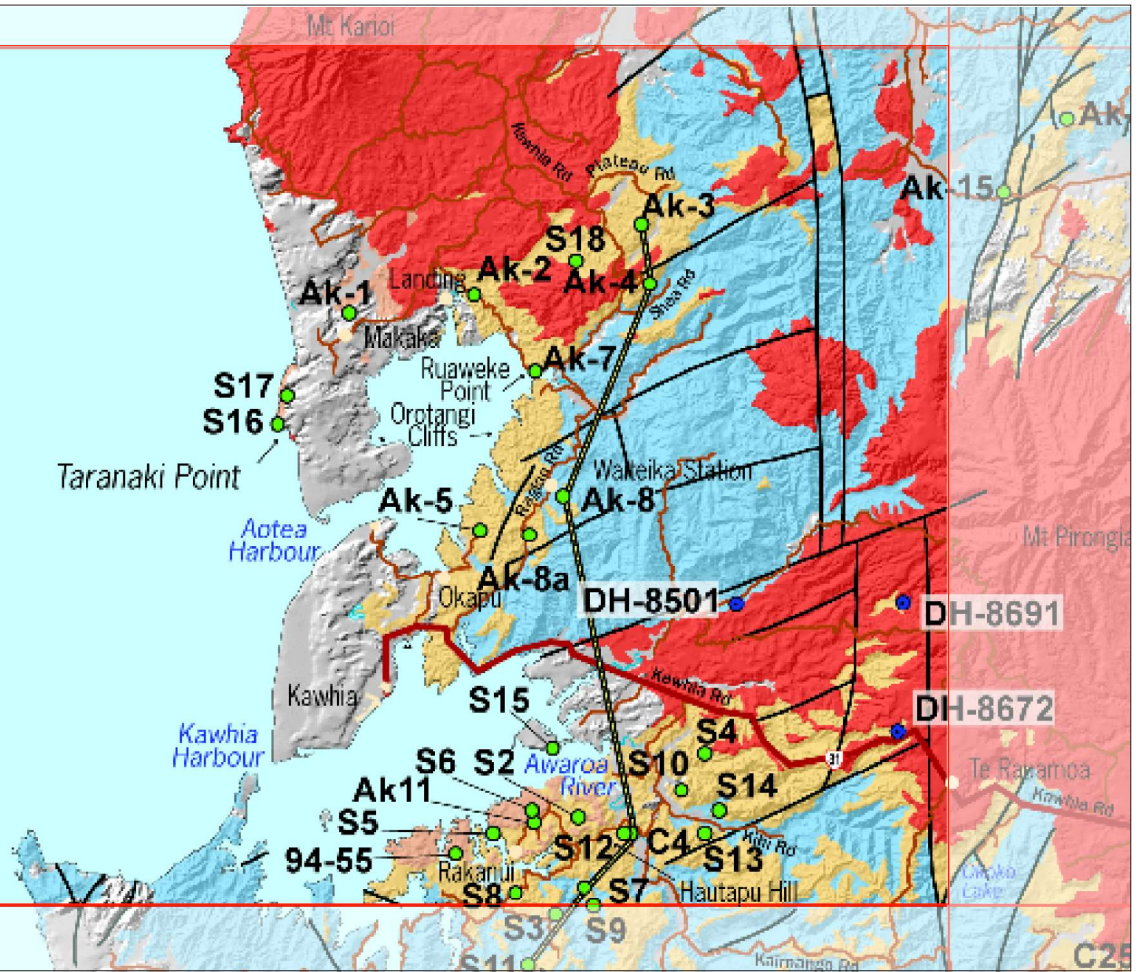


R15



R16

Stratigraphic Column No: Ak-1

Grid Reference: Top

Bottom

NZMS 260 R15

Region: Aotea-Kawhia

E: 2669064

Location: Makaka settlement, Phillips Road,
north of Aotea Harbour

N: 6360694

AK-1

NZMS 260 Sheet: R15/690606

Page 1 of 3

Author: A. Tripathi

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Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description
Ld	Orahiri	0-70		Top eroded						
				Well flaggy, flags 5-10 cm, comparatively pure limestone						
Lwh	Aotea	0-70		Massive, bioturbated with common large inclined burrows, gradational upper and lower contacts.		Scattered bivalves, deformed infaunal panopea		WO3 3357	S2	CALC. SILTY SANDSTONE ; Dull brownish grey, mod. well cemented, massive in appearance, very fine to fine calc sandstone grading into silty sandstone, scattered bivalves mainly concentrated in the lower part, strongly bioturbated, burrows freq apparent on the surface, occas deformed panopea cast, gradational upper and lower transition into limestone.
				Thin to med thickly flag (6-10 cm), selective leaching along recessive seams						
Lwh	Aotea	0-70		Prominent overhang mod well flaggy				WO3 3355	L4	
				Weathering break, large inclined burrows visible						
Lwh	Aotea	0-70		Cavernous weathering, alteration of irregularly flaggy and massive sandy limestone, selective leaching of calcite resulting in resistant and recessive bands		Scattered echinoids, coarse bryozoan frag		WO3 3354	L4-S1	SANDY LIMESTONE : Light yellow brownish, variably weathered often cavernous, thinly to moderately thickly flagged, bioturbated, common large inclined burrows apparent on the weathered surface, abundant medium to coarse sand size lithoclasts, scattered bioclast commonly of echinoids, bryozoan fragments
				Low angle cross-bedding, approx 0.5-0.6 cm thick cross sets						
Lwh	Aotea	0-70		Mod well flaggy, selective leaching along irregular siliciclastic rich seams		Scattered echinoid fragments		WO3 3353	L2-L4	CROSS BEDDED LIMESTONE: Light brownish grey, thinly flaggy, low angle cross bedded.
				Mod to thinly (5-18 cm) flaggy, medium to coarse quartz sand visible on surface						
Lwh	Aotea	0-70		Mod to thin (5-18 cm) flaggy, medium to coarse quartz sand visible on surface		Bivalves mainly pecten fragments		WO3 3352	L4	
Lwh	Aotea	0-70						WO3 3351	L4	
Lwh	Aotea	0-70						WO3 3350	L4	
Lwh	Aotea	0-70						WO3 3349	L4	
<p>Lower contact not seen, most likely to be continuous in the subsurface.</p>										

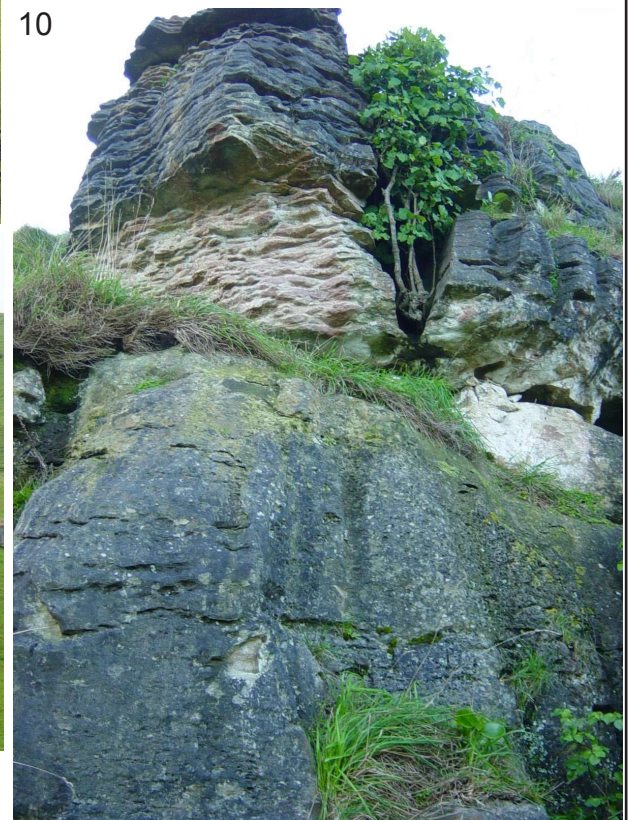
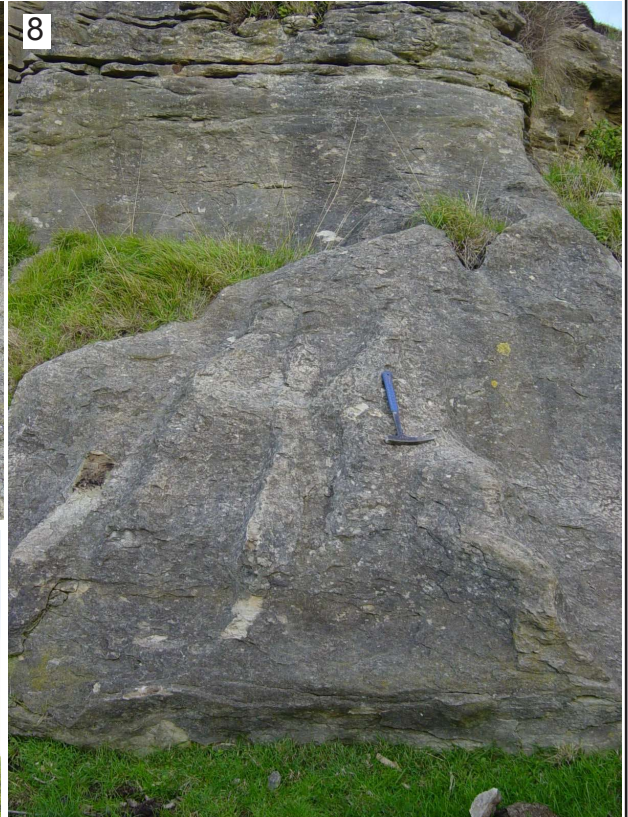
AK-1

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AK-1

3 of 3



Stratigraphic Column No: Ak-2

Grid Reference:

Top

Bottom

NZMS 260 R15

Region: Aotea-Kawhia

E: 2673135

2673450

Location: Pakoka Landing, Motakotako Creek,
Te Mata-Te Papatapu Road

N: 6361205

6361300

AK-2

NZMS 260 Sheet: R15/734613

Page 1 of 2

Author: A. Tripathi

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Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description
Ld	Orahiri	0 to 100		Top eroded	More pure lst in upper 2-3 m	Scattered bivalve frags.	L4	7		SANDY LIMESTONE: Buff to creamish white, irregularly flaggy to knobby, small solution cavities, conformable transitional from underlying calc. sandstone unit, sandy sparry grainstone becoming pure upsection, scattered bivalve fragments.
				Gradational transition, fluting development				6		
	Aotea		Kihiri		Cavernous, large weathering hollows, surface riddled with burrows	abundant bioturb. features. Rare whole pecten	S2	5		CALC. SILTY SANDSTONE: Light dull greyish to bluish grey, mod. well cemented, spheroidal weathering surface, in places horizontal cavities probably representing bedding surfaces, extensively bioturbated, abundant burrows visible on surface especially within large weathering hollows.
					Massive in appear., occ. faint bedding apparent from recessive bedding planes, spheroidal weath.					
Aotea	Hauturu		Conspicuous honeycombed surface	extensively burrowed Rare echinoid and bivalve frags. numerous burrows throughout	S1	2-4		CALC. SANDSTONE: Light brownish yellow, variably cemented hard concretionary bands alternating with moderately soft slightly friable sst bands with leached calcite cement, common highly honeycombed surface, exposure surface riddled with large and medium burrows and other bioturbation structures, variably calc. fine sandstone, steep bluff profile.		
			No exposure, gentle to mod. steep weathering profile							
Lwh	Glen Massey Ahirau			Mod. steep bulbous profile	Scattered pecten and other bivalve fragments	S2	1		CALCAREOUS SILTY SANDSTONE: Dull greyish to brownish grey, mod. well cemented, massive although 0.3-0.5 m faint horizontal bedding apparent in places, ripple to honeycombed surface, very fine to fine silty sandstone, com. tubular burrow structures visible on surface, scattered disart. pectins and fragments especially in lower part.	
			No exposure below creek level						Bottom contact not exposed, likely to continue below water level.	

AK-2

2 of 2



Stratigraphic Column No: Ak-3
Region: Aotea-Kawhia
Location: Plateau Road, Te Mata
NZMS 260 Sheet: R15/803646

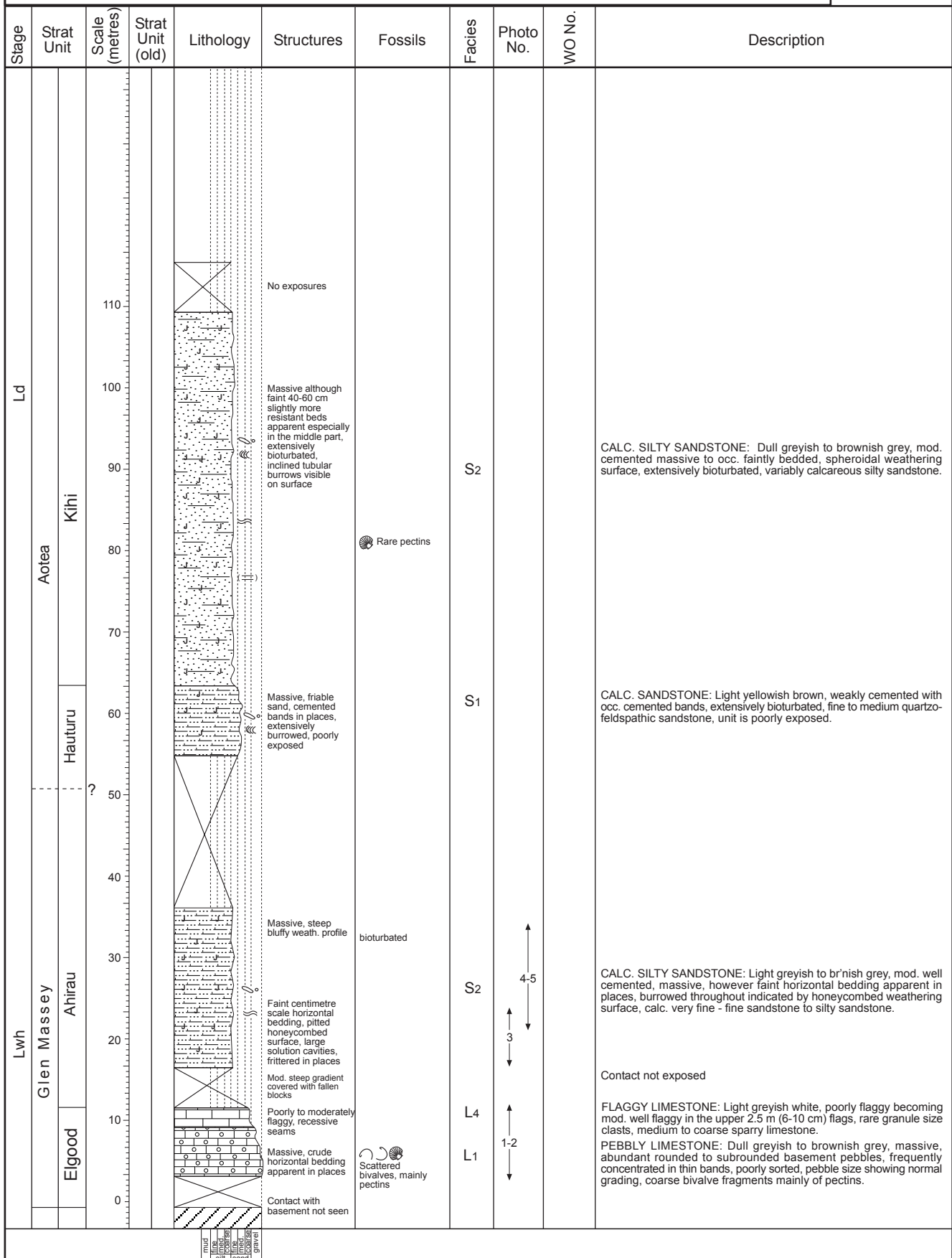
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E: 2680323 - 2679280
N: 6364630 - 6363770

NZMS 260 R15

AK-3

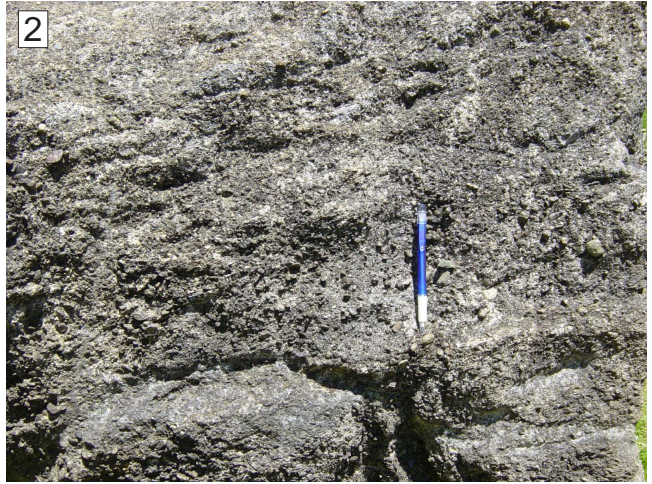
Page 1 of 2 **Author:** A. Tripathi

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AK-3

2 of 2



Stratigraphic Column No: Ak-4

Grid Reference:

Top

Bottom

NZMS 260 R15

Region: Aotea-Kawhia

E: 2679058 - 2679580

Location: O'Shea Road

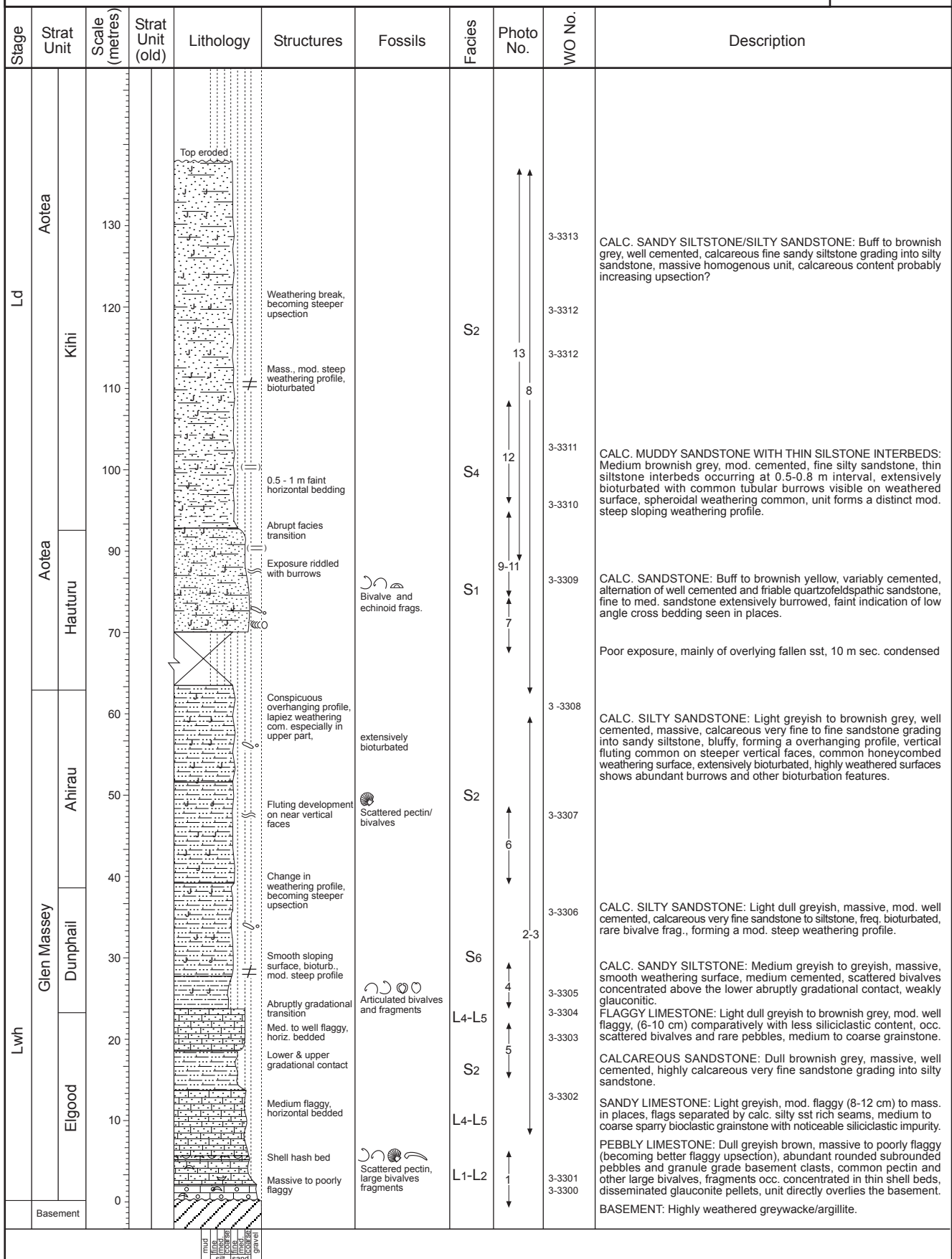
N: 6361050 - 6361670

AK-4

NZMS 260 Sheet: R15/790610

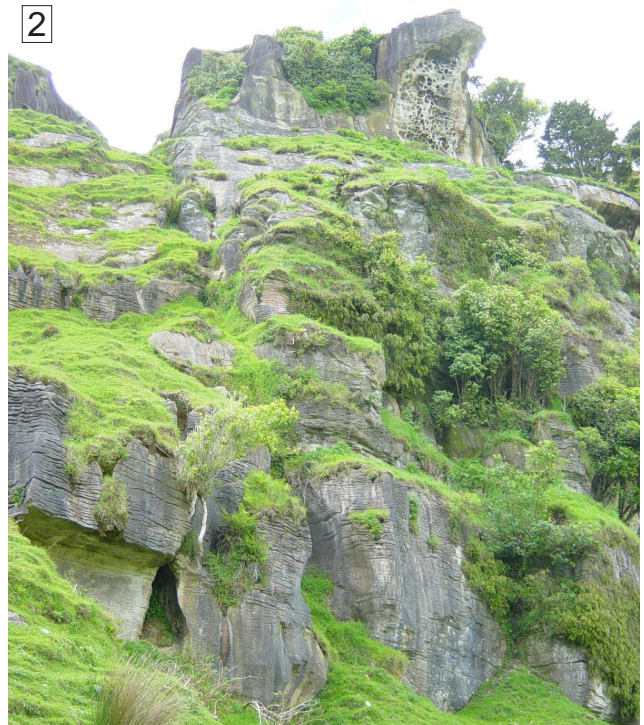
Page 1 of 3 Author: A. Tripathi

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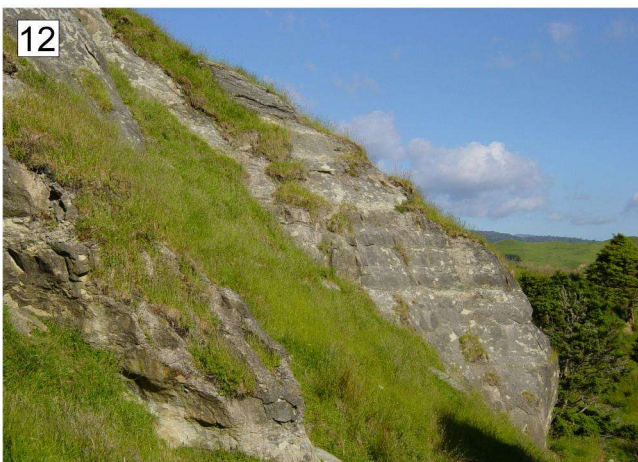
AK-4

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AK-4

3 of 3



Stratigraphic Column No: Ak-5

Grid Reference:

Top

Bottom

NZMS 260 R15

Region: Aotea-Kawhia

E: 2672961

- 2673640

Location: Orotangi Cliffs, Okapu Station, Aotea Harbour

N: 6353369

- 6353050

AK-5

NZMS 260 Sheet: R15/729533

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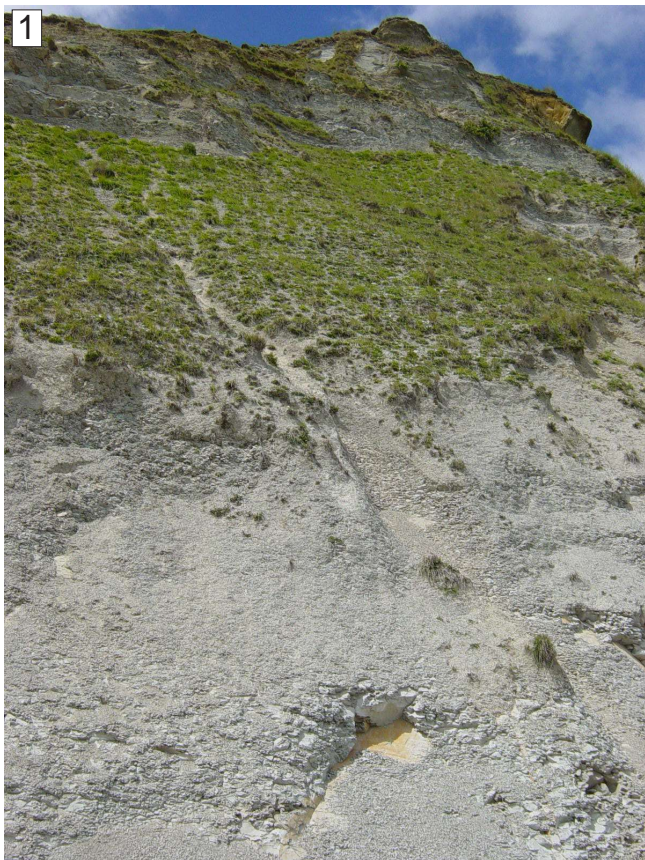
Author: A. Tripathi

1 of 2

Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description
Lwh	Aotea	0 10 20 30 40 50 60 70	Haturu		No exposures, mod. steep weathering profile		S1	4-6	3-3323 3-3322	CALCAREOUS GRITTY SANDSTONE: Dull brownish grey, faint horizontal bedding apparent from large solution cavities parallel to bedding surface, scattered rounded to subrounded granule within fine to medium grained calcareous sandstone, extensively bioturbated, weathered surface shows dense inclined and horizontal burrow network, scattered bivalve and echinoid frags.
	Dunphail			Break in weathering profile, becoming steep upsection, slight overhanging at the contact, gradational facies transition	Typical conchoidal fracturing, mod. steep weathering profile	S6	2	3-3317 3-3316	CALC. SILTSTONE: Light bluish grey to brownish grey, well cemented, massive, frittered weathering surface, conchoidal fracturing common, freq. iron stained curvilinear joints, fine calcareous siltstone.	
										3-3315 3-3314

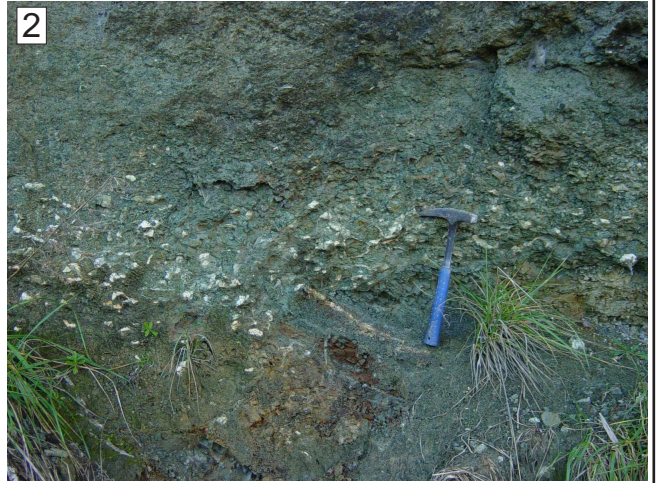
AK-5

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AK-7

2 of 2



Stratigraphic Column No: Ak-8

Grid Reference:

NZMS 260 R15

Region: Aotea-Kawhia

E: 2676531

Location: Waiteira Station, Raglan Kawhia Road

N: 6354284

AK-8

NZMS 260 Sheet: R15/765542

Page 1 of 2

Author: A. Tripathi

1 of 2

Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description
Lwh	Glen Massey	0 to 60	Ahirau	Eroded top						
				Bluffy lapiez weathering on near vertical faces	burrowed		S2	5	3-3383	CALC. SILTY SANDSTONE: Light brownish grey, mod. well cemented, massive, lapiez weathering, honeycombed weathering surface, extensively bioturbated, prominent bluffy with near vertical profile.
					Scattered pecten				3-3382	
				Faint horizontally bedded becoming massive upsection			S1-S6		3-3381	PEBBLY GLAUC. SILTSTONE: Dull greyish to greenish grey, weakly to mod. cemented (crumbly in places), faintly horizontally bedded to massive, abundant scattered rounded-subrounded pebbles frequently glauconitised, fabric supported by poorly sorted glauconitic variably calcareous siltstone matrix, abrupt gradational lower contact with limestone
Elgood	Dunphail	10 to 20	Ahirau	Abruptly gradational facies transition						
				Low angle x-bedded	Scattered bivalve and other coarse bioclasts	L3	4	3-3379	CROSS-BEDDED PEBBLY LIMESTONE: Light greyish to whitish, well flaggy, thin wavy flags 4-8cm, recessive irregular seams, low angle cross bedded 0.2-0.4 m thick cross sets, abundant scattered granule and occ. pebble, common scattered bivalve fragments, disseminated glauconite pellets, medium to coarse bioclastic grainstone.	
				Contact with basement not exposed				1-2	3-3378	
										Weathered basement greywacke, contact with limestone not exposed.

