/s}$). This class is interpreted as sediment of moderate compaction due to increased depth of cover on the beach and dune formation, or due to development adjacent to the settlement.
3. **Moderate seismic S-wave velocity** ($V_s 350\text{-}475\text{m/s}$). This class is interpreted as low strength variably weathered rock. Where continuous and at base of the sections it likely represents a transitional zone to stronger, more competent underlying rock. Where present as isolated anomalies within the interpreted sediment, it is likely to represent partially lithified sediment or rock lenses.
4. **Moderate to high seismic wave velocity** ($V_s > 475\text{m/s}$). This class is interpreted as moderate strength slightly weathered to fresh rock. It is typically observed at the base of the sections as competent rock underlying the variably weathered rock.

4.4 CALIBRATION WITH GEOTECHNICAL TESTING AND ROCK MAPPING

No calibration was undertaken with CPTs at the Onslow sites.

4.5 MODELLED LEVEL TO TOP OF ROCK AND SAND THICKNESS

Subsurface models for the level to top of rock substrate and overlying sand thickness within the region between the coastal foreshore and settlement are presented in Appendix C. These have been generated by digitising the interface between the interpreted sediment and underlying rock profile from the interpreted geological sections along the acquired along-shore and cross-shore transects and calibrated with the CPT plots. The modelled sand thickness was then generated by subtracting this from the surface elevation. The sand thickness can also be considered to be the depth to top of rock where rock exists within the depth of investigation. Interpreted rock depths and levels should be analysed in conjunction with interpreted seismic sections in Appendix B. The following subsurface models have been provided:

- **Contoured Level to Top of Rock Substrate** (drawings 3095C-19 and 3095C-20) – this presents the level to the top of rock substrate ranging from -9.6m AHD to 6.6m AHD.
- **Classed Post Map Level to Top of Rock Substrate** (drawing 3095C-23 and 3095C-24) – this presents the level to the top of rock substrate along the acquired transects at 2m level increments from -6m AHD to 6m AHD.
- **Contoured Sand Thickness / Depth to Top of Rock** (drawings 3095C-21 and 3095C-22) – this presents the thickness of sand overlying the rock substrate ranging from 0.3m to 11.4m in thickness which in consequence represents the depth of the top of rock below ground level.

- **Classed Post Map Sand Thickness / Depth to Top of Rock** (drawings 3095C-25 and 3095C-26) – this presents the thickness of sand overlying the rock substrate along the acquired transects and equivalent depth to top of rock at 1m depth increments from 1mBGL to 6mBGL.

The following limitations should be considered when assessing the subsurface models for the level to top of rock substrate and overlying sand thickness:

The expected accuracy of the top of rock substrate modelled from this investigation is +/-0.5mAHD. Similarly, an accuracy of +/-0.5m is expected for the modelled sand thickness over rock. The quoted accuracies have been based on consideration to the accuracy of the GNSS receivers used during the site work, 1D inversion of the MASW dataset using a 10-layer model, and expected undulations in the sand/rock interface. Note the quoted accuracies are only valid along the geophysical transects. Values given between transects have been interpolated in the contour maps and as such the accuracy in this case is indeterminable.

The generated contours will give the general trend of the top of rock profile however will not image local variations when the extent of these is less than transect spacing. Spatially small features such as karst sinkholes or pinnacle features may not be imaged. The significance of this limitation is considered minor for this investigation since although local geological features such as pinnacles may not be represented in the data, the generated surface of the top of rock will show the broad trends in the geology over the site which is suitable for a coastal erosion assessment.

Transition zones including between fresh and weathered rock and between sediment and lithified/partially lithified sediment may be gradational and as such the interface between these layers are not well defined.

The calculated levels to the top of rock will only be valid along the geophysical transects. Values shown on the contour maps not on the transects have been interpolated using the krigging algorithm and as such the accuracy of these levels is indeterminable. The contour surface will give the general trend of the interface however may not image local variations, it is recommended that the interpreted geological sections presented in Appendix B be used to obtain more accurate top of rock levels and overlying sand thickness.

5 PROJECT SUMMARY

A geotechnical investigation has been carried out as part of a coastal erosion assessment at Onslow in the Shire of Ashburton, Western Australia. During the investigation ground geophysical and intrusive geotechnical testing was conducted within two corridors totalling 3230m of coastal beach and dune formation adjacent to the Onslow settlement which has been identified as an at risk site to coastal inundation as requested by the Shire of Ashburton.

The investigation scope consisted of acquiring multi-channel analysis of surface waves data as a series of specified transects either along-shore (parallel to the coast) or cross-shore (perpendicular to the coast).

The acquired MASW dataset was processed for the generation of seismic velocity sections along the transects showing variations in the seismic shear wave velocity of the subsurface material to a target depth of 10-15m below ground level. The seismic velocity sections were not calibrated with CPT data for the Onslow sites. Velocity ranges representing different material types and conditions for the generation of interpreted geological sections were based on other similar sites, consisting of loose to compacted sediment and variably weathered to fresh rock.

The interpreted geological sections have been compiled to develop subsurface models of the level to rock substrate (relative to AHD) and overlying sand thickness/ depth to top of rock within the region between the foreshore and the settlement. This model will be used to assess the potential vulnerability of the site to erosion and future inundation risk, and whether there is a continuous rock barrier located below the ground surface of sufficient strength and height that may prevent the advancement of erosion to the settlement.

The methods used during the investigation are geophysical and as such the results are based on indirect measurements and the processing and interpretation of seismic wave signals not calibrated with intrusive geotechnical testing. The findings in this report represent the professional opinions of the authors, based on experience gained during previous similar investigations.

We trust that this report and the attached drawings provide you with the information required. If you require clarification on any points arising from this investigation, please do not hesitate to contact the undersigned on 08 9354 6300.

For and on behalf of

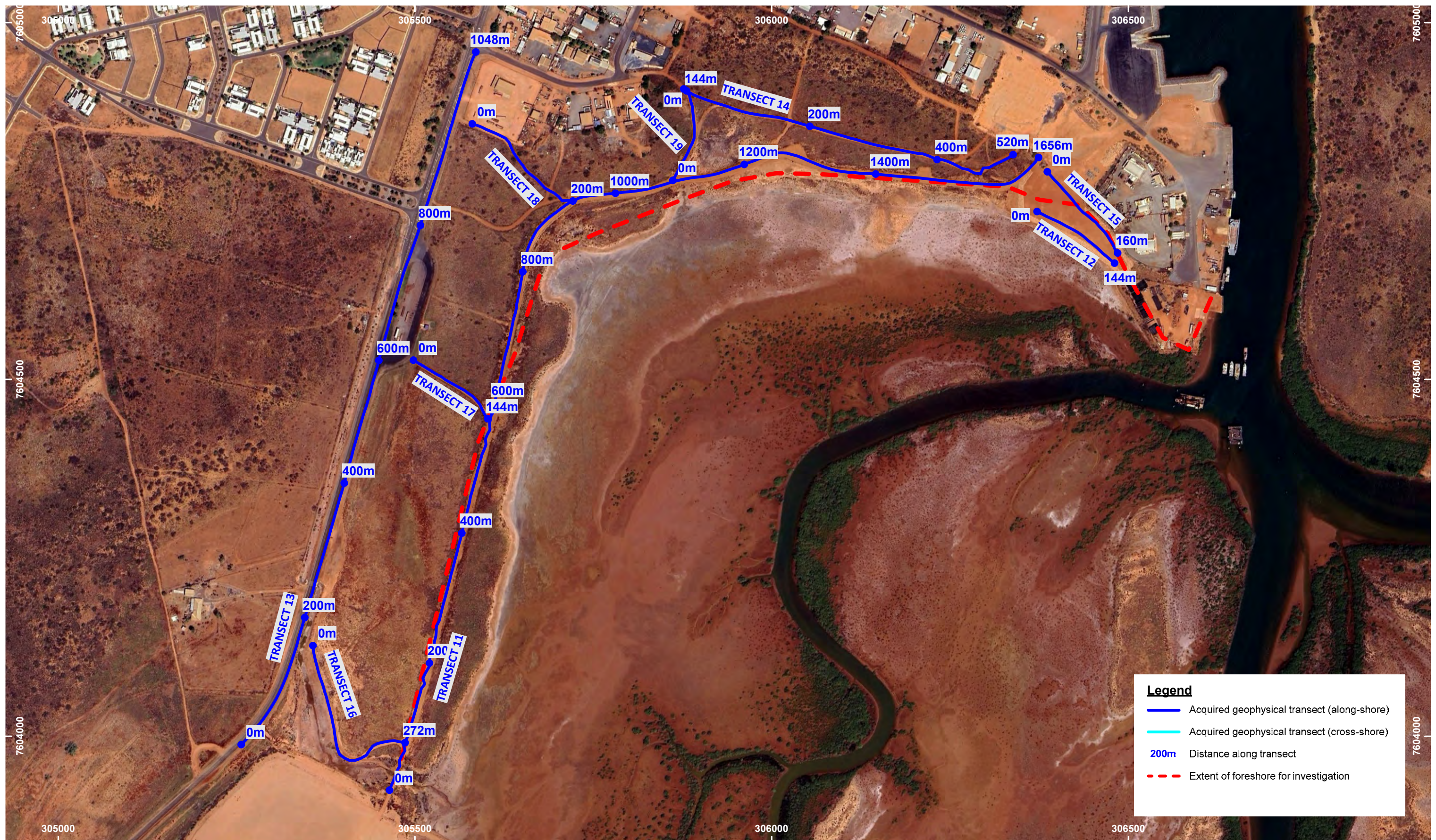
GBG GEOTECHNICS (AUSTRALIA)



PETER ECCLESTON
Senior Geophysicist

APPENDIX A – INVESTIGATION SITE MAP

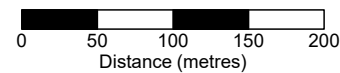
INVESTIGATION SITE MAP (SOUTH)



Legend

- Acquired geophysical transect (along-shore)
- Acquired geophysical transect (cross-shore)
- 200m Distance along transect
- - - Extent of foreshore for investigation

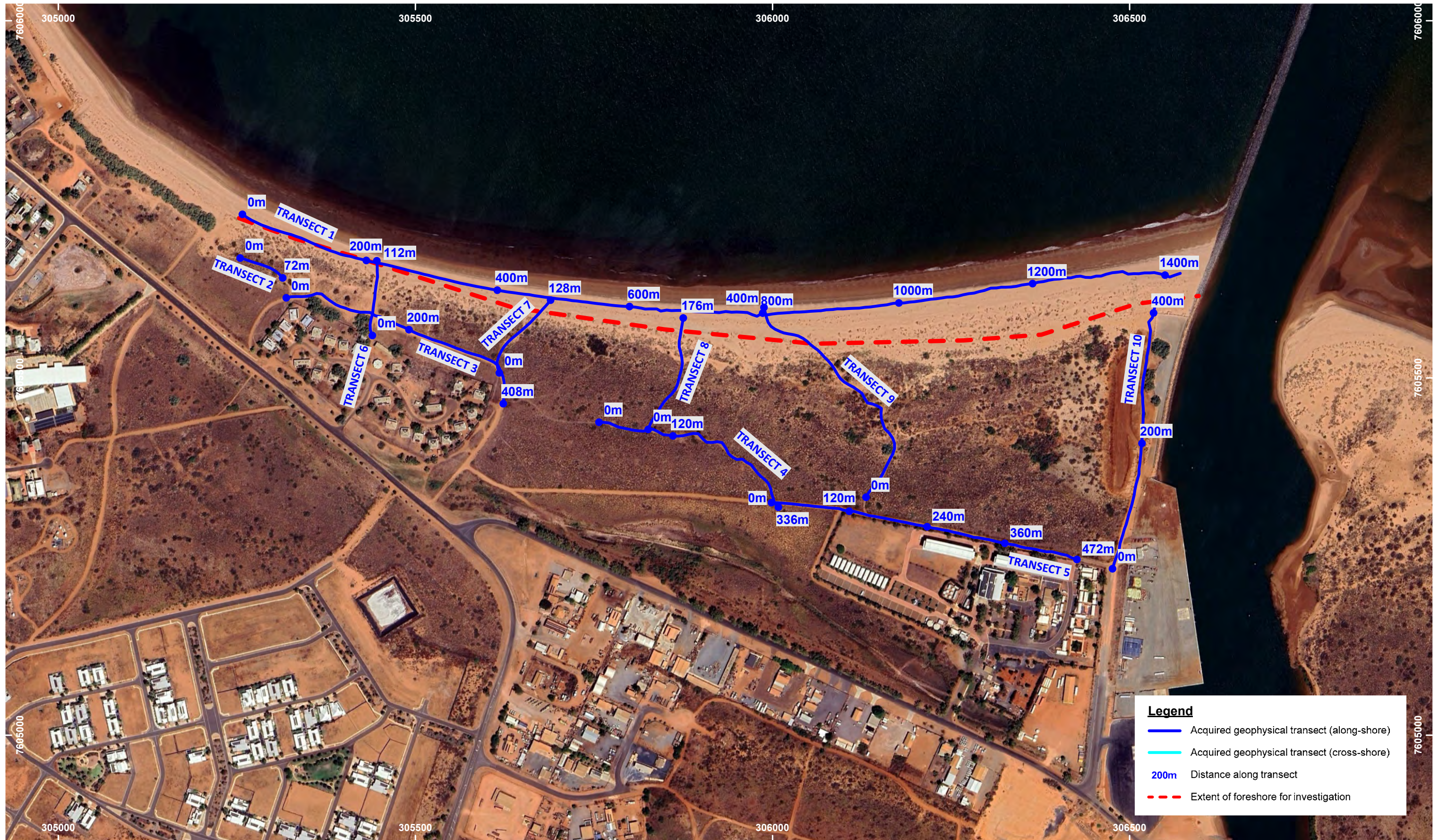
NOTES
Drawing to be used in conjunction with Report 3095C.
Map Projection GDA94 MGA Zone 50.
Aerial image from Google Earth Pro



CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA
	GEOPHYSICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT ONSLow, SHIRE OF ASHBURTON WA

Date	26 September 2023	Paper Size	A3
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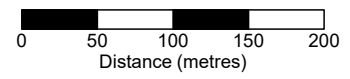
INVESTIGATION SITE MAP (NORTH)



Legend

- Acquired geophysical transect (along-shore)
- Acquired geophysical transect (cross-shore)
- 200m Distance along transect
- - - Extent of foreshore for investigation

NOTES
Drawing to be used in conjunction with Report 3095C.
Map Projection GDA94 MGA Zone 50.
Aerial image from Google Earth Pro

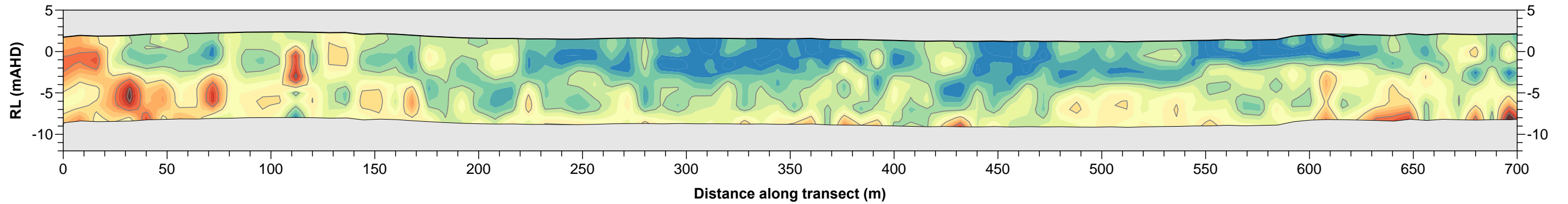


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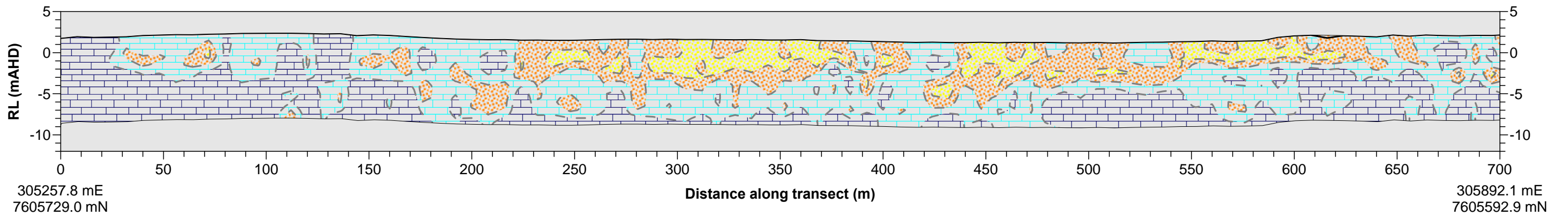
APPENDIX B – GEOPHYSICAL AND INTERPRETED SECTIONS

MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

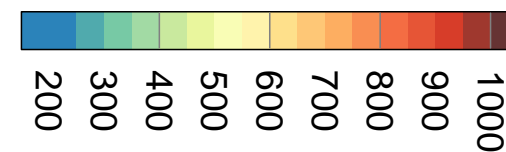
TRANSECT 1 (0-700m) - SEISMIC SHEAR WAVE VELOCITY MODEL



TRANSECT 1 (0-700m) - INTERPRETED GEOLOGICAL SECTION



SEISMIC S-WAVE VELOCITY (m/s)



INTERPRETED MATERIAL TYPE

- SAND - LOW COMPACTION
S-WAVE VELOCITY < 250 m/s
- SAND - MODERATE COMPACTION
S-WAVE VELOCITY 250-350 m/s
- LOW STRENGTH VARIABLY WEATHERED ROCK
S-WAVE VELOCITY 350-475 m/s
- MODERATE STRENGTH COMPETENT ROCK
S-WAVE VELOCITY > 475 m/s.
- 0m AUSTRALIAN HEIGHT DATUM

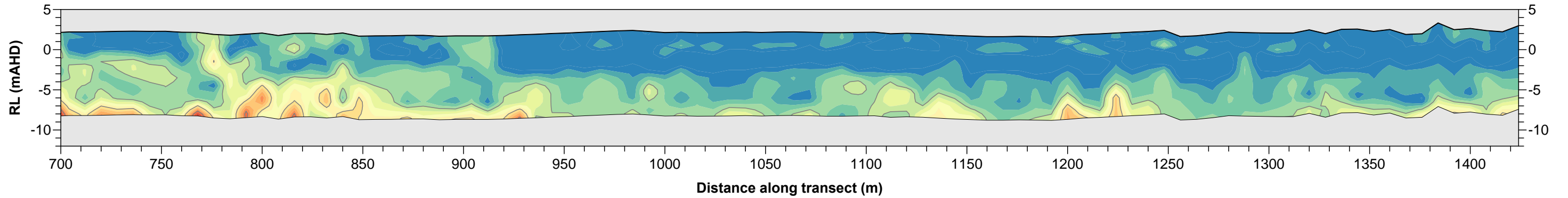
NOTES

Drawing to be used in conjunction with Report 3095B.
Positioning is given in GDA94 zone 50.
Levels are given in Australian Height Datum (AHD).

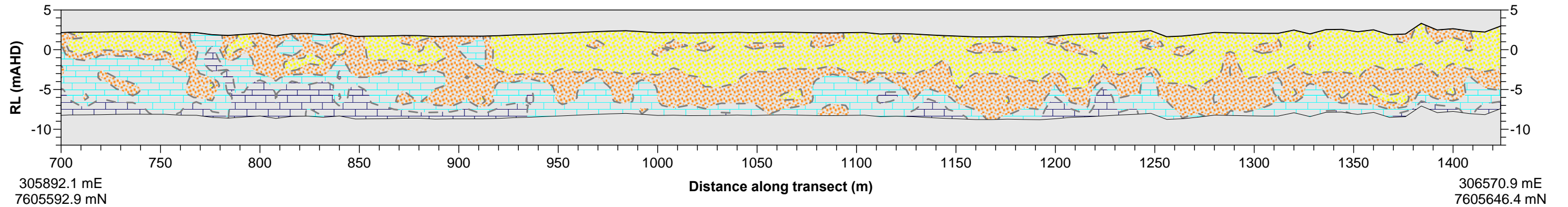
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		Drawing	3095C-03	Revision	0

MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

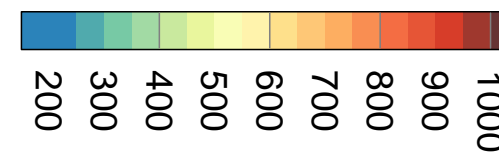
TRANSECT 1 (700-1424m) - SEISMIC SHEAR WAVE VELOCITY MODEL



TRANSECT 1 (700-1424m) - INTERPRETED GEOLOGICAL SECTION



SEISMIC S-WAVE VELOCITY (m/s)



INTERPRETED MATERIAL TYPE

- SAND - LOW COMPACTION
S-WAVE VELOCITY < 250 m/s
- SAND - MODERATE COMPACTION
S-WAVE VELOCITY 250-350 m/s
- LOW STRENGTH VARIABLY WEATHERED ROCK
S-WAVE VELOCITY 350-475 m/s
- MODERATE STRENGTH COMPETENT ROCK
S-WAVE VELOCITY > 475 m/s.
- 0m AUSTRALIAN HEIGHT DATUM

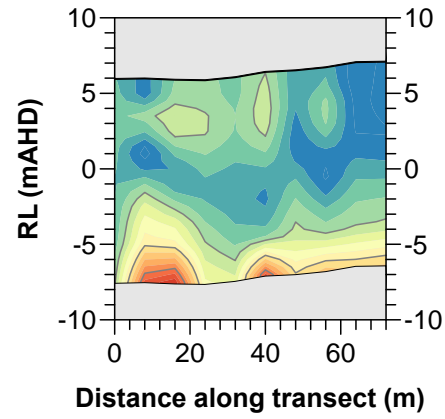
NOTES

Drawing to be used in conjunction with Report 3095B.
Positioning is given in GDA94 zone 50.
Levels are given in Australian Height Datum (AHD).

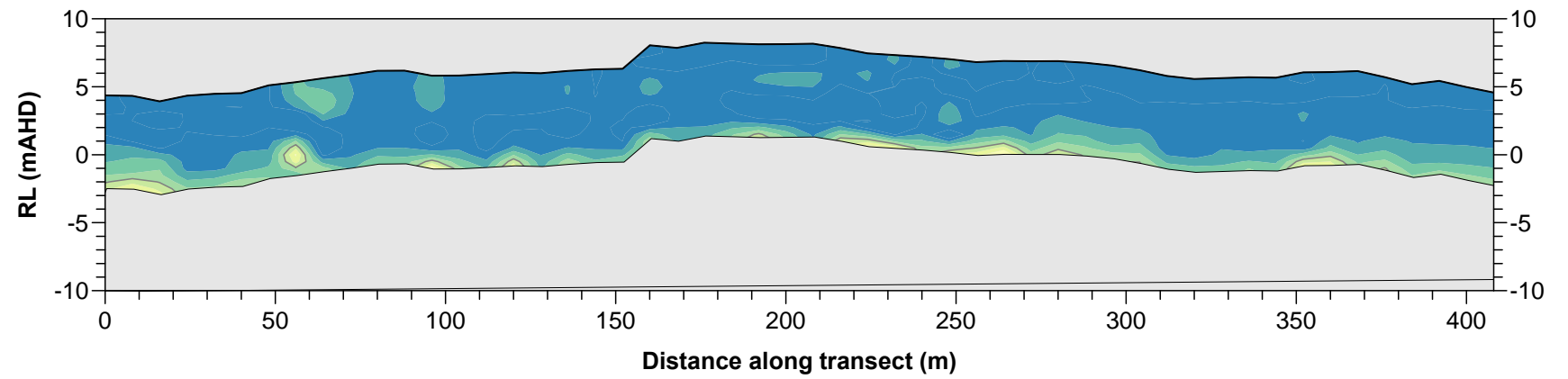
CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA		Date	24 June 2024	Paper Size	A3
	GEOTECHNICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT. ONSLOW, SHIRE OF ASHBURTON WA		Scale	1:2000H, 1:500V	Drawn	QA
			Drawing	3095C-04	Revision	0

MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

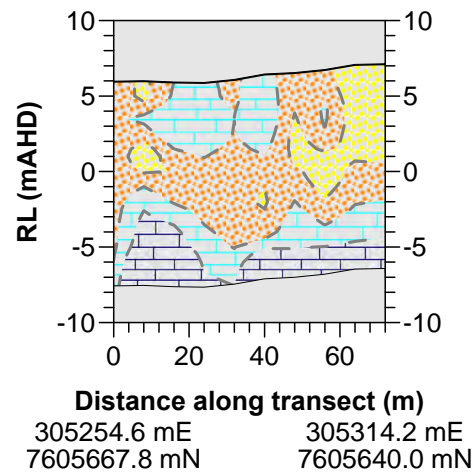
TRANSECT 2 - SEISMIC SHEAR WAVE VELOCITY MODEL



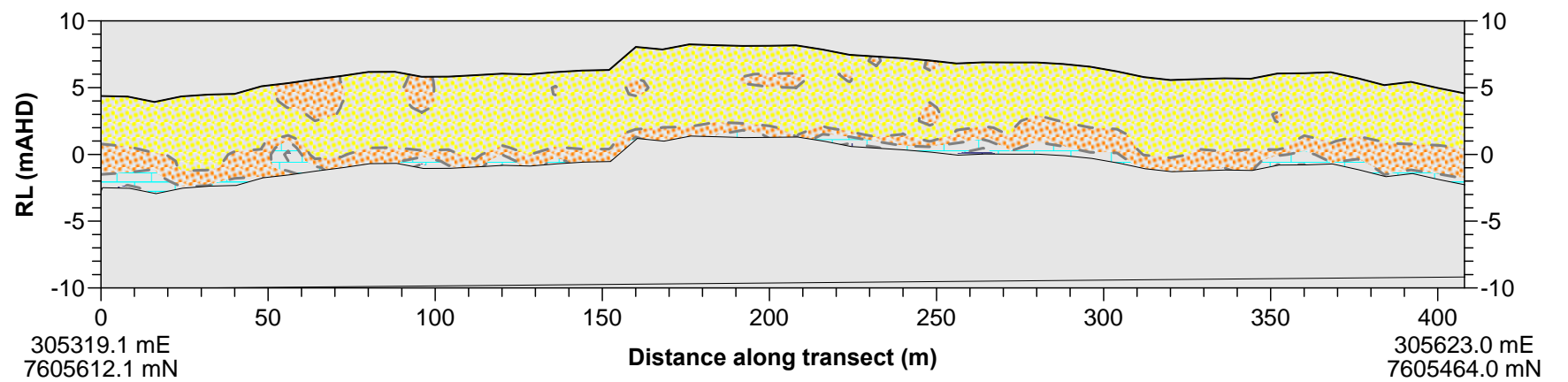
TRANSECT 3 - SEISMIC SHEAR WAVE VELOCITY MODEL



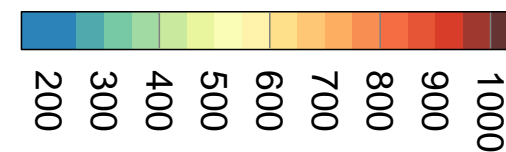
TRANSECT 2 - INTERPRETED GEOLOGICAL SECTION



TRANSECT 3 - INTERPRETED GEOLOGICAL SECTION



SEISMIC S-WAVE VELOCITY (m/s)



INTERPRETED MATERIAL TYPE

- SAND - LOW COMPACTION
S-WAVE VELOCITY < 250 m/s
- SAND - MODERATE COMPACTION
S-WAVE VELOCITY 250-350 m/s
- LOW STRENGTH VARIABLY WEATHERED ROCK
S-WAVE VELOCITY 350-475 m/s
- MODERATE STRENGTH COMPETENT ROCK
S-WAVE VELOCITY > 475 m/s.
- 0m AUSTRALIAN HEIGHT DATUM

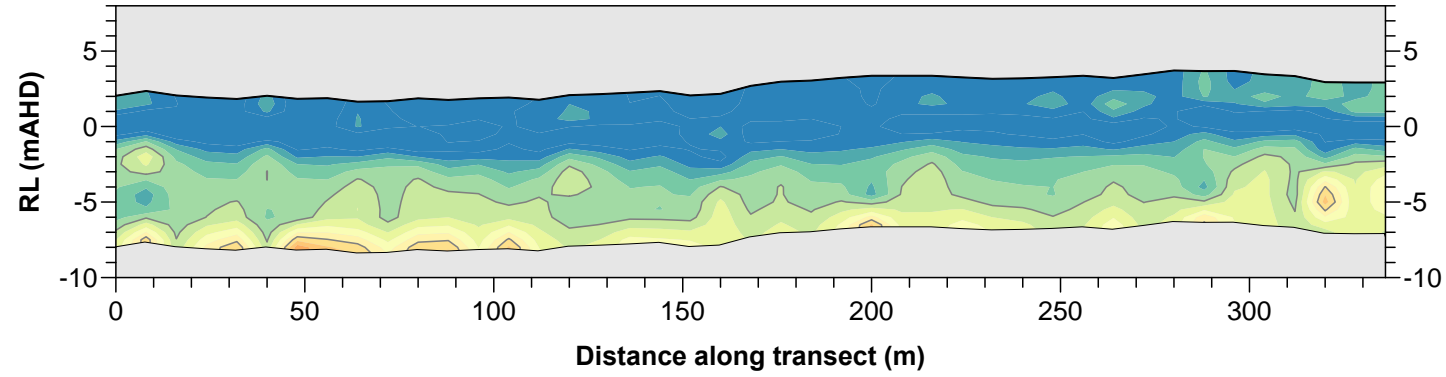
NOTES

Drawing to be used in conjunction with Report 3095B.
Positioning is given in GDA94 zone 50.
Levels are given in Australian Height Datum (AHD).

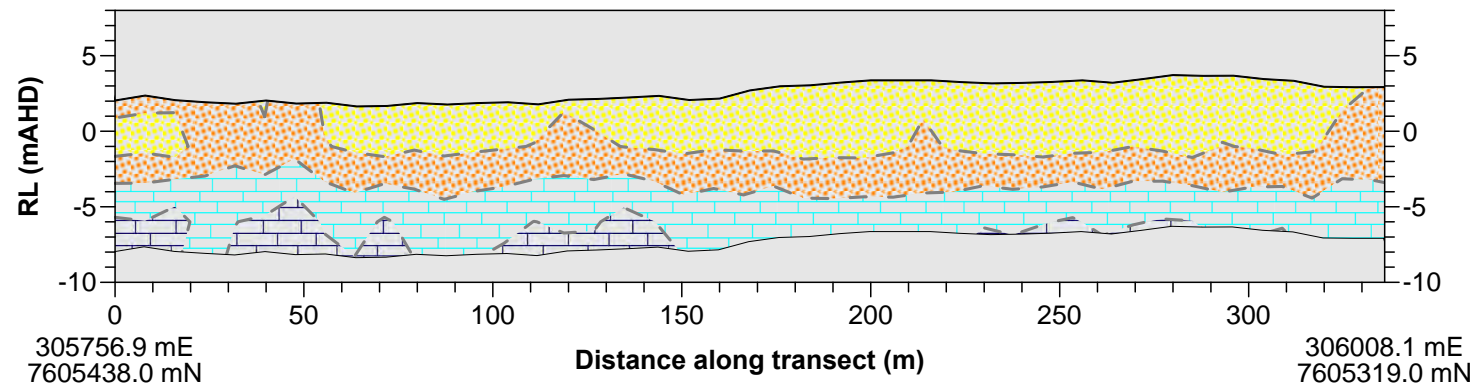
CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA	Date	24 June 2024	Paper Size	A3
	GEOTECHNICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT. ONSLOW, SHIRE OF ASHBURTON WA	Scale	1:2000H, 1:500V	Drawn	QA
		Drawing	3095C-05	Revision	0

MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

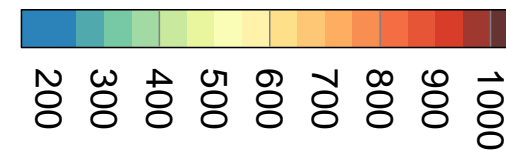
TRANSECT 4 - SEISMIC SHEAR WAVE VELOCITY MODEL



TRANSECT 4 - INTERPRETED GEOLOGICAL SECTION



SEISMIC S-WAVE VELOCITY (m/s)