mud
 clay
 silt
 sand
 gravel

AK-8

2 of 2



Stratigraphic Column No: Ak-8A

Grid Reference:

NZMS 260 R15

Region: Aotea-Kawhia

E: 2675350

Location: Mangaora Stream, Kawhia-Raglan Road

N: 6352900

AK-8A

NZMS 260 Sheet: R15/753529

Page 1 of 2

Author: A. Tripathi

1 of 1

Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description
	Glen Massey Ahirau	0 10 20 30 40			<p>No exposure, thick vegetation</p> <p>Massive, common tubular burrows, well cemented</p> <p>Lower contact not exposed</p>	<p>Scattered pectins</p>	S2		<p>3- 3389</p> <p>3- 3388</p> <p>3- 3387</p>	CALCAREOUS SILTY FINE SANDSTONE
				<p>mud</p> <p>clay</p> <p>loam</p> <p>silt</p> <p>sand</p> <p>gravel</p>						

Stratigraphic Column No: Ak-11

Grid Reference:

NZMS 260 R15

Region: Aotea-Kawhia

E: 2675565

Location: Rakanui Peninsula, abandoned quarry on Rakanui Road, Kawhia Harbour

N: 6342909

AK-11

NZMS 260 Sheet: R15/755429

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Author: A. Tripathi

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Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description
LW	Otorohanga				<p>Top eroded</p> <p>Abruptly gradational transition</p> <p>Highly irregular seams</p> <p>Master bedding surface, horizontally bedded</p> <p>Well developed flags, recessive seams</p> <p>Cross-stratification, resistant flags separated by prominent recessive siliciclastic rich seams</p> <p>No exposures, 20 m gap.</p> <p>Massive, faint horizontal bedding discernible in places obvious from partings</p>	<p>Athlopecten athleta, Panopea, Dentalium, other large bivalves</p> <p>Oyster bed/ cluster, shells bored</p> <p>Scattered large bivalve fragments</p> <p>Abundant scattered oysters, haphazardly orientated</p> <p>Echinoid, bryozoan skeletal grains</p>	<p>S2</p> <p>L6-L5</p> <p>L3</p> <p>L6</p> <p>L2</p> <p>L4</p> <p>L2-L4</p> <p>S1</p>	<p>8-10</p> <p>6-7</p> <p>4</p> <p>5</p> <p>3</p> <p>1</p> <p>1-2</p>	<p>3-3372</p> <p>3-3371</p> <p>3-3370</p> <p>3-3369</p> <p>3-3368</p> <p>3-3367</p> <p>3-3366</p>	<p>MASSIVE SILTY SANDSTONE: Medium bluish grey, weakly to mod. cemented, massive, silty sandstone, extensively bioturbated, highly fossiliferous.</p> <p>IRREGULARLY FLAGGY LIMESTONE: Light brownish grey, thickly flagged, irregularly seamed, com. scattered oysters and other large bivalve fragments, coarse skeletal grainstone, pure.</p> <p>OYSTER LIMESTONE: Light greyish to dirty white, mod. flaggy, abundant oysters occurring within metre thick beds.</p> <p>CROSS BEDDED LIMESTONE: Light greyish, well flagged (6-12 cm), low angle planar cross-bedded alternating with horizontally bedded units, med. to coarse skeletal grainstone.</p> <p>CROSS BEDDED LIMESTONE: Low angle planar cross-bedded, gently inclined beds</p> <p>HORIZONTALLY BEDDED SANDY LIMESTONE: Light greyish, well flagged, (8-14 cm) medium to coarse skeletal sandy grainstone.</p> <p>SANDY LIMESTONE: Dull greyish to light brownish, thinly flaggy (5-6 cm), low angle ripple cross stratification apparent on the weathered exposed face, thin resistant flags alternating with horizontal to gently inclined recessive seams.</p> <p>CALCAREOUS SANDSTONE: Light dull greyish to brownish, mod. well cemented, overall massive in appearance, variably calcareous fine to medium sandstone.</p>
	Ld		<p>Aotea</p> <p>Hauturu</p>	?						

mud
silt
sand
gravel

AK-11

2 of 3



AK-11

3 of 3



Stratigraphic Column No: 94-55

Grid Reference:

NZMS 260 R15

Region: Aotea - Kawhia

E: 2672800

Location: Waipuna Station, Kawhia Harbour

N: 6341800

94-55

NZMS 260 Sheet: R15/728418

Page 1 of 2 **Author:** A.S. Anastas
Modified: A. Tripathi

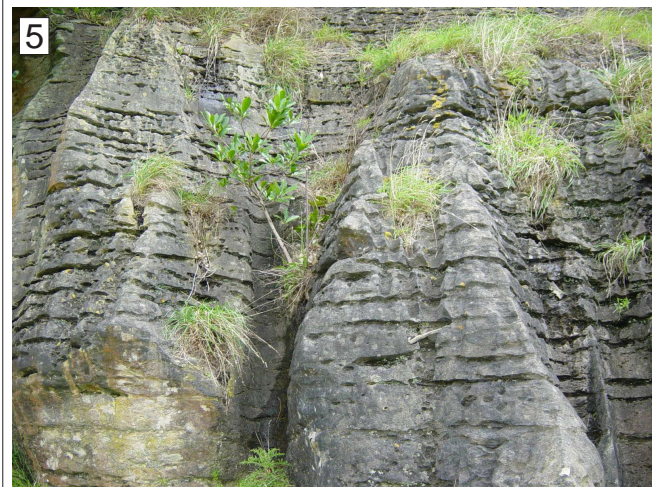
1 of 2

Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description
Lw	Otorohanga Limestone	0-70	Orahiri Limestone				L2-L4			<p>Low angle sandy limestone, echinoderm frags. packstone, strong interparticle suturing, 30 % glauconite.</p> <p>Low angle inclined bedded sandy limestone, 'packaged' (25-40 cm), beds 15-20 cm, non-bioclastics 1%.</p>
										<p>Cross-bedded grainstone, sandy, stratification, closed frame, diverse allochems. Echinoderm bryozoan grainstone, beige, small cross-sets.</p> <p>Sandy grainstone, medium sand. Pebble horizon, fossiliferous, gradational base, pyritic nodules, basement pebbles.</p> <p>Beige sandy grainstone, horizontally bedded, seams at large intervals.</p>
Ld	Orahiri Fmn	0-10	Orahiri Limestone			<p>Fossiliferous, echinoderms, bivalves</p> <p>⊕ Bioturbation nodules</p> <p>⊕ <i>Amphistegina</i></p>	L4			<p>Sandy grainstone, cross-set.</p> <p>Low angle and horizontal lamination. Shell layer, massive, pebbles, bivalves.</p> <p>Sandy lst./calc. sst, resistant, relict bedding, horizontally bedded. Sandy lst./calc. sst, massive. Sandy lst./calc. sst, resistant, relict bedding, horizontal bedded, 15-25 cm tabular layers, laminated sandy grainstone.</p>

mud
 silt
 sand
 gravel

94-55

2 of 2



Stratigraphic Column No: C. 4

Grid Reference:

NZMS 260 R15

Region: King Country/Waitomo

E: 2678955

Location: Hautapu Hill, east of Hauturu

N: 6342499

C-4

NZMS 1 Sheet: R15

Page 2 of 2

Author: C. Nelson

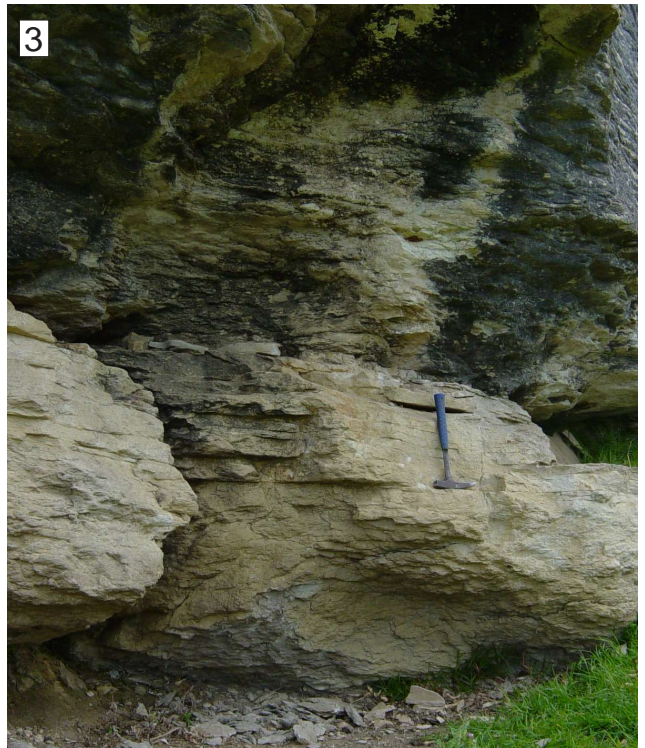
Modified: A. Tripathi

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Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description	
Ld	Orahiri - Otorohanga?	170 160 150	Otorohanga Lst	<p>eroded top</p> <p>Pakeho Lst</p> <p>W.Br 158.6 m</p> <p>oysters</p>			L6-L4			<p>Occ. oyst. in mod. dev. irreg. seamed lst.; 165.6-166.8 m mod.-well dev., sl. irreg. seams, vert. joints, rubbly app.</p> <p>Seams av. 13 cm well dev. 162.5-165.6 m. Seams av. 8 cm, freq. anastomose.</p> <p>Oyster band ~159 m, mod. well packed, sharp top & bott., occ. oysts. below, irreg. mod. dev. seams.</p>	
	Te Anga ?		Pakeho Lst							<p>Distinct W.Br. (148 m)</p>	<p>Seams 5-8 cm, 157-159 m, mod-well dev. Occ. scatt. oysts 156.7m, & ~156 m, mod. packed. Sl. wavy, narrow av. 2.5-5 cm seams.</p>
	Aotea	140					S2			<p>Typ. mass. calc. ssts (s.lst) having variable weath. app; mass. to incip. seams with ripply surf. or smooth sloped fritt. bl/gr ssts.</p>	
	Kihi	130						10-11			
	Aotea Sandstone	120						5			
	Hauturu	110					S1		3-3348	<p>Mass. sl. ripply calc. ssts. (s. lst) wh. between about 102-117 m form a distinct smooth cliff face.</p>	
				<p>Weak weath. break</p>							
				<p>mud clay silt sand gravel</p>							

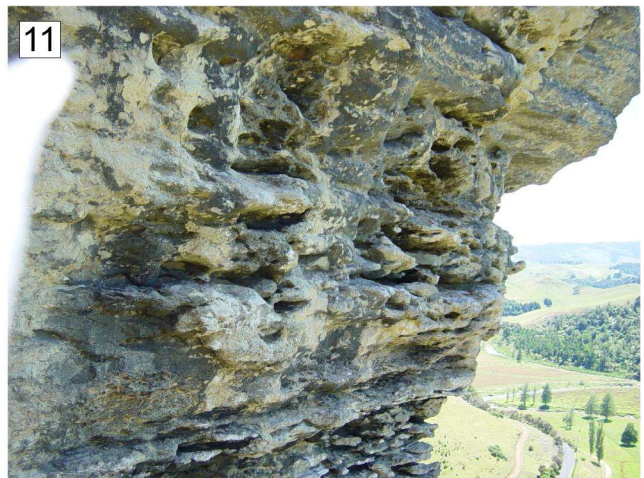
C-4

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C-4

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Stratigraphic Column No: S2

Grid Reference:

NZMS 260 R15

Region: Aotea - Kawhia

E: 2677100

Location: Tawairoa trig station

N: 6343100

S-2

NZMS 260 Sheet: R15/771431

Page 1 of 1 **Author:** D. Fergusson

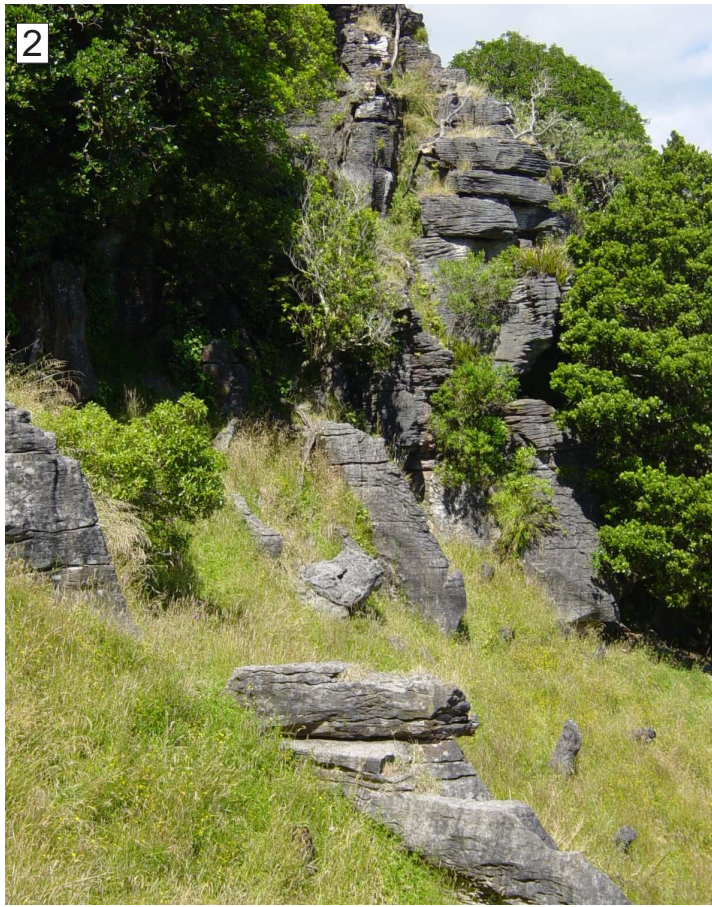
1 of 2

Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description
Ld	Otorohanga	200	Orahiri Limestone				L6			Oyst. frags-micritic lst.
	Orahiri	190								Lt. br. cr. well ind., cryst. v. sl. glauc. v. sl s. lst.; micritic cement. Flags uneven; seams lat. cont., occ. pinch-out.
LWh	Aotea	170	Aotea Sandstone				S2			Blocky-flaggy; 8-15 cm beds. Scour and fill relatns. discern. in flags.
	Kihi	160								1/2 m oyst. band, mod.-tightly packed.
LWh	Hauturu	150	Aotea Sandstone				S1			Well ind. cryst. bioclastic lst. Flaggy; flags 8-12 cm sl. wavy seams, but lat. cont.
		140								Terrig. content decreases upward. Flaggy lst; flags 3-5 cm, interflags 2 cm, sl. wavy.
		130								Cr. well ind., cryst., s. lst.
		120								Cr. - lt. br., mod. ind., v. sl. glauc., sl. cryst., f.s. lst. (- v.c. sst?), Cementation increases upwards. Incip. flaggy, seams irreg. (1-2 cm). Beds 5-8 cm, pinch-out laterally.
		110								Br.-or., mod. ind., v. sl. glauc., sl. m. v.s. f. sst - f.s. lst with rare shell frags. Mass.-ripply.
		100								Fe-stained burrows.
		90								Br.-gr., wk. ind., sl. glauc., calc. f. sst. with some shell frags (conspic. on smooth surf.).
		80			Weathering break					Rare calcite pebbs. (sm); 'random' joints conspic.
		70								Or.-br., wk.-mod. ind., sl. glauc. sl. m. f. c.sst. with some shell frags. Smooth, mass. surf. exfoliating. Fine sst (no appt. change in outcrop form).
		60								Or.-gr., mod. ind., crs. s. calc. sst. with rare-some crs. sand - grans. SRF. Gradual lith. change.
		50								Ol.-gr.; mod. ind., v. sl. glauc., sl. cryst. v.c. sst-v.s. lst. (?) with pocket of crs. s. shell frags. and rare granules of SRF. Incip. flaggy-flaggy seams 3-4 cm, beds 5-12 cm.
		40								Lt. or.-ol./gr.; mod. ind., sl. glauc., (med. s), sl. cryst., v.c. sst. -v.s. lst. (f-med. s) with rare shell frags. but often many (concentrated) in seams. Incip. flaggy, mass. ripply, irreg. seams 2-5 cm.
		30								Outcrop grass covered.
		20			Slight weathering break					Lt. or.-gr., wk.-mod. ind., v. sl. glauc., sl. cryst., f-m slst.-v.c. sst.(?). Shell frags. concn. in seams. Mass.-ripply; irreg. seams, some com., pinch-outs, 2-5 cm thick, beds 10-15 cm.
		10			Weathering break					Grassed ledge, prob. grad. into above lith.
		0			Weathering break					Lt. or.-gr. (Fe stained) mod.-str. ind., sl. cryst. f.s. lst.
					Weathering break					Grad. lith. change. Knobbly bedded; very irreg.
										Lt. or.-gr., mod. ind., v. sl. glauc. (sl. cryst.) v.c.f. sst.-f.s. lst. X-bed. app. dip 17°E, planar foresets. shell frags.
										Massive, w. ind., sl. calc. sst.
										Light br.-or., wk. ind.-friable, sl. glauc. sl. calc. sst. Occ. shell frags. Knobbly-bded: beds v. irreg., 5-8 cm thick, often only remnant 'knobs' in leached sst matrix.
										Lower contact not seen, probably basal lst. on Jurassic basement rocks.

mud
lime
silt
silt
sand
sand
gravel

S-2

2 of 2



Stratigraphic Column No: S4

Grid Reference:

NZMS 260 R15

Region: Aotea - Kawhia

E: 2681500

Location: 2 km due W of Te Kauri Lodge

N: 6345300

S-4

NZMS 260 Sheet: R15/815453

Page 1 of 1 **Author:** D. Fergusson

1 of 1

Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description		
Ld	Orahiri - Otorohanga	100	Orahiri Limestone		eroded top?	Loosely packed oyster horizon	L6			Flaggy		
							L3			Cr., v. well ind., cryst., bioclastic lst. Gradational contact?		
LWh	Kihi	0-100	Aotea Sandstone		Sub vertical repose Vertical repose ↑ Repose = 30°	Fossil debris	L2			Bioclastic lst. with intervening 1-2 cm terrig. x-beds (app. dip 12-14° E). Flags 5-8 cm at lower contact, increasing to 8-12 cm above 84 m		
							L4			Multicolour, well ind., sl. gran.-crs. s. bioclastic lst (pinkish bioclasts conspic.)		
							S4			Lt. yell.-gr., well ind., sl. glauc. s. lst. Pectinid valves lying horizontally. Seams 1-3 cm, deeply incised		
							S4			Seams beginning to develop, variably spaced, irreg.		
							S4			Lt. or.-gr., well ind., sl.-mod. glauc. sl. m. calc. f.-m.? sst		
	Aotea		Waitetuna Lst	0-100	Waitetuna Lst		Repose change = 50° SI concavity. Weathering break Repose = 70°		S4			Ol.-gr., wk. ind., mod. glauc. sl. m. calc. f. sst. Massive, vertical repose
									S4			Lt. bl.-gr., wk. ind., mod. glauc. sl. m. calc. f. sst
									S2			Lt. br.-ol. gr., wk.-mod. ind., mod. glauc. sl. m. calc. f. sst. Massive, ripply; surface pocked
									S2			Lt. or.-gr., well ind., sl. cryst., f. s. lst-v. calc. sst. Patches of sand enrichment. Flaggy, seams 3-5 cm, deeply incised, sl. wavy
									S1			Grassed slope
Hauturu	Aotea Sandstone	0-100	Aotea Sandstone				S1			Lt. br.-gr., wk. ind., sl.-mod. glauc., muddy calc. f. sst.		
							S1			Lt. or.-gr., wk. ind., sl. glauc., muddy calc. f.-m. sst. Crude bedding discern., but seams inverted, interconnect, and 3-5 cm wide. Local increase in bioturbation.		

Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description
LWh	Aotea Kihī	0 10 20 30 40	Orehihi Lst		No outcrop		L4 S2 S2 S2			<p>Cr. grey, v. well ind., bioclastic lst with rare s. grains and laminae. Flaggy.</p> <p>Gr. grey, v. well ind., mod. glauc., v. calc. sst-v.s. lst(?), rare shell frags (sand = msu-crsSL). Thicker, wavy 'flags', seams less distinct.</p> <p>Lt. br., well ind., sl. glauc., s. lst-v. calc. sst(?); (sand = fsl-fsu). 'Flags' 3-5 cm. Wavy, lat. discontin., 1-2 cm thick seams.</p> <p>Gr. grey, well ind., sl.-mod. glauc. v.s. lst-v. calc. sst (sand = msu).</p> <p>Yell.-gr., sl. glauc., s. lst. (sand = msu). Irreg. seams impart wavy flagginess.</p> <p>Or.-gr., v. well ind., s. lst. with thin beds of crs. s. (qztz) app. concn. at base of ind. unit.</p> <p>Gr. grey, mod. ind., sl. glauc. sl. s. lst. with conspic. shell frags. (sand = fsu).</p> <p>Gr. grey, mod. ind., sl.-mod. glauc. f.s. lst., sl. muddy? Burrowed/bored.</p> <p>Yell.-or.gr., well ind., sl. glauc., f.s. lst. with rare shell frags.</p> <p>Leached calc. sst.</p>

Stratigraphic Column No: S6; **Rakanui Grid Reference:**

NZMS 260 R15

Region: Aotea - Kawhia

E: 2675500

Location: Central Rakanui Peninsula, north of Rakanui Road

N: 6343300

S-6

NZMS 260 Sheet: R15/755433

Page 1 of 1 **Author:** D. Fergusson

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Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description
Ld	Aotea Kihi	0 to 10	Aotea Sst							Massive, ripply fine calcareous sst.
	Orahiri		Orahiri Limestone		Rounded profile	Mod. packed oysters	L4			
Lw	Otorohanga	10 to 60	Waitemo Sst			Scattered oysters, fossiliferous	S2			Fossiliferous, fine calcareous sandstone. Oysters loose, scattered.
							L6		Sand coarser, concentrated near base. Mod. packed oysters.	
						Mod. packed oysters	L6			Mod. packed oysters.

mud
clay
silt
fine sand
coarse sand
gravel

Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description
Ld	Aotea	0 10 20 30 40 50 60 70 80 90	Aotea	eroded top Aotea Sandstone			S2			<p>Fine-grained sand.</p> <p>Massive, frippery, exfoliating, grey-yellow, sl. glauc. calcareous sandstone. Oversteep outcrop.</p> <p>Massive, sl. glauc., wky. indurated sandstone.</p>
	Kihi		Aotea		S2	<p>Typical banded sandstone.</p> <p>Bands 1-2 cm wide.</p> <p>Bands with weakly cemented intervening sands. Glauconitic, many shell fragments.</p>				
LWh	Aotea	0 10 20 30 40 50 60 70 80 90	Aotea	Aotea Sandstone			S1			<p>Typical banded sandstone facies. Oversteepened outcrop.</p> <p>Bioturbated, glauc., med-crs calc. sst. Incipient flags.</p> <p>30-40 cm pbl. band, very fossil. Lower contact sharply defined with occ. irreg 'v' protruding into lower lith.</p> <p>Gr.-bl. grey, massive sl. glauc. calc. sst. with many shell fragments and laterally impersistent granule bed a 12 m - pebble band immed. below.</p>
	Hauturu		Aotea		S1	<p>Swamp in valley.</p>				
	Glen Massey		Ahirau	Whaingaroa Silt			S4			

gravel
 sand
 silt
 clay
 mud
 sand
 silt
 clay
 mud
 gravel

Stratigraphic Column No: S12

Grid Reference:

NZMS 260 R15

Region: Aotea - Kawhia

E: 2678700

Location: Hautapu Hill, 3/4 km west of Hauturu

N: 6342500

S-12

NZMS 260 Sheet: R15/787425

Page 1 of 2 Author: D. Fergusson

1 of 2

Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description
LW/h	Glen Massey Dunphail - Ahirau	0-10	Whaingaroa S1st				S4			Lt. or-tan, sl.-mod. ind., v. sl. glauc, muddy lst. sl. cryst. Incip. flaggy, vague x-bedded near contact. Lt. br.-gr., weakly ind., moderately glauc., s.c mst-m.c. sst.
			Whaingaroa S2st				S6			Massive, friitery-exfol. occ. curv. joint, Fe stained. Bl.-gr., wk. ind., sl. f.s calc mst/muddy sst. Occ. mud filled, pyr. burrows (Fe stained). Pectin frags.
LW/h	Whaingaroa Awaroa	10-30	Wairua Lst Member				L2			Or-tan, mod.-well ind., cryst. lst. Flags 3-5 cm, wavy, occ. pinchout. Pinkish, cryst. lst. Flags thicken upwards. Tan-cr., well ind., cryst. lst (gran.-sm. pbl. bioclasts visible). Flags 6-10 cm, seams 1 cm, sl. wavy. relief on flags 5 cm.
			Ngape-enga?		No outcrop, grassed slope					Lapiez solution. Seams less distinct.
LW/h	Aotea Hauturu	30-90	Aotea Sandstone		Sl. weathering break	Echinoid frags.	S1			Wk. ind., mod.-v. glauc., calc. (fsu-msL) sst with rare shell frags. Peb. band, weakly ind., poorly cemented, mod. glauc., calc. s. (fsu-msL) conglomerate. Density of pbls. dec. upwards - gran.-sm. pbl (av.) with rare med. pebble. Whole abraded echinoid frags., many whole/frag. macrofossils. Wk. ind., poorly cemented, sl. glauc., calc. (fsu) sst with rare-some granules/pebbles. Banded calc. sst-v. s. lst(?). Thin granule bands.
			Aotea Sandstone							Banded calc. sst-v. s. lst(?), ver occasional cross-bedded strata.

mud
silt
sand
gravel

Stratigraphic Column No: S12
Region: Aotea - Kawhia
Location: 3/4 km west of Hauturu
NZMS 260 Sheet: R15/787425

Grid Reference:
E: 2678700
N: 6342500

NZMS 260 R15

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Page 2 of 2 **Author:** D. Fergusson

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Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description	
Lw	Orahiri-Otorohanga	180 170 160	Orahiri Limestone		Sharp contact, small relief		L3-L6			Scattered oysters, micritic matrix. Bioclastic lst; grans.-small pebble grains. Blocky.	
							L2-L4			Inarticulated oyster, loosely packed. Slightly sandy lst. Incip. cross bedding.	
Ld	Aotea	150 140 130	Aotea Sandstone		Repose change massive		S2			Flags 5-10 cm; seams deep. incised otherwise ~ 1-2 cm. Sl. wavy, occ. pinch outs. Prominent horizon; massive ripply v. well cemented c. sst-v. s. lst? Very incip. seams.	
							S2			Sl. weathering break	
	Aotea	Kihī	120 110	Aotea Sandstone		Vertical repose		S2			Grey, weakly ind., slightly glauc., slightly muddy calc. fine sst.
								S2			Massive-ripply.
	Hauturu	100	Aotea Sandstone				S1			Burrowing evident. Sl. glauc., mod. ind., v. calc sst. Low angle x-beds, bands 5-10 cm.	