INTERPRETED MATERIAL TYPE

- SAND - LOW COMPACTION
S-WAVE VELOCITY < 250 m/s
- SAND - MODERATE COMPACTION
S-WAVE VELOCITY 250-350 m/s
- LOW STRENGTH VARIABLY WEATHERED ROCK
S-WAVE VELOCITY 350-475 m/s
- MODERATE STRENGTH COMPETENT ROCK
S-WAVE VELOCITY > 475 m/s.
- 0m AUSTRALIAN HEIGHT DATUM

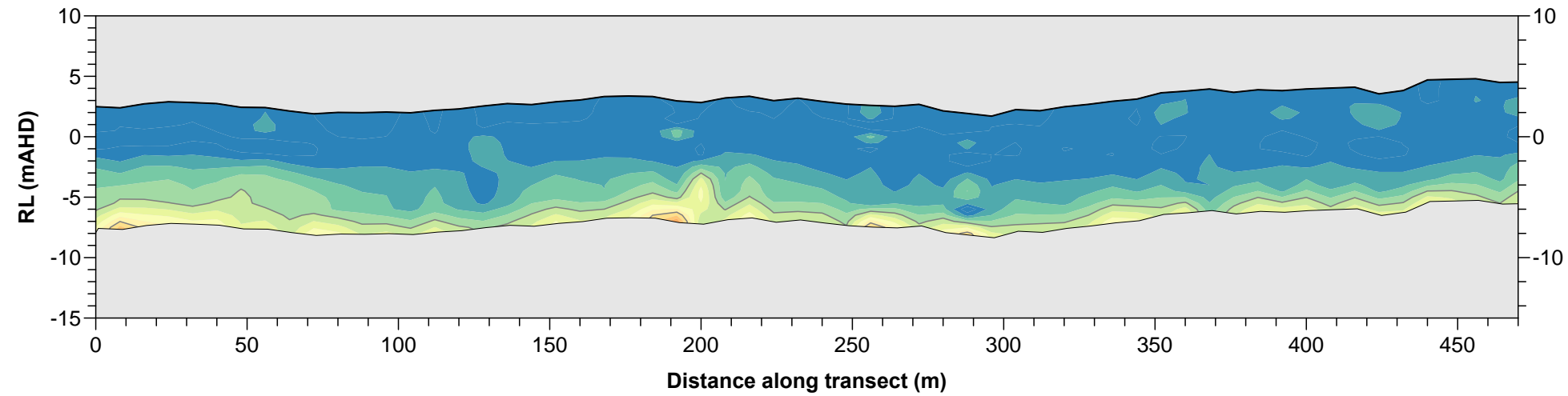
NOTES

Drawing to be used in conjunction with Report 3095B.
Positioning is given in GDA94 zone 50.
Levels are given in Australian Height Datum (AHD).

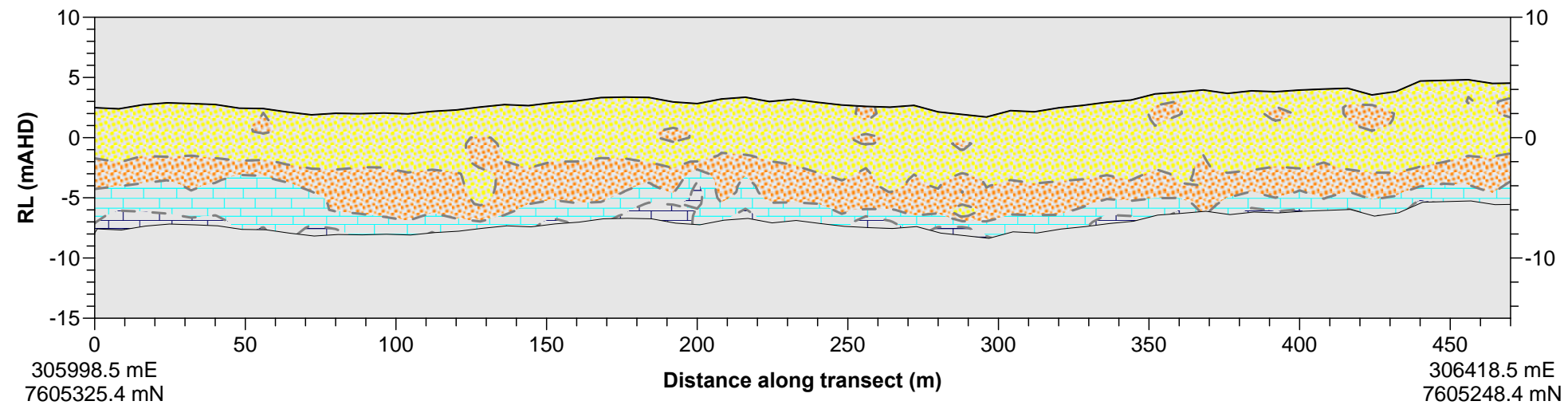
CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA	Date	24 June 2024	Paper Size	A3
	GEOTECHNICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT. ONSLOW, SHIRE OF ASHBURTON WA	Scale	1:2000H, 1:500V	Drawn	QA
		Drawing	3095C-06	Revision	0

MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

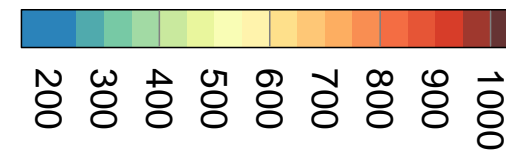
TRANSECT 5 - SEISMIC SHEAR WAVE VELOCITY MODEL



TRANSECT 5 - INTERPRETED GEOLOGICAL SECTION



SEISMIC S-WAVE VELOCITY (m/s)



INTERPRETED MATERIAL TYPE

- SAND - LOW COMPACTION
S-WAVE VELOCITY < 250 m/s
- SAND - MODERATE COMPACTION
S-WAVE VELOCITY 250-350 m/s
- LOW STRENGTH VARIABLY WEATHERED ROCK
S-WAVE VELOCITY 350-475 m/s
- MODERATE STRENGTH COMPETENT ROCK
S-WAVE VELOCITY > 475 m/s.
- 0m AUSTRALIAN HEIGHT DATUM

NOTES
 Drawing to be used in conjunction with Report 3095B.
 Positioning is given in GDA94 zone 50.
 Levels are given in Australian Height Datum (AHD).

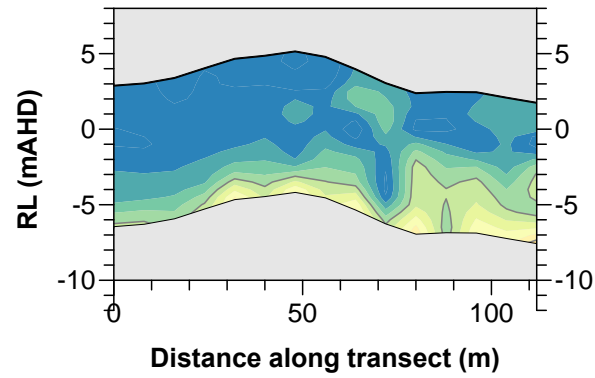
CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA
	GEOTECHNICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT. ONSLOW, SHIRE OF ASHBURTON WA

Date	24 June 2024
Scale	1:2000H, 1:500V
Drawing	3095C-07

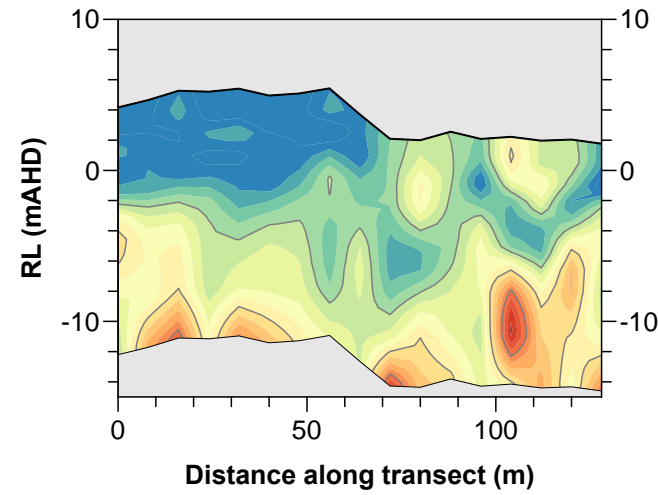
Paper Size	A3
Drawn	QA
Revision	0

MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

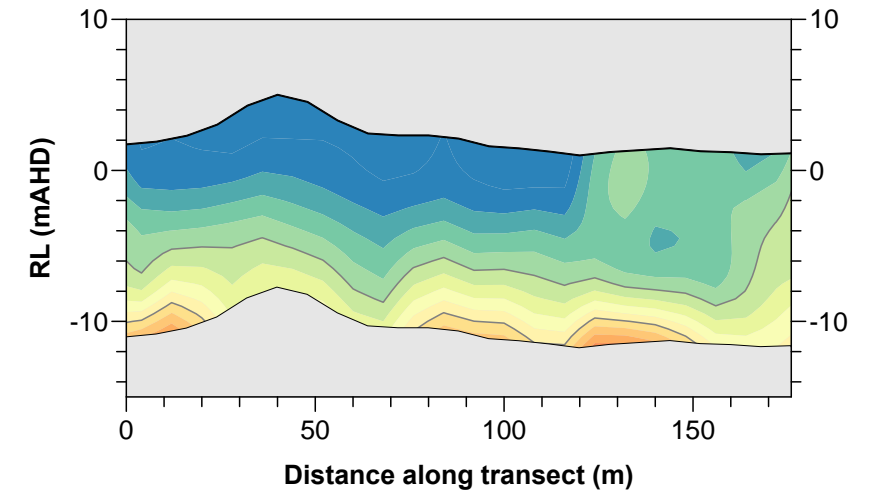
TRANSECT 6 - SEISMIC SHEAR WAVE VELOCITY MODEL



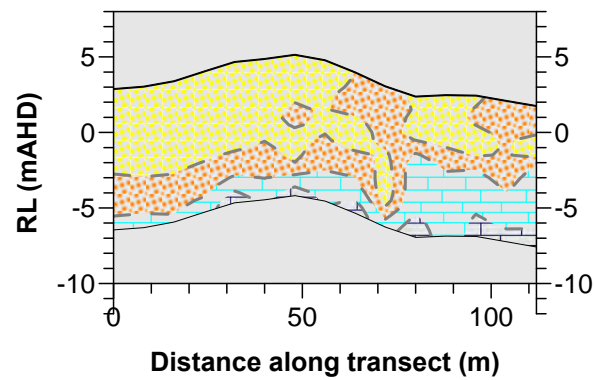
TRANSECT 7 - SEISMIC SHEAR WAVE VELOCITY MODEL



TRANSECT 8 - SEISMIC SHEAR WAVE VELOCITY MODEL

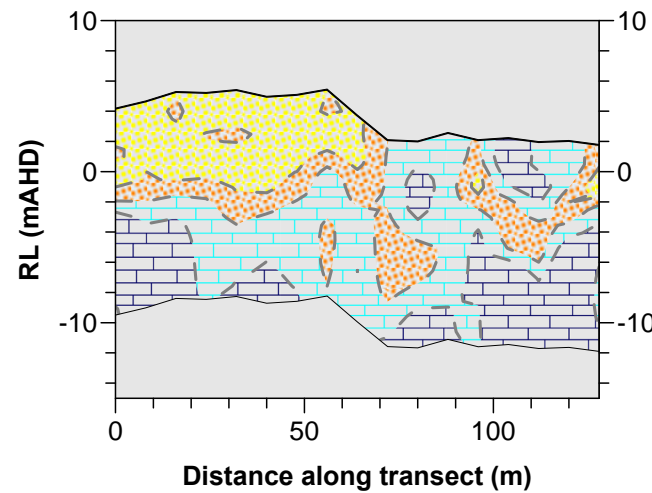


TRANSECT 6 - INTERPRETED GEOLOGICAL SECTION



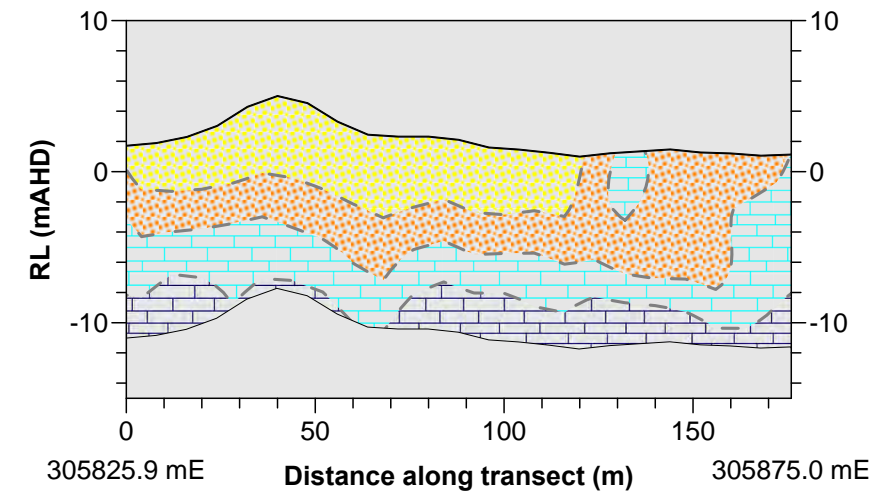
305439.7 mE 305445.9 mE
7605559.5 mN 7605664.0 mN

TRANSECT 7 - INTERPRETED GEOLOGICAL SECTION



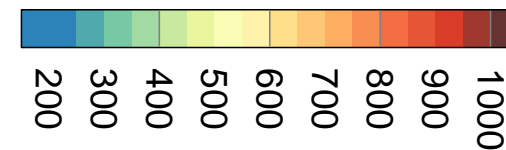
305617.5 mE 305689.3 mE
7605507.0 mN 7605608.8 mN

TRANSECT 8 - INTERPRETED GEOLOGICAL SECTION



305825.9 mE 305875.0 mE
7605428.0 mN 7605583.9 mN

SEISMIC S-WAVE VELOCITY (m/s)



INTERPRETED MATERIAL TYPE

- SAND - LOW COMPACTION
S-WAVE VELOCITY < 250 m/s
- SAND - MODERATE COMPACTION
S-WAVE VELOCITY 250-350 m/s
- LOW STRENGTH VARIABLY WEATHERED ROCK
S-WAVE VELOCITY 350-475 m/s
- MODERATE STRENGTH COMPETENT ROCK
S-WAVE VELOCITY > 475 m/s.
- 0m AUSTRALIAN HEIGHT DATUM

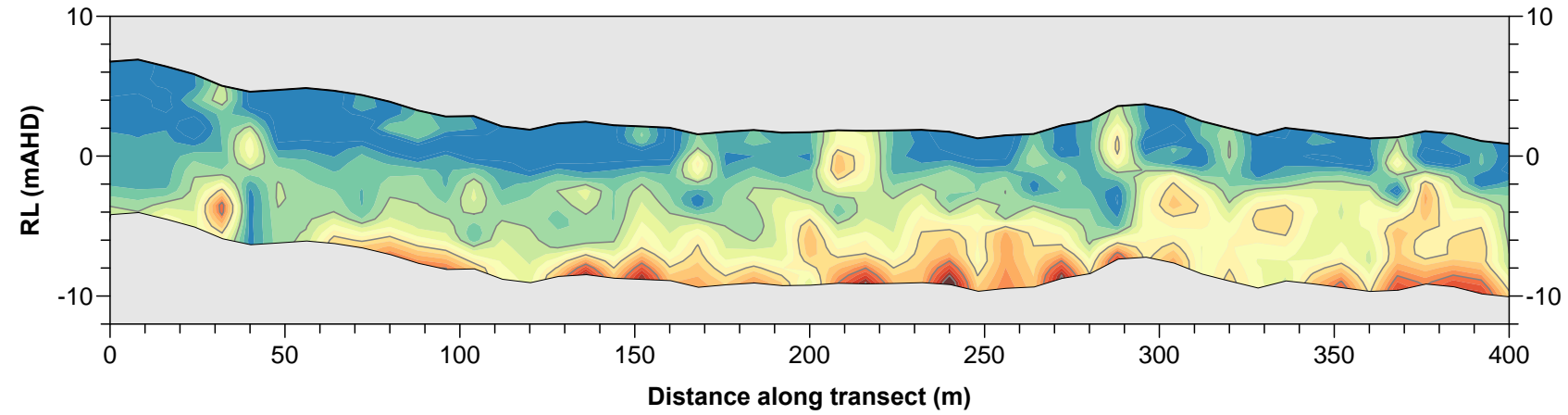
NOTES

Drawing to be used in conjunction with Report 3095B.
Positioning is given in GDA94 zone 50.
Levels are given in Australian Height Datum (AHD).

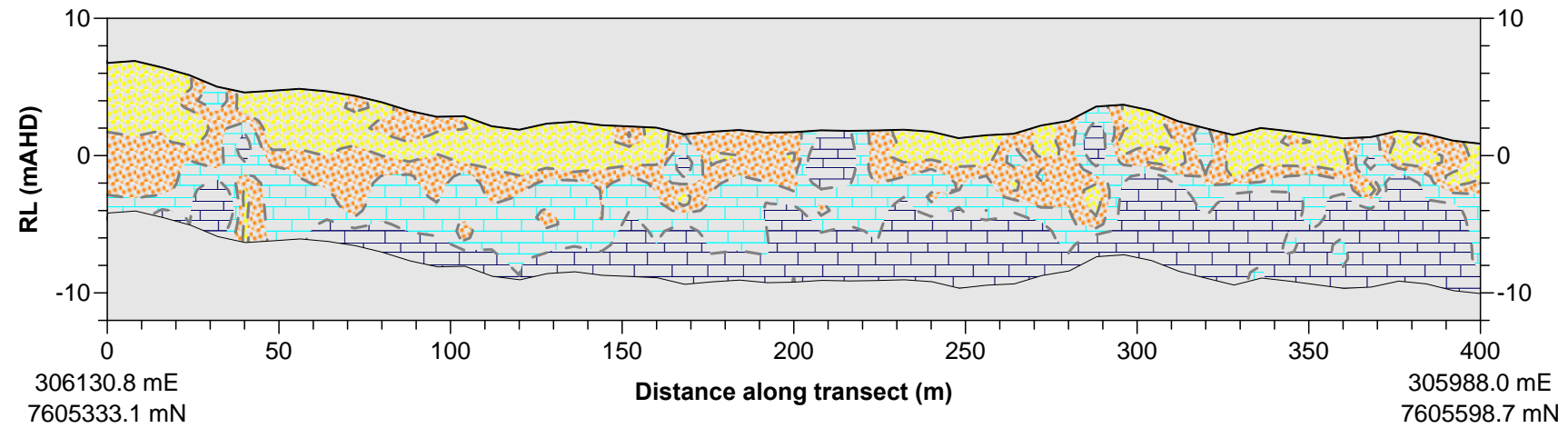
CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA	Date	24 June 2024	Paper Size	A3
	GEOTECHNICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT. ONSLOW, SHIRE OF ASHBURTON WA	Scale	1:2000H, 1:500V	Drawn	QA
		Drawing	3095C-08	Revision	0

MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

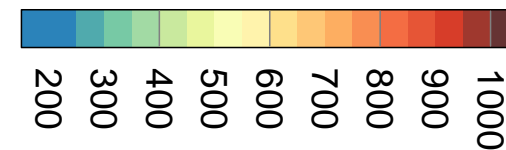
TRANSECT 9 - SEISMIC SHEAR WAVE VELOCITY MODEL



TRANSECT 9 - INTERPRETED GEOLOGICAL SECTION



SEISMIC S-WAVE VELOCITY (m/s)



INTERPRETED MATERIAL TYPE

- SAND - LOW COMPACTION
S-WAVE VELOCITY < 250 m/s
- SAND - MODERATE COMPACTION
S-WAVE VELOCITY 250-350 m/s
- LOW STRENGTH VARIABLY WEATHERED ROCK
S-WAVE VELOCITY 350-475 m/s
- MODERATE STRENGTH COMPETENT ROCK
S-WAVE VELOCITY > 475 m/s.
- 0m AUSTRALIAN HEIGHT DATUM

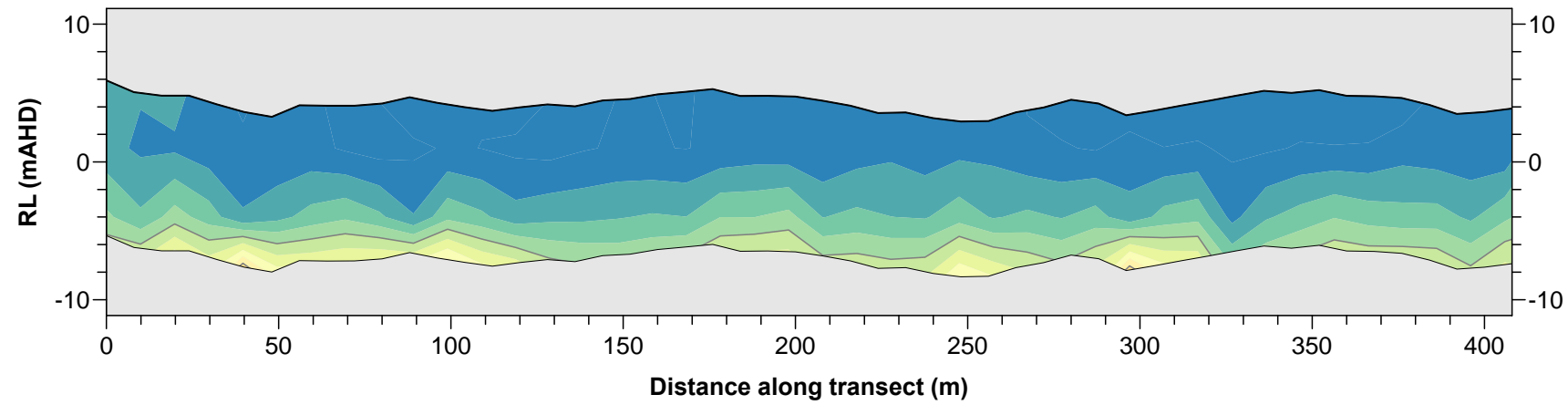
NOTES

Drawing to be used in conjunction with Report 3095B.
Positioning is given in GDA94 zone 50.
Levels are given in Australian Height Datum (AHD).

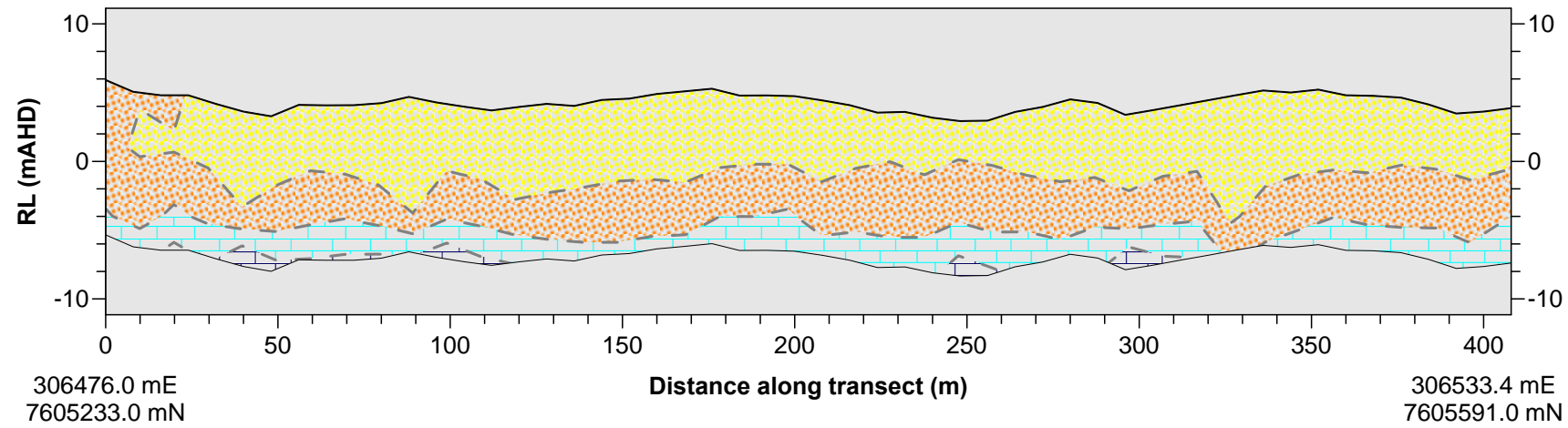
CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA	Date	24 June 2024	Paper Size	A3
	GEOTECHNICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT. ONSLOW, SHIRE OF ASHBURTON WA	Scale	1:2000H, 1:500V	Drawn	QA
		Drawing	3095C-09	Revision	0

MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

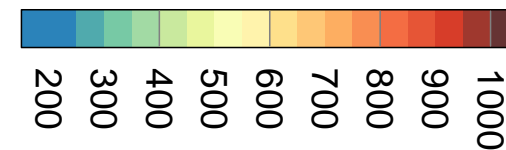
TRANSECT 10 - SEISMIC SHEAR WAVE VELOCITY MODEL



TRANSECT 10 - INTERPRETED GEOLOGICAL SECTION



SEISMIC S-WAVE VELOCITY (m/s)



INTERPRETED MATERIAL TYPE

- SAND - LOW COMPACTION
S-WAVE VELOCITY < 250 m/s
- SAND - MODERATE COMPACTION
S-WAVE VELOCITY 250-350 m/s
- LOW STRENGTH VARIABLY WEATHERED ROCK
S-WAVE VELOCITY 350-475 m/s
- MODERATE STRENGTH COMPETENT ROCK
S-WAVE VELOCITY > 475 m/s.
- 0m AUSTRALIAN HEIGHT DATUM

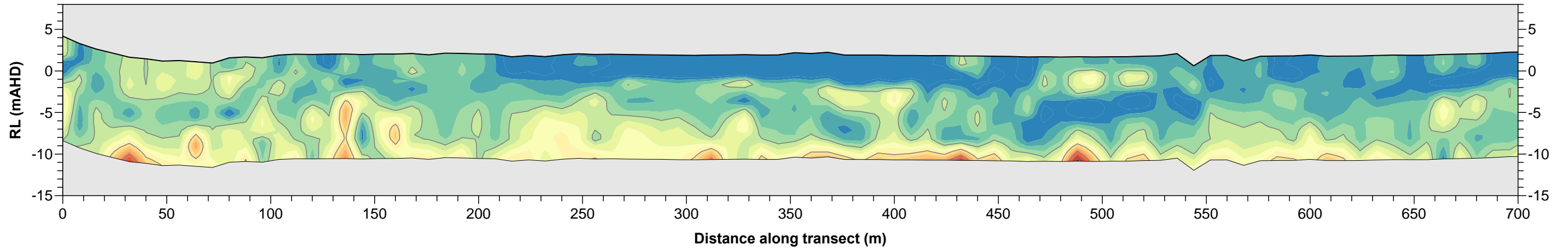
NOTES

Drawing to be used in conjunction with Report 3095C.
Positioning is given in GDA94 zone 50.
Levels are given in Australian Height Datum (AHD).

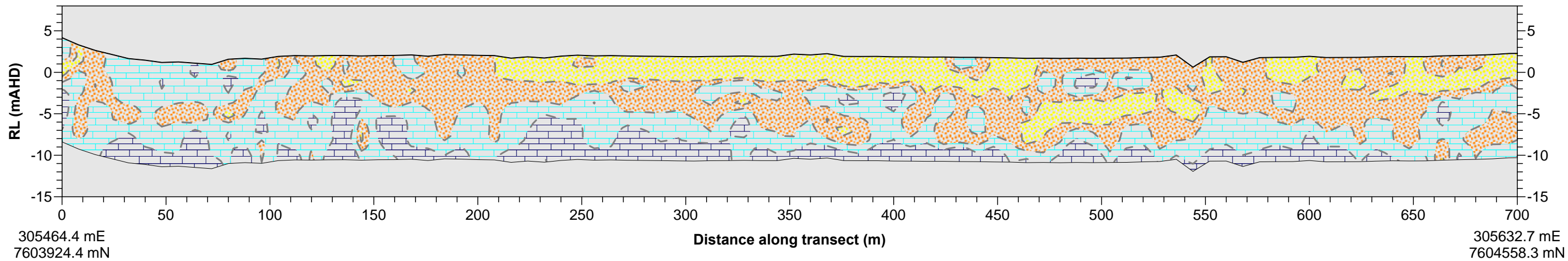
CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA	Date	3 July 2024	Paper Size	A3
	GEOTECHNICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT. ONSLOW, SHIRE OF ASHBURTON WA	Scale	1:2000H, 1:500V	Drawn	QA
		Drawing	3095C-10	Revision	0

MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

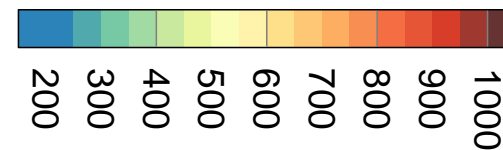
TRANSECT 11 (0-700m) - SEISMIC SHEAR WAVE VELOCITY MODEL



TRANSECT 11 (0-700m) - INTERPRETED GEOLOGICAL SECTION



SEISMIC S-WAVE VELOCITY (m/s)



INTERPRETED MATERIAL TYPE

- SAND - LOW COMPACTION
S-WAVE VELOCITY < 250 m/s
- SAND - MODERATE COMPACTION
S-WAVE VELOCITY 250-350 m/s
- LOW STRENGTH VARIABLY WEATHERED ROCK
S-WAVE VELOCITY 350-475 m/s
- MODERATE STRENGTH COMPETENT ROCK
S-WAVE VELOCITY > 475 m/s.
- 0m AUSTRALIAN HEIGHT DATUM

NOTES

Drawing to be used in conjunction with Report 3095B.
Positioning is given in GDA94 zone 50.
Levels are given in Australian Height Datum (AHD).

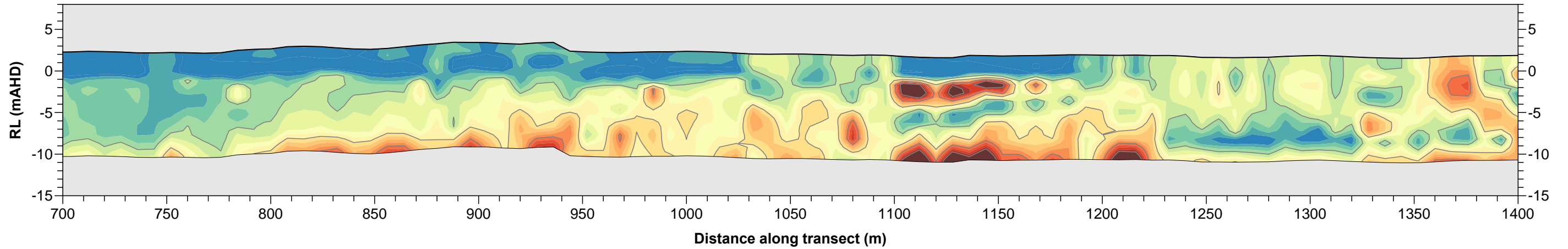
CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA
	GEOTECHNICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT. ONSLOW, SHIRE OF ASHBURTON WA

Date	24 June 2024
Scale	1:2000H, 1:500V
Drawing	3095C-11

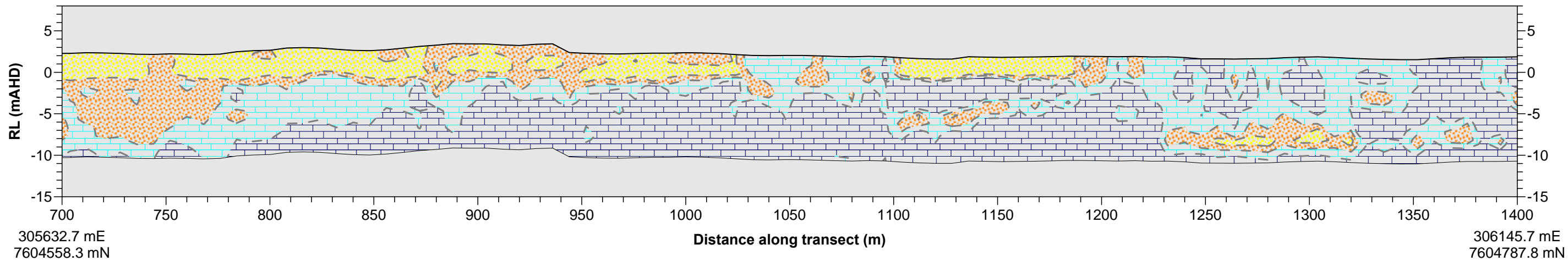
Paper Size	A3
Drawn	QA
Revision	0

MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

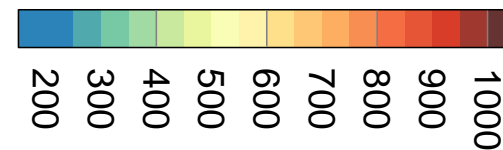
TRANSECT 11 (700-1400m) - SEISMIC SHEAR WAVE VELOCITY MODEL



TRANSECT 11 (700-1400m) - INTERPRETED GEOLOGICAL SECTION



SEISMIC S-WAVE VELOCITY (m/s)



INTERPRETED MATERIAL TYPE

- SAND - LOW COMPACTION
S-WAVE VELOCITY < 250 m/s
- SAND - MODERATE COMPACTION
S-WAVE VELOCITY 250-350 m/s
- LOW STRENGTH VARIABLY WEATHERED ROCK
S-WAVE VELOCITY 350-475 m/s
- MODERATE STRENGTH COMPETENT ROCK
S-WAVE VELOCITY > 475 m/s.
- 0m AUSTRALIAN HEIGHT DATUM

NOTES

Drawing to be used in conjunction with Report 3095B.
Positioning is given in GDA94 zone 50.
Levels are given in Australian Height Datum (AHD).