mud
 silt
 sand
 gravel

Stratigraphic Column No: S13, Te Turutu **Grid Reference:**

NZMS 260 R15

Region: Aotea - Kawhia

E: 2681500

Location: ca. 2 km east of Hauturu, south side of Kihī Rd

N: 6342500

S-13

NZMS 260 Sheet: R15/815425

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Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description																				
e.LWWh	Aotea	0 10 20 30 40 50 60 70 80 90 100 WCM	Aotea Sandstone				S1			<p>Banded.</p> <p>Lt. tan/cr., mod. ind., v. sl. glauc., c. sst (s = msL).</p> <p>Pebble band; sm.-med. pebs. (well rded.) in calc. sst. matrix. Cr., mod. ind., sl. (-mod.) glauc., calc. sst. (s=fsu-msL). Knobbly bedded.</p> <p>Mod. ind., sl.(-mod.) glauc., c. sst. Fe-staining. (s=fsu; qtz feld). Knobbly-banded?</p> <p>Vegetation partly obscures outcrop surface.</p> <p>Mod.-str. ind., sl. glauc. v.c. sst - s. lst (s= fsu-msL). Mod. ind., glauc. gran.-sm. pbly lst. Pectinid frags. Sl. f.s. cryst bioclastic lst. Flaggy, flags 3-5 cm. Decrease in sand content.</p> <p>Strongly ind., sl. glauc. f.s. bioclastic lst. Flaggy. Fe-stained, cr., mod.-str. ind., sl. glauc., f.s. lst, (cryst). Terrig. seams, 1-2 cm spacing. Lt. or.-br., mod.-strongly indurated, very sl. glauc., f.s. lst, poss. cryst. conspic. bioclasts. Lt. or.-br., mod. ind., v. sl. glauc., sl. m. f sst/f.s. lst? Conspic. bioclasts (rare).</p> <p>Lt. br.-gr., mod. ind., sl. glauc., m.f. calc. siltstone. Mud lenses, mica? Rare shell frags. Evidence of bioturbation in terms of micro-lith. differences inside/outside mud coated elliptical trace. Massive, exfoliating.</p> <p>Lt. br.-gr., mod. ind., v. sl. glauc., f.s. calc. siltstone. conspic. mud lenses, rare micaceous flakes.</p> <p>Base not seen, overlies WCM; slumped topography?</p>																				
											S1	7-8	3 3362	5	6	4	1	3	2											
											S1																			
											S1																			
											S1																			
											S1																			
	Hauturu										Aotea	0 10 20 30 40 50 60 70 80 90 100 WCM	Aotea Sandstone				S1			<p>Banded.</p> <p>Lt. tan/cr., mod. ind., v. sl. glauc., c. sst (s = msL).</p> <p>Pebble band; sm.-med. pebs. (well rded.) in calc. sst. matrix. Cr., mod. ind., sl. (-mod.) glauc., calc. sst. (s=fsu-msL). Knobbly bedded.</p> <p>Mod. ind., sl.(-mod.) glauc., c. sst. Fe-staining. (s=fsu; qtz feld). Knobbly-banded?</p> <p>Vegetation partly obscures outcrop surface.</p> <p>Mod.-str. ind., sl. glauc. v.c. sst - s. lst (s= fsu-msL). Mod. ind., glauc. gran.-sm. pbly lst. Pectinid frags. Sl. f.s. cryst bioclastic lst. Flaggy, flags 3-5 cm. Decrease in sand content.</p> <p>Strongly ind., sl. glauc. f.s. bioclastic lst. Flaggy. Fe-stained, cr., mod.-str. ind., sl. glauc., f.s. lst, (cryst). Terrig. seams, 1-2 cm spacing. Lt. or.-br., mod.-strongly indurated, very sl. glauc., f.s. lst, poss. cryst. conspic. bioclasts. Lt. or.-br., mod. ind., v. sl. glauc., sl. m. f sst/f.s. lst? Conspic. bioclasts (rare).</p> <p>Lt. br.-gr., mod. ind., sl. glauc., m.f. calc. siltstone. Mud lenses, mica? Rare shell frags. Evidence of bioturbation in terms of micro-lith. differences inside/outside mud coated elliptical trace. Massive, exfoliating.</p> <p>Lt. br.-gr., mod. ind., v. sl. glauc., f.s. calc. siltstone. conspic. mud lenses, rare micaceous flakes.</p> <p>Base not seen, overlies WCM; slumped topography?</p>										
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Hauturu	Aotea	0 10 20 30 40 50 60 70 80 90 100 WCM	Aotea Sandstone				S1			<p>Banded.</p> <p>Lt. tan/cr., mod. ind., v. sl. glauc., c. sst (s = msL).</p> <p>Pebble band; sm.-med. pebs. (well rded.) in calc. sst. matrix. Cr., mod. ind., sl. (-mod.) glauc., calc. sst. (s=fsu-msL). Knobbly bedded.</p> <p>Mod. ind., sl.(-mod.) glauc., c. sst. Fe-staining. (s=fsu; qtz feld). Knobbly-banded?</p> <p>Vegetation partly obscures outcrop surface.</p> <p>Mod.-str. ind., sl. glauc. v.c. sst - s. lst (s= fsu-msL). Mod. ind., glauc. gran.-sm. pbly lst. Pectinid frags. Sl. f.s. cryst bioclastic lst. Flaggy, flags 3-5 cm. Decrease in sand content.</p> <p>Strongly ind., sl. glauc. f.s. bioclastic lst. Flaggy. Fe-stained, cr., mod.-str. ind., sl. glauc., f.s. lst, (cryst). Terrig. seams, 1-2 cm spacing. Lt. or.-br., mod.-strongly indurated, very sl. glauc., f.s. lst, poss. cryst. conspic. bioclasts. Lt. or.-br., mod. ind., v. sl. glauc., sl. m. f sst/f.s. lst? Conspic. bioclasts (rare).</p> <p>Lt. br.-gr., mod. ind., sl. glauc., m.f. calc. siltstone. Mud lenses, mica? Rare shell frags. Evidence of bioturbation in terms of micro-lith. differences inside/outside mud coated elliptical trace. Massive, exfoliating.</p> <p>Lt. br.-gr., mod. ind., v. sl. glauc., f.s. calc. siltstone. conspic. mud lenses, rare micaceous flakes.</p> <p>Base not seen, overlies WCM; slumped topography?</p>																				
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Hauturu	Aotea										0 10 20 30 40 50 60 70 80 90 100 WCM	Aotea Sandstone				S1			<p>Banded.</p> <p>Lt. tan/cr., mod. ind., v. sl. glauc., c. sst (s = msL).</p> <p>Pebble band; sm.-med. pebs. (well rded.) in calc. sst. matrix. Cr., mod. ind., sl. (-mod.) glauc., calc. sst. (s=fsu-msL). Knobbly bedded.</p> <p>Mod. ind., sl.(-mod.) glauc., c. sst. Fe-staining. (s=fsu; qtz feld). Knobbly-banded?</p> <p>Vegetation partly obscures outcrop surface.</p> <p>Mod.-str. ind., sl. glauc. v.c. sst - s. lst (s= fsu-msL). Mod. ind., glauc. gran.-sm. pbly lst. Pectinid frags. Sl. f.s. cryst bioclastic lst. Flaggy, flags 3-5 cm. Decrease in sand content.</p> <p>Strongly ind., sl. glauc. f.s. bioclastic lst. Flaggy. Fe-stained, cr., mod.-str. ind., sl. glauc., f.s. lst, (cryst). Terrig. seams, 1-2 cm spacing. Lt. or.-br., mod.-strongly indurated, very sl. glauc., f.s. lst, poss. cryst. conspic. bioclasts. Lt. or.-br., mod. ind., v. sl. glauc., sl. m. f sst/f.s. lst? Conspic. bioclasts (rare).</p> <p>Lt. br.-gr., mod. ind., sl. glauc., m.f. calc. siltstone. Mud lenses, mica? Rare shell frags. Evidence of bioturbation in terms of micro-lith. differences inside/outside mud coated elliptical trace. Massive, exfoliating.</p> <p>Lt. br.-gr., mod. ind., v. sl. glauc., f.s. calc. siltstone. conspic. mud lenses, rare micaceous flakes.</p> <p>Base not seen, overlies WCM; slumped topography?</p>											
																				S1	7-8	3 3362	5	6	4	1	3	2		
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Hauturu	Aotea	0 10 20 30 40 50 60 70 80 90 100 WCM	Aotea Sandstone				S1			<p>Banded.</p> <p>Lt. tan/cr., mod. ind., v. sl. glauc., c. sst (s = msL).</p> <p>Pebble band; sm.-med. pebs. (well rded.) in calc. sst. matrix. Cr., mod. ind., sl. (-mod.) glauc., calc. sst. (s=fsu-msL). Knobbly bedded.</p> <p>Mod. ind., sl.(-mod.) glauc., c. sst. Fe-staining. (s=fsu; qtz feld). Knobbly-banded?</p> <p>Vegetation partly obscures outcrop surface.</p> <p>Mod.-str. ind., sl. glauc. v.c. sst - s. lst (s= fsu-msL). Mod. ind., glauc. gran.-sm. pbly lst. Pectinid frags. Sl. f.s. cryst bioclastic lst. Flaggy, flags 3-5 cm. Decrease in sand content.</p> <p>Strongly ind., sl. glauc. f.s. bioclastic lst. Flaggy. Fe-stained, cr., mod.-str. ind., sl. glauc., f.s. lst, (cryst). Terrig. seams, 1-2 cm spacing. Lt. or.-br., mod.-strongly indurated, very sl. glauc., f.s. lst, poss. cryst. conspic. bioclasts. Lt. or.-br., mod. ind., v. sl. glauc., sl. m. f sst/f.s. lst? Conspic. bioclasts (rare).</p> <p>Lt. br.-gr., mod. ind., sl. glauc., m.f. calc. siltstone. Mud lenses, mica? Rare shell frags. Evidence of bioturbation in terms of micro-lith. differences inside/outside mud coated elliptical trace. Massive, exfoliating.</p> <p>Lt. br.-gr., mod. ind., v. sl. glauc., f.s. calc. siltstone. conspic. mud lenses, rare micaceous flakes.</p> <p>Base not seen, overlies WCM; slumped topography?</p>																				
																				S1	7-8	3 3362	5	6	4	1	3	2		
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Hauturu	Aotea										0 10 20 30 40 50 60 70 80 90 100 WCM	Aotea Sandstone				S1			<p>Banded.</p> <p>Lt. tan/cr., mod. ind., v. sl. glauc., c. sst (s = msL).</p> <p>Pebble band; sm.-med. pebs. (well rded.) in calc. sst. matrix. Cr., mod. ind., sl. (-mod.) glauc., calc. sst. (s=fsu-msL). Knobbly bedded.</p> <p>Mod. ind., sl.(-mod.) glauc., c. sst. Fe-staining. (s=fsu; qtz feld). Knobbly-banded?</p> <p>Vegetation partly obscures outcrop surface.</p> <p>Mod.-str. ind., sl. glauc. v.c. sst - s. lst (s= fsu-msL). Mod. ind., glauc. gran.-sm. pbly lst. Pectinid frags. Sl. f.s. cryst bioclastic lst. Flaggy, flags 3-5 cm. Decrease in sand content.</p> <p>Strongly ind., sl. glauc. f.s. bioclastic lst. Flaggy. Fe-stained, cr., mod.-str. ind., sl. glauc., f.s. lst, (cryst). Terrig. seams, 1-2 cm spacing. Lt. or.-br., mod.-strongly indurated, very sl. glauc., f.s. lst, poss. cryst. conspic. bioclasts. Lt. or.-br., mod. ind., v. sl. glauc., sl. m. f sst/f.s. lst? Conspic. bioclasts (rare).</p> <p>Lt. br.-gr., mod. ind., sl. glauc., m.f. calc. siltstone. Mud lenses, mica? Rare shell frags. Evidence of bioturbation in terms of micro-lith. differences inside/outside mud coated elliptical trace. Massive, exfoliating.</p> <p>Lt. br.-gr., mod. ind., v. sl. glauc., f.s. calc. siltstone. conspic. mud lenses, rare micaceous flakes.</p> <p>Base not seen, overlies WCM; slumped topography?</p>											
																				S1	7-8	3 3362	5	6	4	1	3	2		
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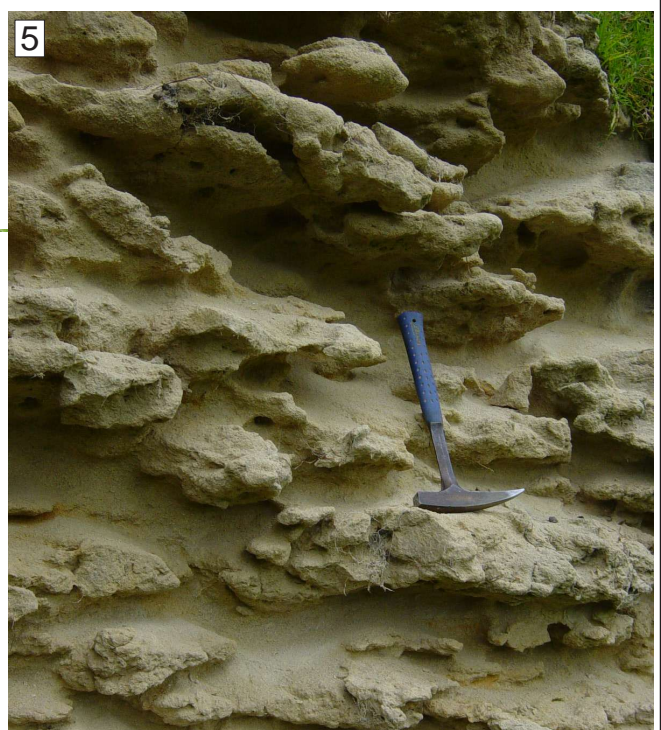
mud
silt
clay
sand
gravel

Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description
Aotea	Hauturu	0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150	Aotea Sandstone							
	Kihi									
Aotea	Kihi		Aotea Sandstone				S2			Br., sl.-mod. ind., sl.-med. glauc., m. c. sst. Bulbous profile, otherwise massive.
							S2			
							S2			
							S1			Differentially cemented c. sst. Crude horizontal beds 20 cm - 50 cm wide.

mud
 fine sand
 coarse sand
 gravel

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4 of 4



Stratigraphic Column No: S14, Maturangi

Grid Reference:

NZMS 260 R15

Region: Aotea - Kawhia

E: 2682000

Location: ca. 2 km east of Kihi Rd/Kawhia Harbour Rd

N: 6343300

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NZMS 260 Sheet: R15/820433

Page 1 of 2 **Author:** D. Fergusson

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Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description
i.LWh	Aotea	100 90 80 70 60 50 40 30	Aotea Sandstone	<p>cont. on pg 2</p>			S1			Typical banded calc. sandstone.
	Aotea									Hauturu
e.LWh	Glen Massey	20 10 0	Whaingaroa Silt	<p>↑ Increasing sand</p> <p>Low repose angle, friitery</p>			S4			Dark grey, weakly indurated, sl. glauc., calcareous siltstone. Many shell fragments. Massive in situ.
	Dunphail - Ahirau									
				<p>mixt silt fine sand coarse sand coarse gravel</p>						

Stratigraphic Column No: S16

Grid Reference:

NZMS 260 R15

Region: Aotea - Kawhia

E: 2666600

Location: Taranaki Point, West Aotea Harbour

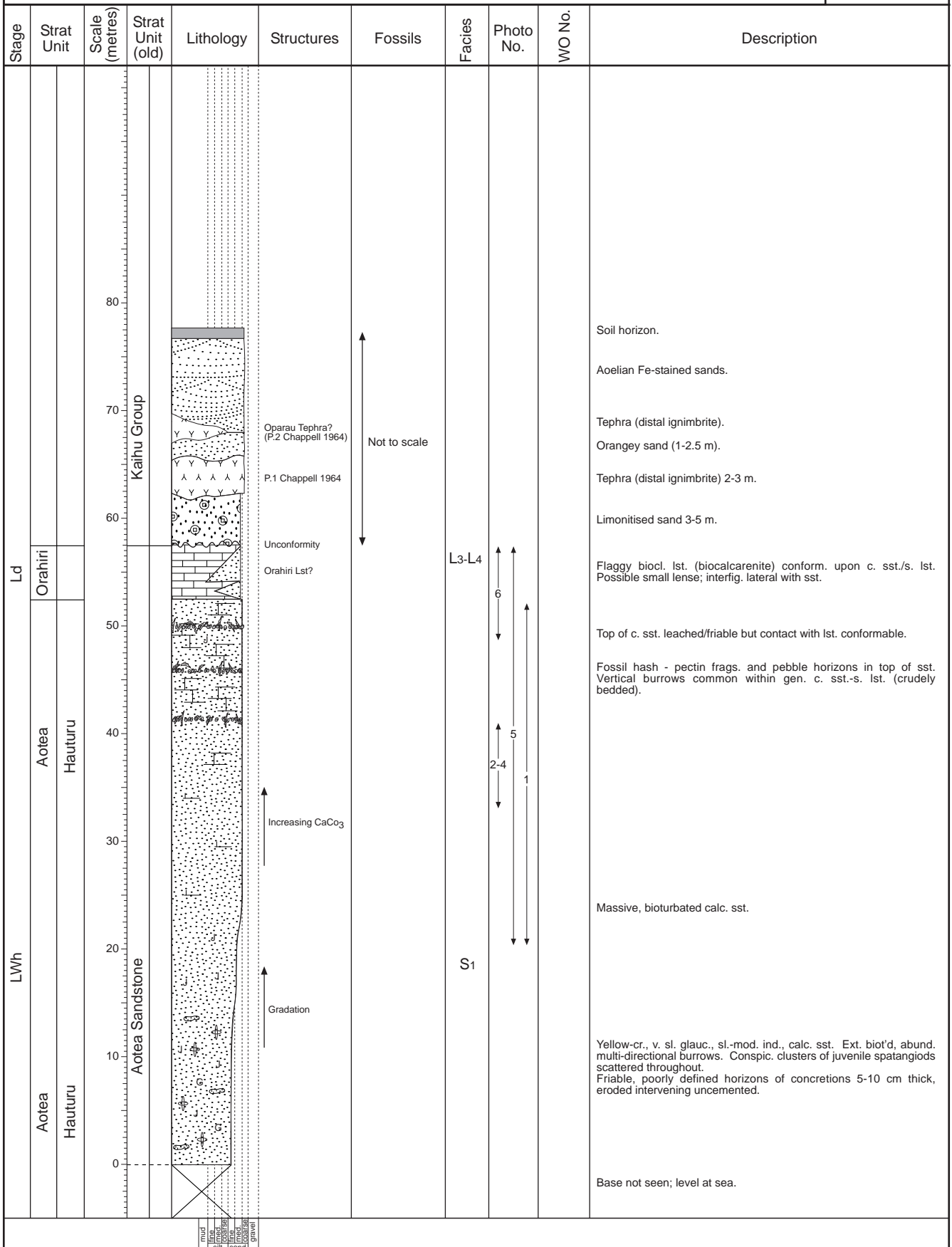
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NZMS 260 Sheet: R15/666568

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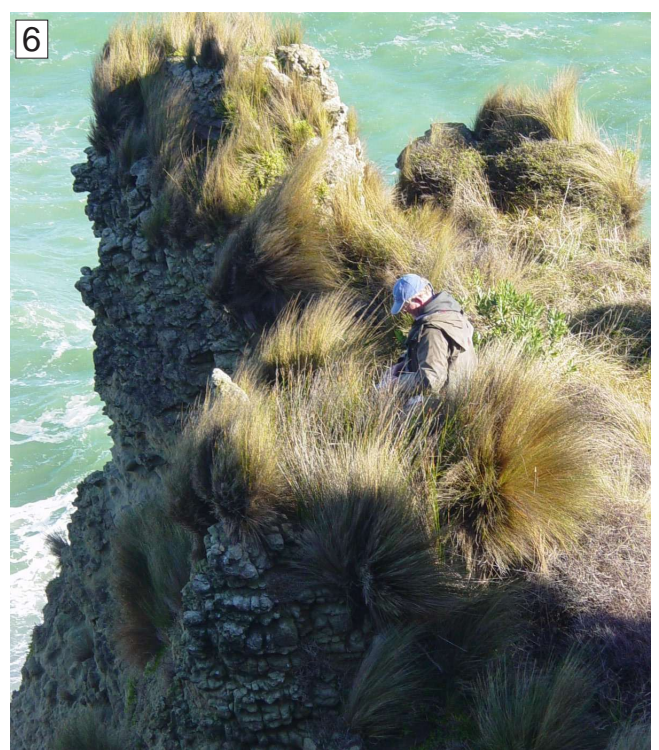
1 of 2



mud
silt
sand
gravel

S-16

2 of 2



Stage	Strat Unit	Scale (metres)	Strat Unit (old)	Lithology	Structures	Fossils	Facies	Photo No.	WO No.	Description
LWh	Aotea	0 to 70	?	Aotea Sandstone	Gradation		S2			<p>Massive, slightly muddy (includes mud lenses), very sl. glauc., fine calc sst. Extremely biot'd, occ. macrofaunal frag., microfossil tests conspic. Frittery, incip. exfoliation of outcrop surface.</p> <p>Massive, sl.-mod. glauc., f.m. calc. sst. Lapiez, subvert. repose</p> <p>Transition in profile.</p>
	Kihi									
	Aotea	60 to 70		Aotea Sandstone	Unconformity		S4			<p>Massive, sl. muddy, f.m. calc. sst. Better ind. than below, prominent horizon.</p> <p>Crudely bedded (diff. cementation) muddy fine calc. sst. - f. sandy calc. mudstone.</p>
	Kihi									
										<p>General sequence incomplete due to post-Oligocene/pre Okete erosion. General NW dip 4°. Okete Lavas have flow along paleodip slope.</p> <p>Correlation must be considered very tentative owing to poor strat. exposure.</p> <p>Concordant upper surface - in places overlain by Okete volcanics (basalt flows).</p>

mud
 silt
 clay
 sand
 gravel