CLIENT **DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA**

**GEOTECHNICAL INVESTIGATION FOR COASTAL
EROSION VULNERABILITY ASSESSMENT.
ONSLOW, SHIRE OF ASHBURTON WA**

Date 3 July 2024

Scale 1:2000H, 1:500V

Drawing 3095C-12

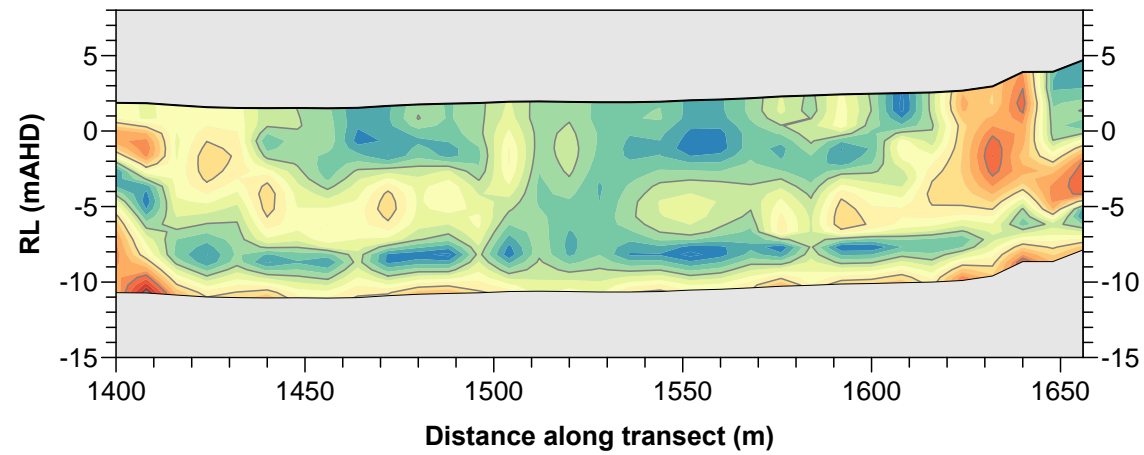
Paper Size A3

Drawn QA

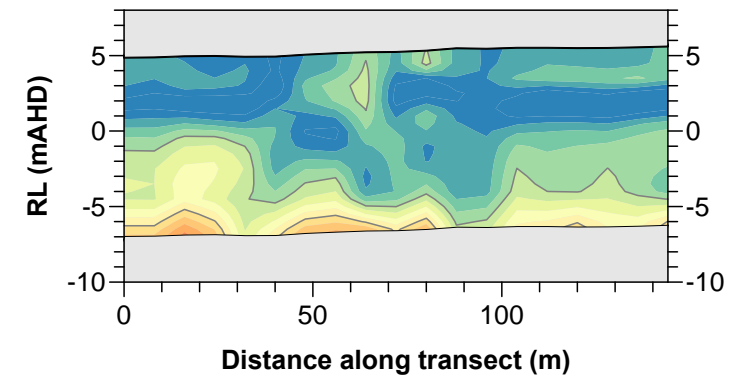
Revision 0

MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

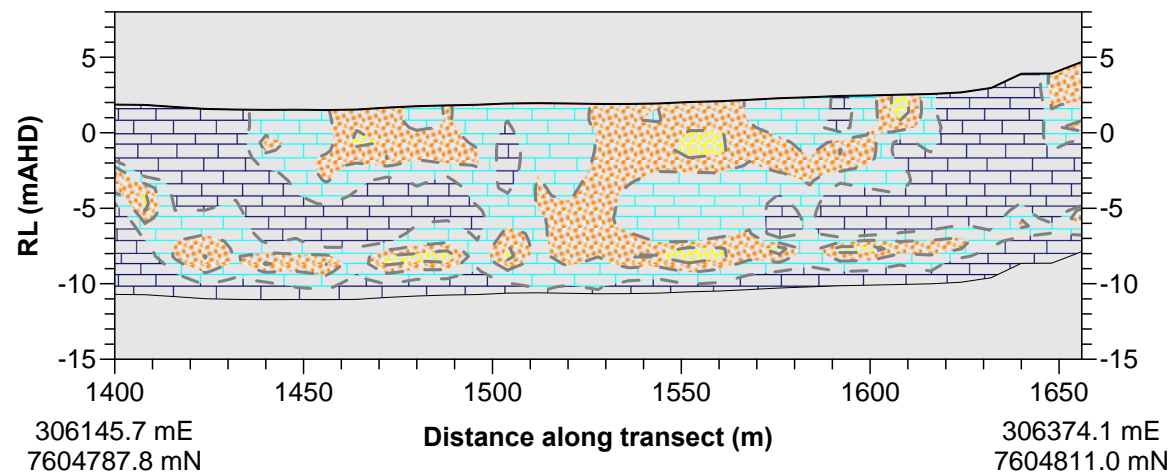
TRANSECT 11 (1400-1656m) - SEISMIC SHEAR WAVE VELOCITY MODEL



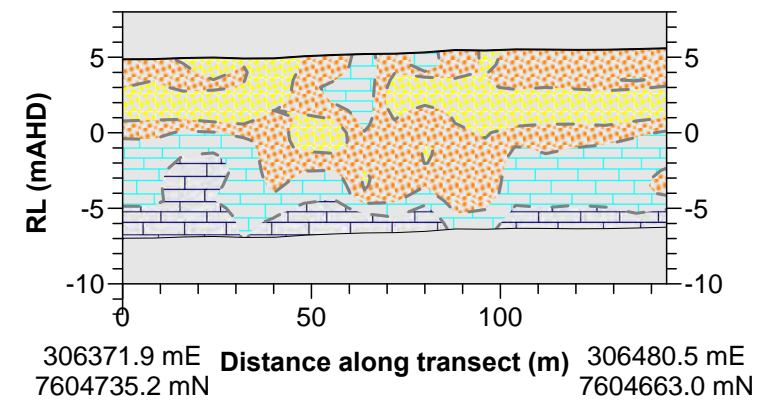
TRANSECT 12 - SEISMIC SHEAR WAVE VELOCITY MODEL



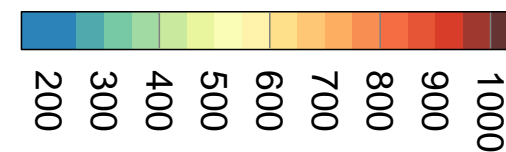
TRANSECT 11 (1400-1656m) - INTERPRETED GEOLOGICAL SECTION



TRANSECT 12 - INTERPRETED GEOLOGICAL SECTION



SEISMIC S-WAVE VELOCITY (m/s)



INTERPRETED MATERIAL TYPE

- SAND - LOW COMPACTION
S-WAVE VELOCITY < 250 m/s
- SAND - MODERATE COMPACTION
S-WAVE VELOCITY 250-350 m/s
- LOW STRENGTH VARIABLY WEATHERED ROCK
S-WAVE VELOCITY 350-475 m/s
- MODERATE STRENGTH COMPETENT ROCK
S-WAVE VELOCITY > 475 m/s.
- 0m AUSTRALIAN HEIGHT DATUM

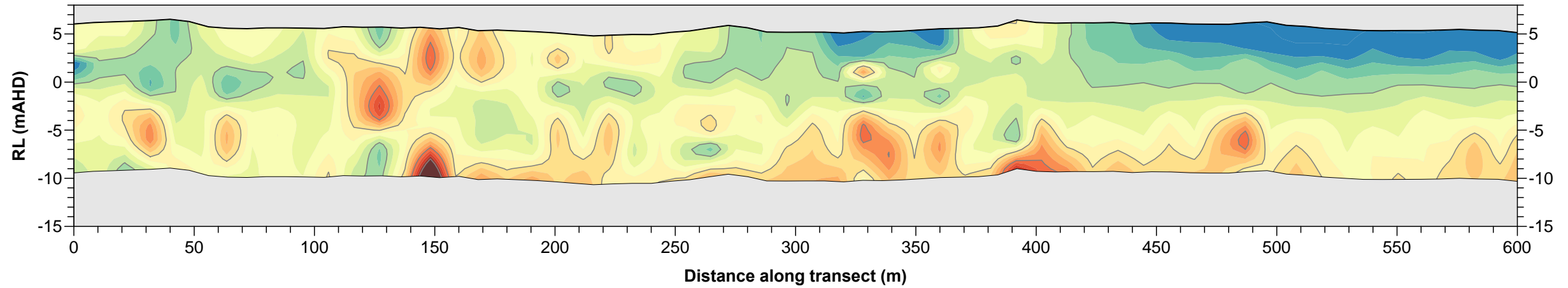
NOTES

Drawing to be used in conjunction with Report 3095B.
Positioning is given in GDA94 zone 50.
Levels are given in Australian Height Datum (AHD).

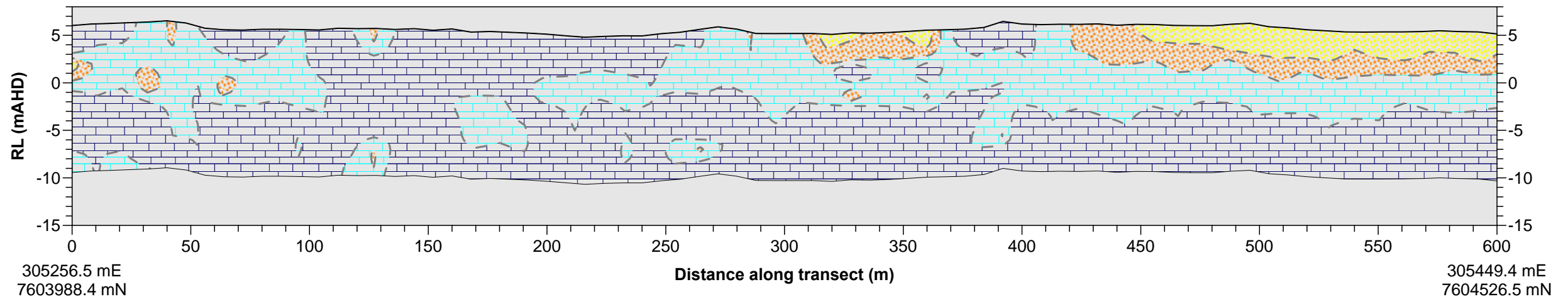
CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA	Date	3 July 2024	Paper Size	A3
	GEOTECHNICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT. ONSLOW, SHIRE OF ASHBURTON WA	Scale	1:2000H, 1:500V	Drawn	QA
		Drawing	3095C-13	Revision	0

MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

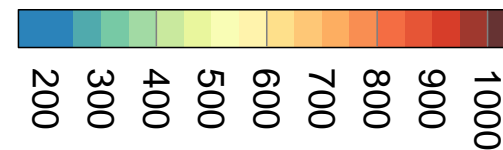
TRANSECT 13 (0-600m) - SEISMIC SHEAR WAVE VELOCITY MODEL



TRANSECT 13 (0-600m) - INTERPRETED GEOLOGICAL SECTION



SEISMIC S-WAVE VELOCITY (m/s)



INTERPRETED MATERIAL TYPE

- SAND - LOW COMPACTION
S-WAVE VELOCITY < 250 m/s
- SAND - MODERATE COMPACTION
S-WAVE VELOCITY 250-350 m/s
- LOW STRENGTH VARIABLY WEATHERED ROCK
S-WAVE VELOCITY 350-475 m/s
- MODERATE STRENGTH COMPETENT ROCK
S-WAVE VELOCITY > 475 m/s.
- 0m AUSTRALIAN HEIGHT DATUM

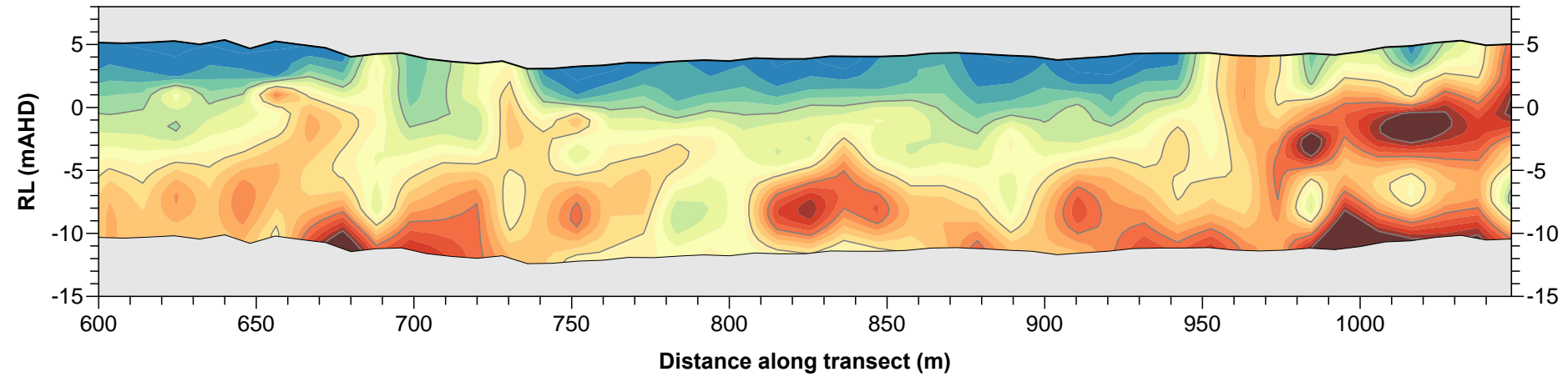
NOTES

Drawing to be used in conjunction with Report 3095C.
Positioning is given in GDA94 zone 50.
Levels are given in Australian Height Datum (AHD).

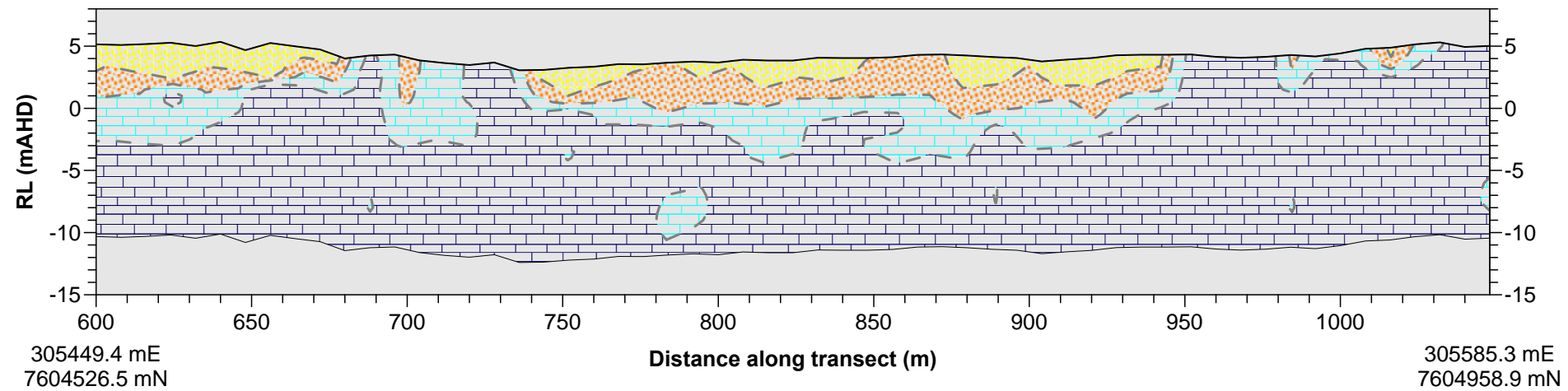
CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA	Date	2 July 2024	Paper Size	A3
	GEOTECHNICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT. ONSLOW, SHIRE OF ASHBURTON WA	Scale	1:2000H, 1:500V	Drawn	QA
		Drawing	3095C-14	Revision	0

MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

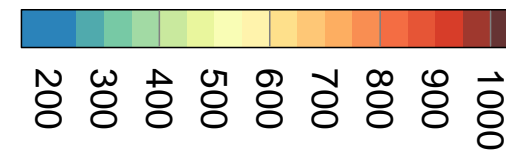
TRANSECT 13 (600-1048m) - SEISMIC SHEAR WAVE VELOCITY MODEL



TRANSECT 13 (600-1048m) - INTERPRETED GEOLOGICAL SECTION



SEISMIC S-WAVE VELOCITY (m/s)



INTERPRETED MATERIAL TYPE

- SAND - LOW COMPACTION
S-WAVE VELOCITY < 250 m/s
- SAND - MODERATE COMPACTION
S-WAVE VELOCITY 250-350 m/s
- LOW STRENGTH VARIABLY WEATHERED ROCK
S-WAVE VELOCITY 350-475 m/s
- MODERATE STRENGTH COMPETENT ROCK
S-WAVE VELOCITY > 475 m/s.
- 0m AUSTRALIAN HEIGHT DATUM

NOTES

Drawing to be used in conjunction with Report 3095C.
Positioning is given in GDA94 zone 50.
Levels are given in Australian Height Datum (AHD).

CLIENT **DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA**

**GEOTECHNICAL INVESTIGATION FOR COASTAL
EROSION VULNERABILITY ASSESSMENT.
ONSLow, SHIRE OF ASHBURTON WA**

Date 2 July 2024

Scale 1:2000H, 1:500V

Drawing 3095C-15

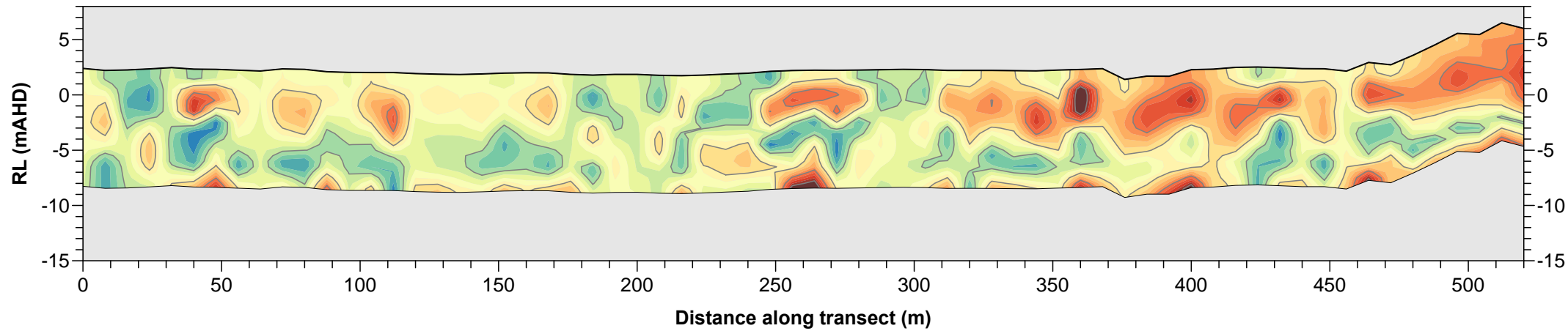
Paper Size A3

Drawn QA

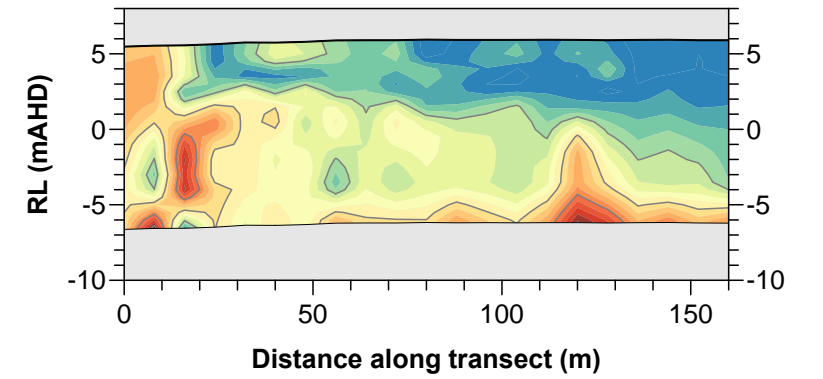
Revision 0

MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

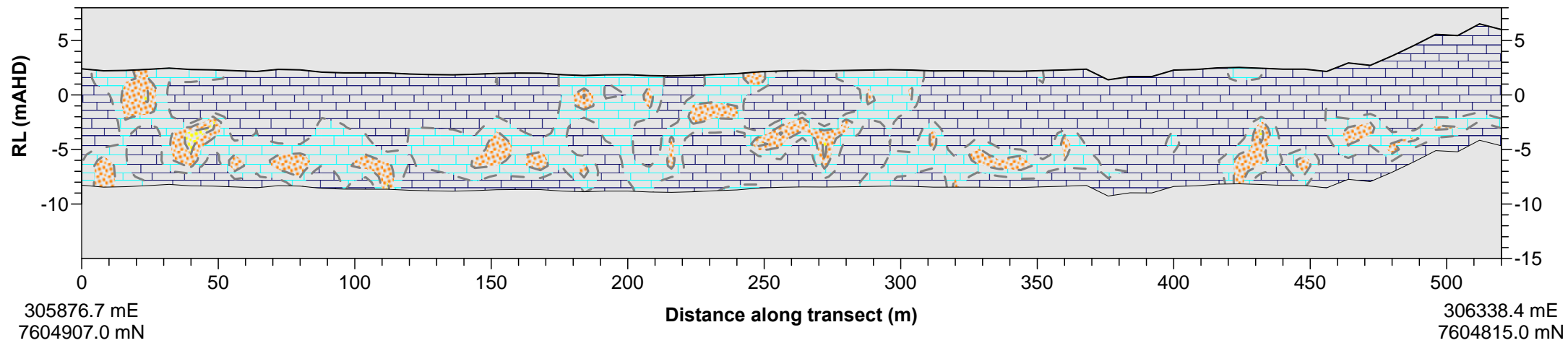
TRANSECT 14 - SEISMIC SHEAR WAVE VELOCITY MODEL



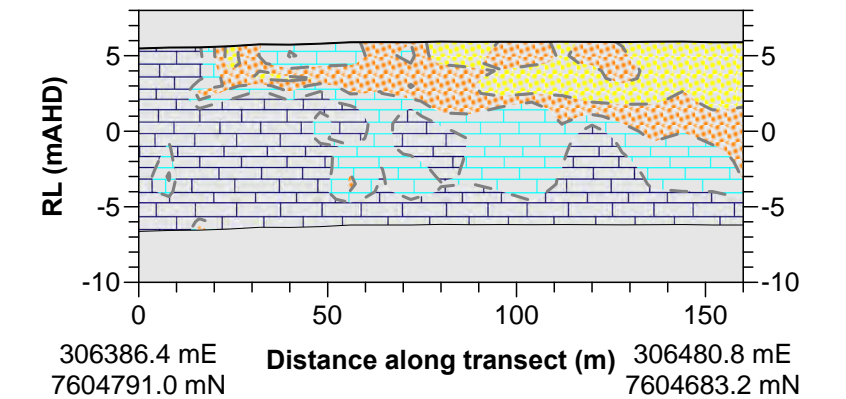
TRANSECT 15 - SEISMIC SHEAR WAVE VELOCITY MODEL



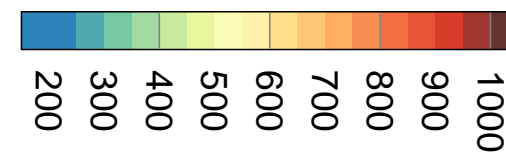
TRANSECT 14 - INTERPRETED GEOLOGICAL SECTION



TRANSECT 15 - INTERPRETED GEOLOGICAL SECTION



SEISMIC S-WAVE VELOCITY (m/s)



INTERPRETED MATERIAL TYPE

- SAND - LOW COMPACTION
S-WAVE VELOCITY < 250 m/s
- SAND - MODERATE COMPACTION
S-WAVE VELOCITY 250-350 m/s
- LOW STRENGTH VARIABLY WEATHERED ROCK
S-WAVE VELOCITY 350-475 m/s
- MODERATE STRENGTH COMPETENT ROCK
S-WAVE VELOCITY > 475 m/s.
- 0m AUSTRALIAN HEIGHT DATUM

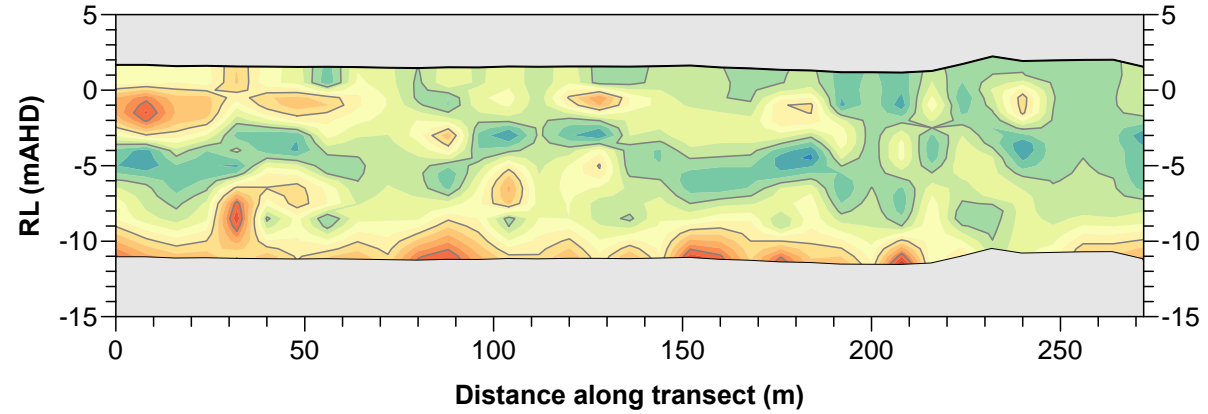
NOTES

Drawing to be used in conjunction with Report 3095C.
Positioning is given in GDA94 zone 50.
Levels are given in Australian Height Datum (AHD).

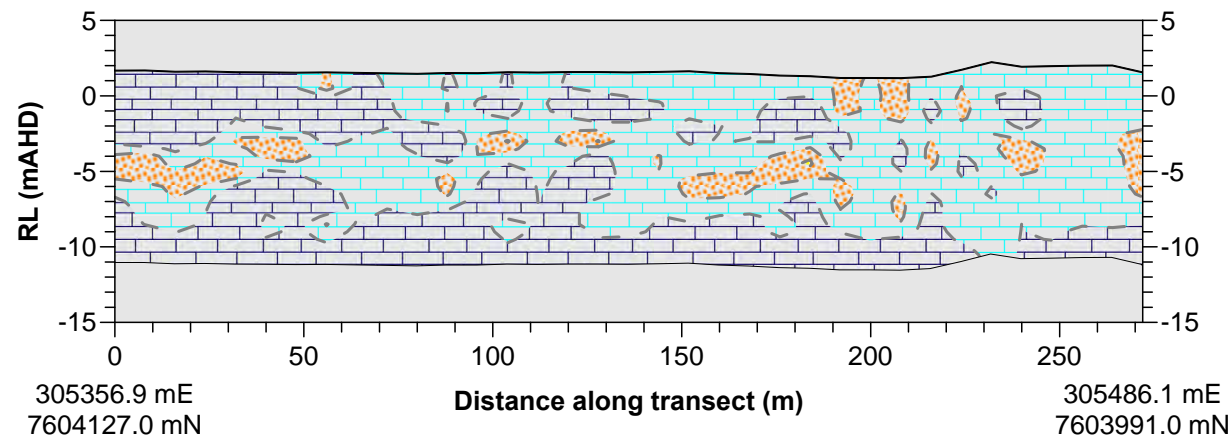
CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA	Date	3 July 2024	Paper Size	A3
	GEOTECHNICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT. ONSLOW, SHIRE OF ASHBURTON WA	Scale	1:2000H, 1:500V	Drawn	QA
		Drawing	3095C-16	Revision	0

MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

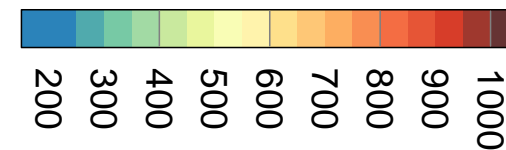
TRANSECT 16 - SEISMIC SHEAR WAVE VELOCITY MODEL



TRANSECT 16 - INTERPRETED GEOLOGICAL SECTION



SEISMIC S-WAVE VELOCITY (m/s)



INTERPRETED MATERIAL TYPE

- SAND - LOW COMPACTION
S-WAVE VELOCITY < 250 m/s
- SAND - MODERATE COMPACTION
S-WAVE VELOCITY 250-350 m/s
- LOW STRENGTH VARIABLY WEATHERED ROCK
S-WAVE VELOCITY 350-475 m/s
- MODERATE STRENGTH COMPETENT ROCK
S-WAVE VELOCITY > 475 m/s.
- 0m AUSTRALIAN HEIGHT DATUM

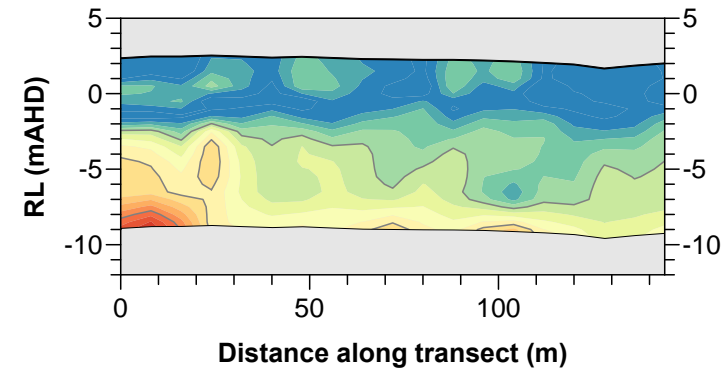
NOTES

Drawing to be used in conjunction with Report 3095B.
Positioning is given in GDA94 zone 50.
Levels are given in Australian Height Datum (AHD).

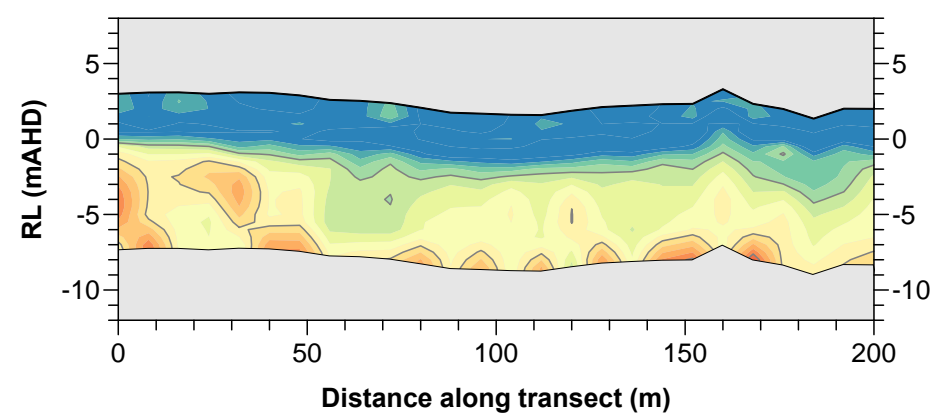
CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA	Date	24 June 2024	Paper Size	A3
	GEOTECHNICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT. ONSLOW, SHIRE OF ASHBURTON WA	Scale	1:2000H, 1:500V	Drawn	QA
		Drawing	3095C-17	Revision	0

MULTI-CHANNEL ANALYSIS OF SURFACE WAVES

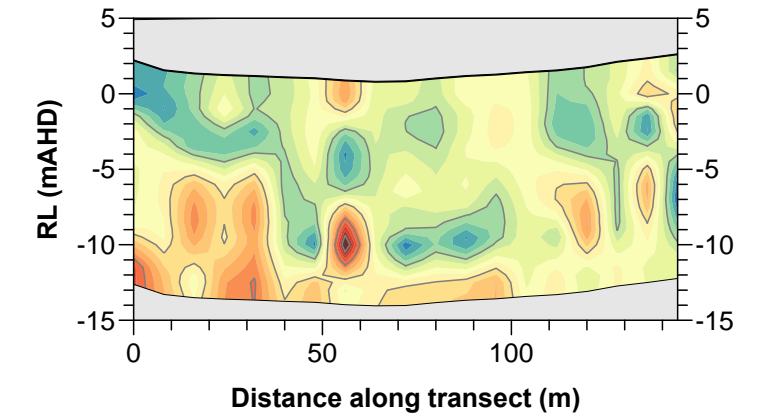
TRANSECT 17 - SEISMIC SHEAR WAVE VELOCITY MODEL



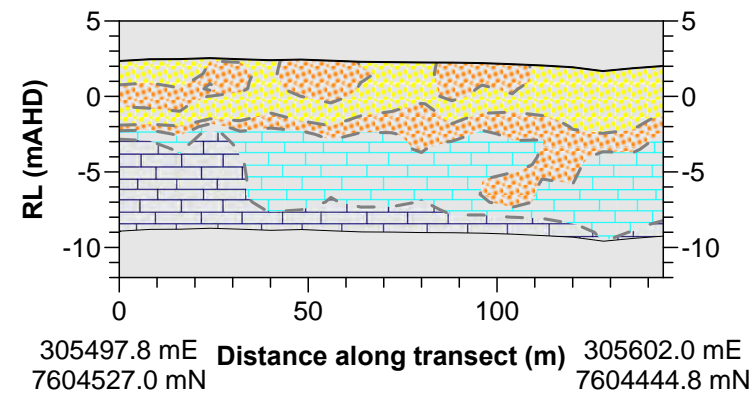
TRANSECT 18 - SEISMIC SHEAR WAVE VELOCITY MODEL



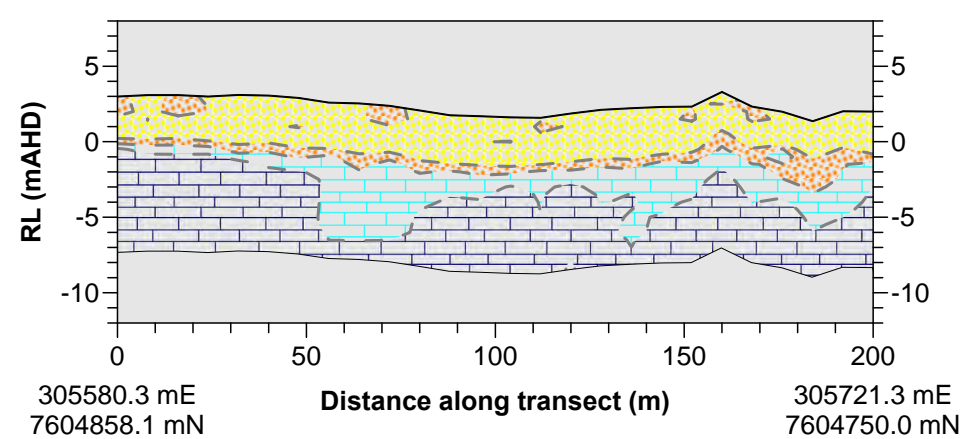
TRANSECT 19 - SEISMIC SHEAR WAVE VELOCITY MODEL



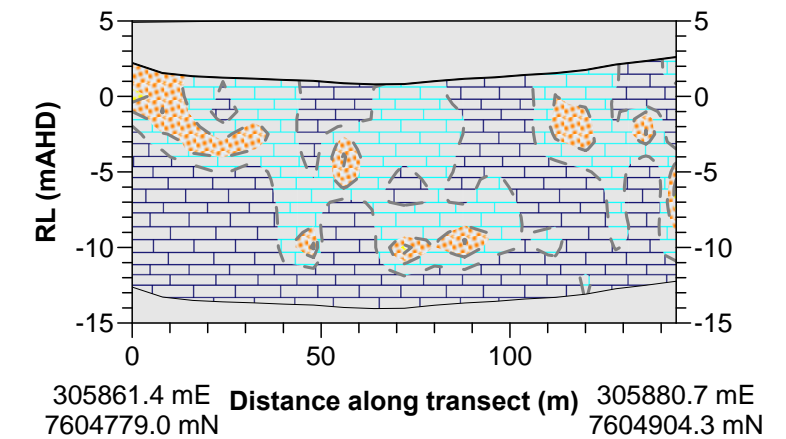
TRANSECT 17 - INTERPRETED GEOLOGICAL SECTION



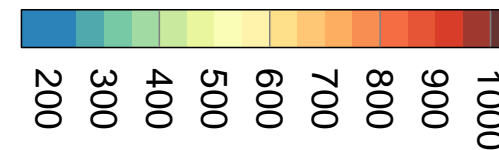
TRANSECT 18 - INTERPRETED GEOLOGICAL SECTION



TRANSECT 19 - INTERPRETED GEOLOGICAL SECTION



SEISMIC S-WAVE VELOCITY (m/s)



INTERPRETED MATERIAL TYPE

- SAND - LOW COMPACTION
S-WAVE VELOCITY < 250 m/s
- SAND - MODERATE COMPACTION
S-WAVE VELOCITY 250-350 m/s
- LOW STRENGTH VARIABLY WEATHERED ROCK
S-WAVE VELOCITY 350-475 m/s
- MODERATE STRENGTH COMPETENT ROCK
S-WAVE VELOCITY > 475 m/s.
- 0m AUSTRALIAN HEIGHT DATUM

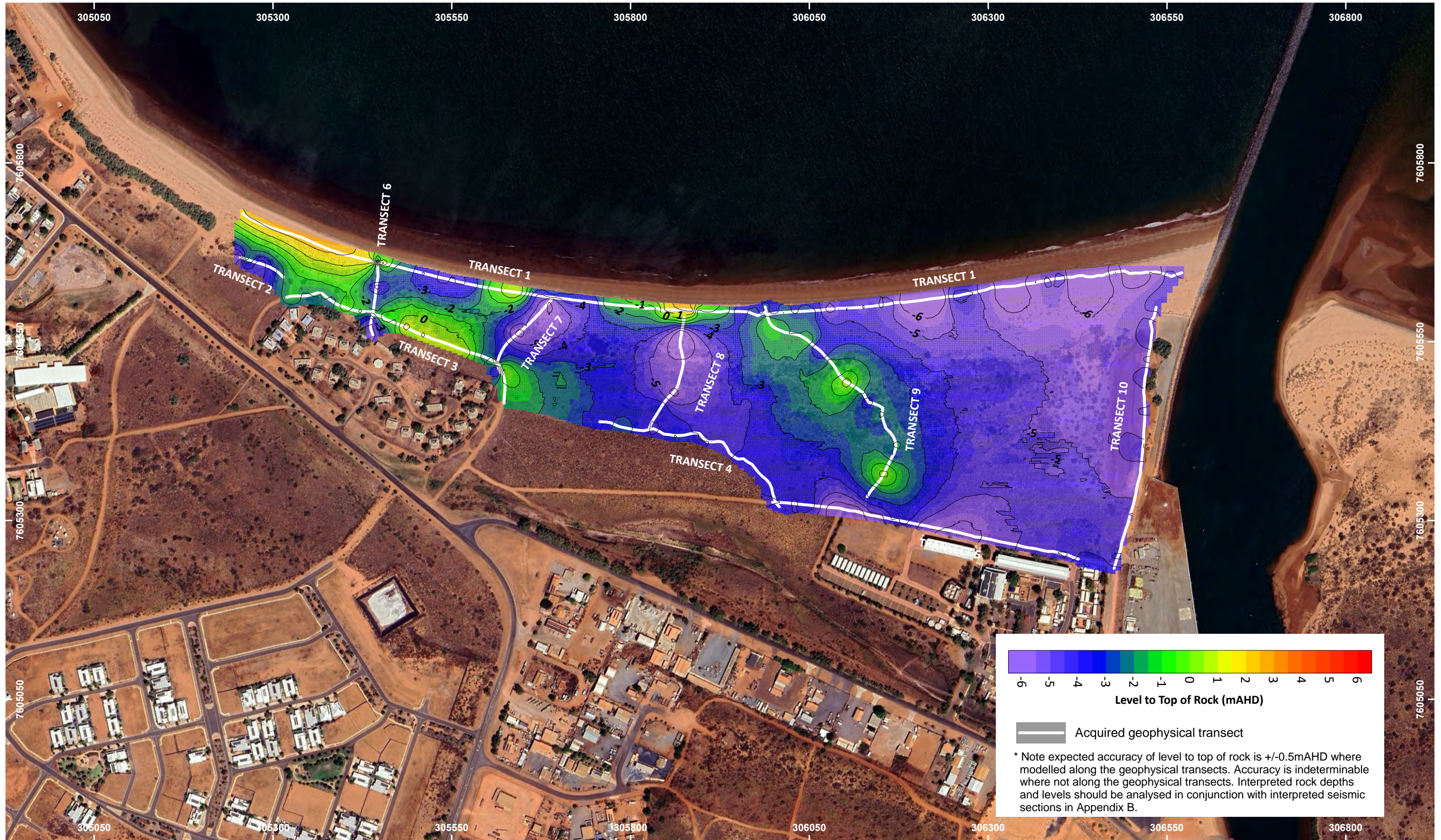
NOTES

Drawing to be used in conjunction with Report 3095B.
Positioning is given in GDA94 zone 50.
Levels are given in Australian Height Datum (AHD).

CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA	Date	24 June 2024	Paper Size	A3
	GEOTECHNICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT. ONSLOW, SHIRE OF ASHBURTON WA	Scale	1:2000H, 1:500V	Drawn	QA
		Drawing	3095C-18	Revision	0

APPENDIX C – MODELLED LEVEL TO TOP OF ROCK AND SAND THICKNESS

CONTOUR LEVEL TO TOP OF ROCK (NORTH)

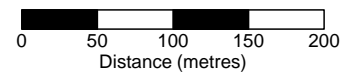


Level to Top of Rock (mAHd)

— Acquired geophysical transect

* Note expected accuracy of level to top of rock is +/-0.5mAHd where modelled along the geophysical transects. Accuracy is indeterminable where not along the geophysical transects. Interpreted rock depths and levels should be analysed in conjunction with interpreted seismic sections in Appendix B.

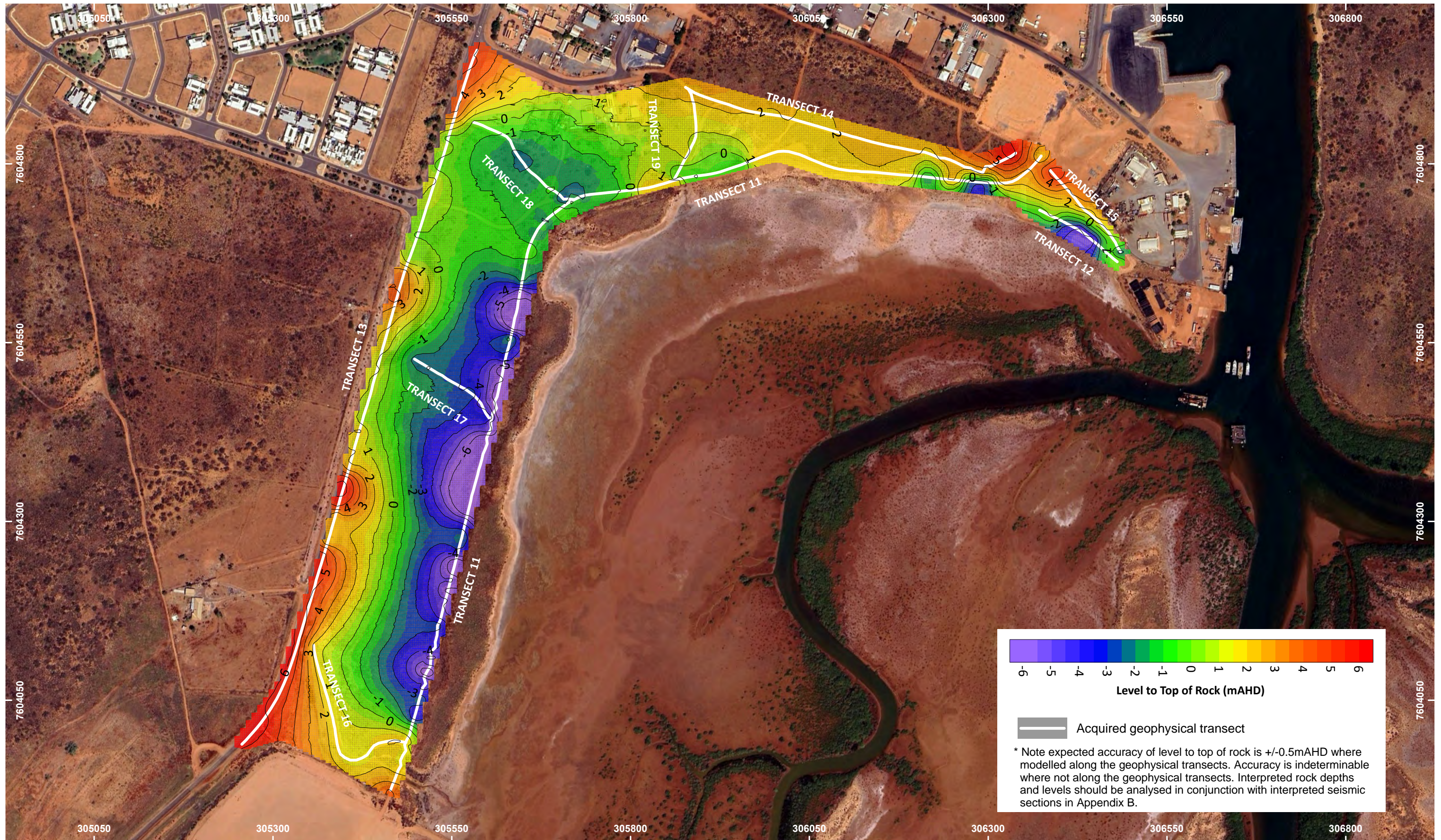
NOTES
Drawing to be used in conjunction with Report 3095C.
Map Projection GDA94 MGA Zone 50.
Aerial image from Google Earth Pro and GBG photogrammetry.



CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA
	GEOPHYSICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT ONSLOW, SHIRE OF ASHBURTON WA

Date	18 July 2024	Paper Size	A3
Scale	1:5000	Drawn	OMLE
Drawing	3095C-19	Revision	1

CONTOUR LEVEL TO TOP OF ROCK (SOUTH)

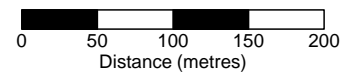


Level to Top of Rock (mAHD)

— Acquired geophysical transect

* Note expected accuracy of level to top of rock is +/-0.5mAHD where modelled along the geophysical transects. Accuracy is indeterminable where not along the geophysical transects. Interpreted rock depths and levels should be analysed in conjunction with interpreted seismic sections in Appendix B.

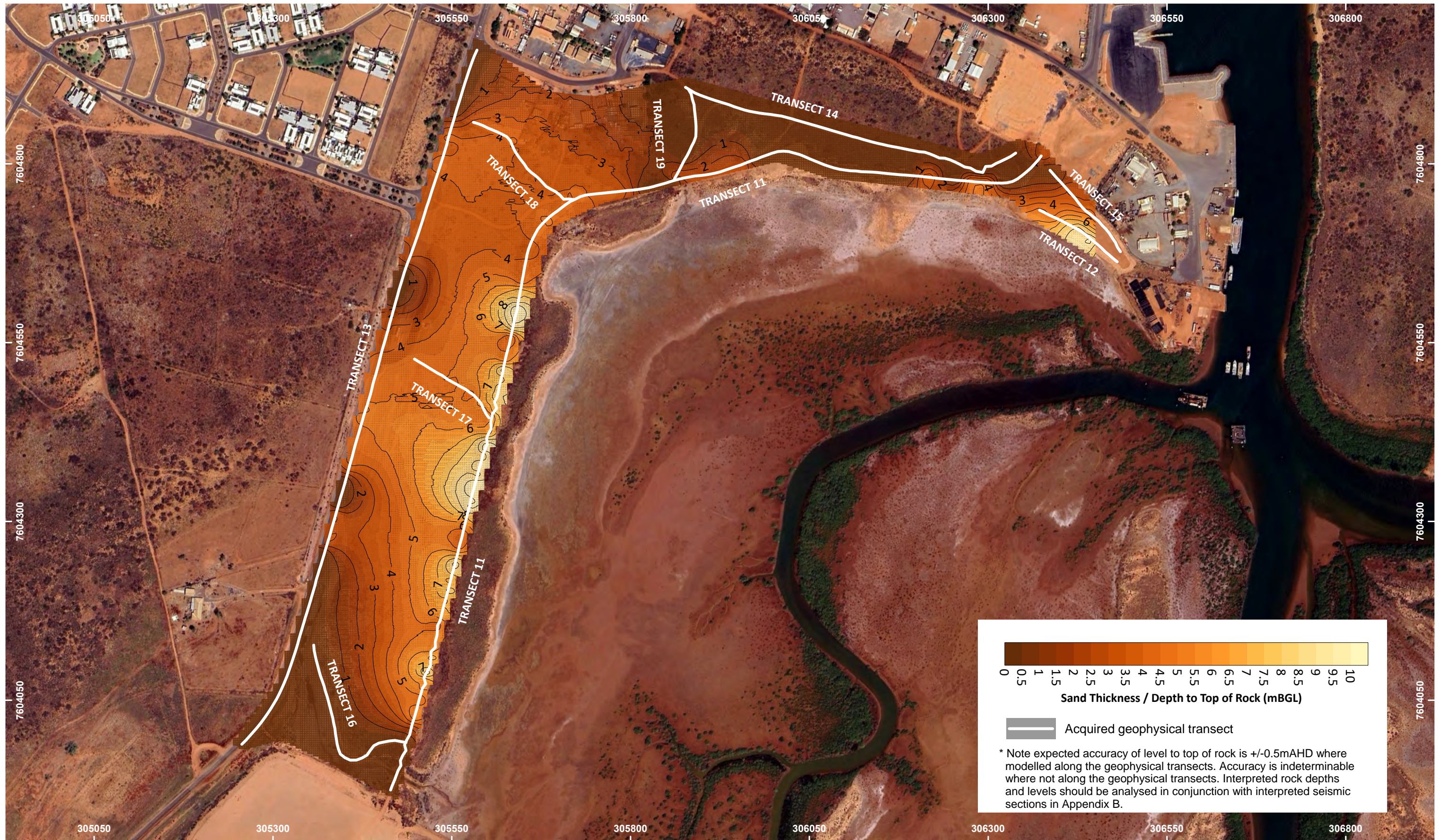
NOTES
 Drawing to be used in conjunction with Report 3095C.
 Map Projection GDA94 MGA Zone 50.
 Aerial image from Google Earth Pro and GBG
 photogrammetry.



CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA		
	GEOPHYSICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT ONSLOW, SHIRE OF ASHBURTON WA		
Date	18 July 2024	Paper Size	A3
Scale	1:5000	Drawn	OMLE
Drawing	3095C-20	Revision	1

**GEOTECHNICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT
ONSLOW, SHIRE OF ASHBURTON WESTERN AUSTRALIA**

CONTOUR SAND THICKNESS / DEPTH TO TOP OF ROCK (SOUTH)

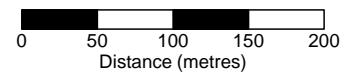


Sand Thickness / Depth to Top of Rock (mBGL)

— Acquired geophysical transect

* Note expected accuracy of level to top of rock is +/-0.5mAHd where modelled along the geophysical transects. Accuracy is indeterminable where not along the geophysical transects. Interpreted rock depths and levels should be analysed in conjunction with interpreted seismic sections in Appendix B.

NOTES
Drawing to be used in conjunction with Report 3095C.
Map Projection GDA94 MGA Zone 50.
Aerial image from Google Earth Pro and GBG photogrammetry.



CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA
	GEOPHYSICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT ONSLOW, SHIRE OF ASHBURTON WA

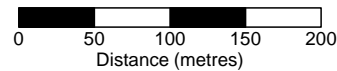
Date	18 July 2024
Scale	1:5000
Drawing	3095C-22

Paper Size	A3
Drawn	OMLE
Revision	1



NOTES

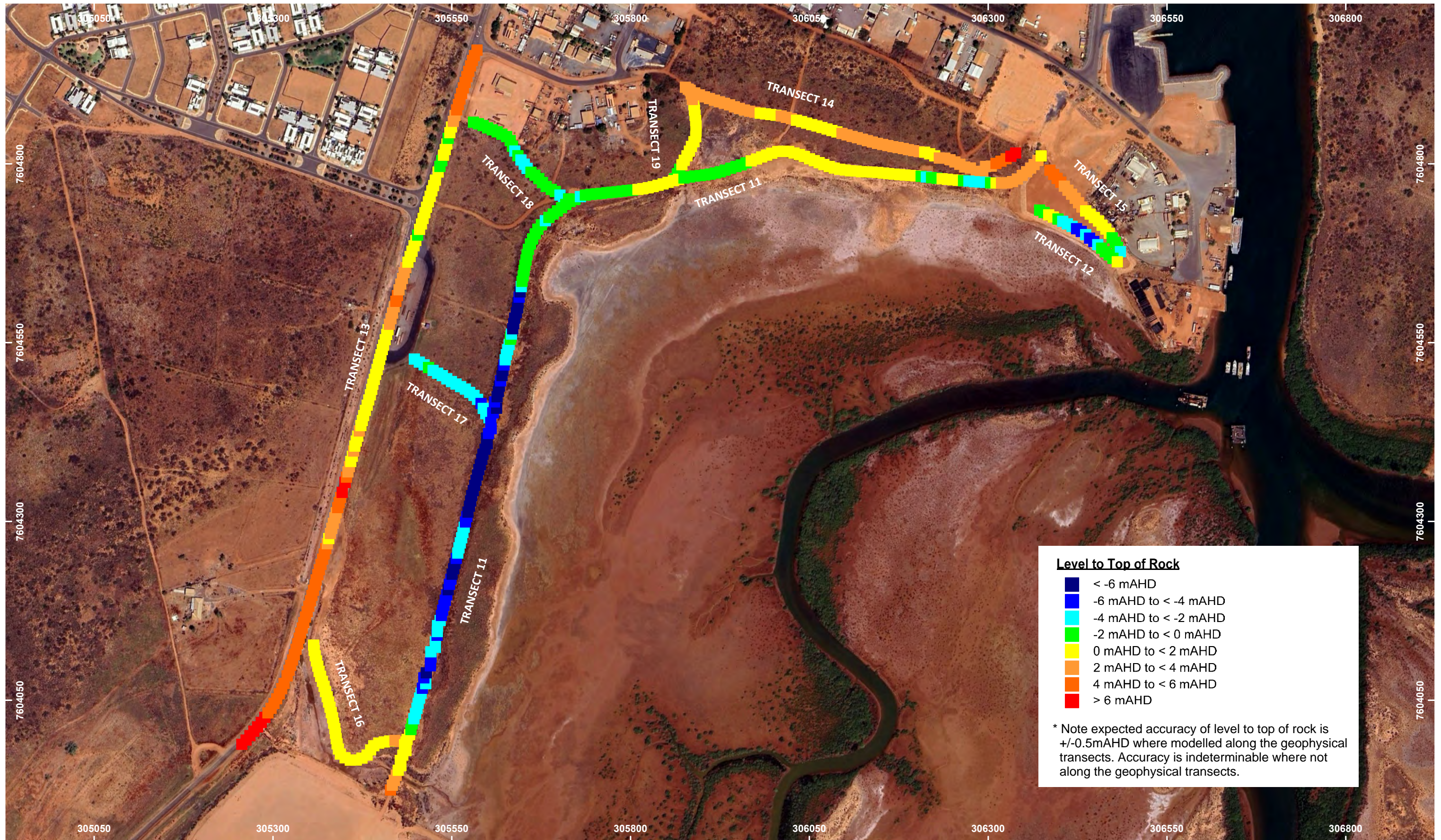
Drawing to be used in conjunction with Report 3095C.
 Map Projection GDA94 MGA Zone 50.
 Aerial image from Google Earth Pro and GBG photogrammetry.



CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA
	GEOPHYSICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT ONSLOW, SHIRE OF ASHBURTON WA

Date	18 July 2024	Paper Size	A3
Scale	1:5000	Drawn	OMLE
Drawing	3095C-23	Revision	1

CLASS POST MAP LEVEL TO TOP OF ROCK (SOUTH)

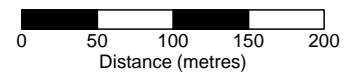


Level to Top of Rock

- < -6 mAHD
- -6 mAHD to < -4 mAHD
- -4 mAHD to < -2 mAHD
- -2 mAHD to < 0 mAHD
- 0 mAHD to < 2 mAHD
- 2 mAHD to < 4 mAHD
- 4 mAHD to < 6 mAHD
- > 6 mAHD

* Note expected accuracy of level to top of rock is +/-0.5mAHD where modelled along the geophysical transects. Accuracy is indeterminable where not along the geophysical transects.

NOTES
 Drawing to be used in conjunction with Report 3095C.
 Map Projection GDA94 MGA Zone 50.
 Aerial image from Google Earth Pro and GBG
 photogrammetry.



CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA
	GEOPHYSICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT ONSLow, SHIRE OF ASHBURTON WA

Date	18 July 2024	Paper Size	A3
Scale	1:5000	Drawn	OMLE
Drawing	3095C-24	Revision	1

CLASS POST MAP LEVEL SAND THICKNESS / DEPTH TO TOP OF ROCK (NORTH)



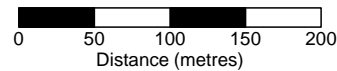
Sand Thickness / Depth to Top of Rock (mBGL)

- < 1 m
- 1 m to < 2 m
- 2 m to < 3 m
- 3 m to < 4 m
- 4 m to < 5 m
- 5 m to < 6 m
- > 6 m

* Note expected accuracy of sand thickness over rock is +/-0.5m where modelled along the geophysical transects. Accuracy is indeterminable where not along the geophysical transects.

NOTES

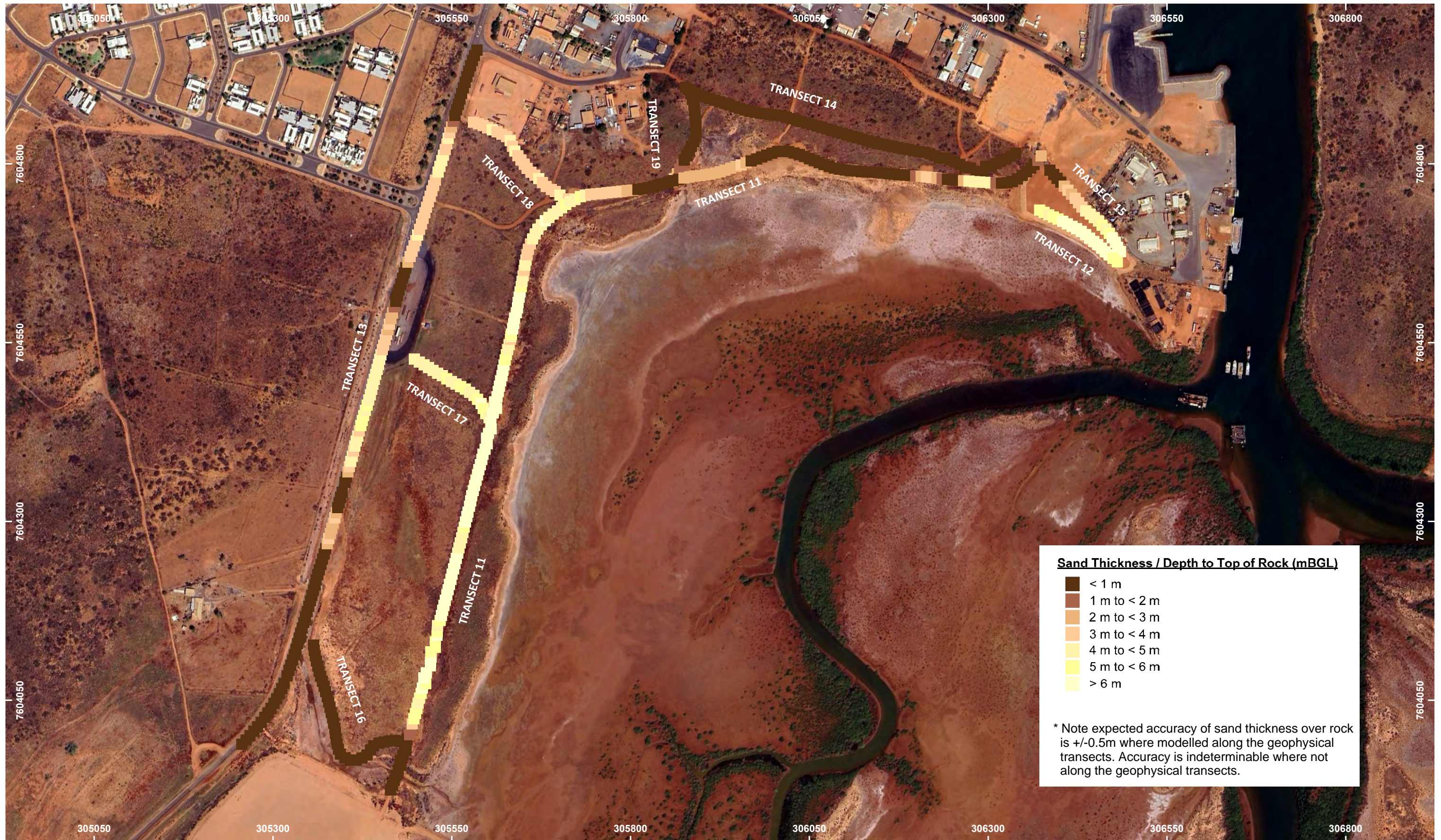
Drawing to be used in conjunction with Report 3095C.
 Map Projection GDA94 MGA Zone 50.
 Aerial image from Google Earth Pro and GBG photogrammetry.



CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA
	GEOPHYSICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT ONSLOW, SHIRE OF ASHBURTON WA

Date	18 July 2024	Paper Size	A3
Scale	1:5000	Drawn	OMLE
Drawing	3095C-25	Revision	1

CLASS POST MAP LEVEL SAND THICKNESS / DEPTH TO TOP OF ROCK (SOUTH)

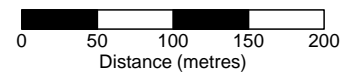


Sand Thickness / Depth to Top of Rock (mBGL)

- < 1 m
- 1 m to < 2 m
- 2 m to < 3 m
- 3 m to < 4 m
- 4 m to < 5 m
- 5 m to < 6 m
- > 6 m

* Note expected accuracy of sand thickness over rock is +/-0.5m where modelled along the geophysical transects. Accuracy is indeterminable where not along the geophysical transects.

NOTES
 Drawing to be used in conjunction with Report 3095C.
 Map Projection GDA94 MGA Zone 50.
 Aerial image from Google Earth Pro and GBG photogrammetry.



CLIENT	DEPARTMENT OF TRANSPORT, WESTERN AUSTRALIA		Date	18 July 2024	Paper Size	A3
	GEOPHYSICAL INVESTIGATION FOR COASTAL EROSION VULNERABILITY ASSESSMENT ONSLOW, SHIRE OF ASHBURTON WA		Scale	1:5000	Drawn	OMLE
			Drawing	3095C-26	Revision	1