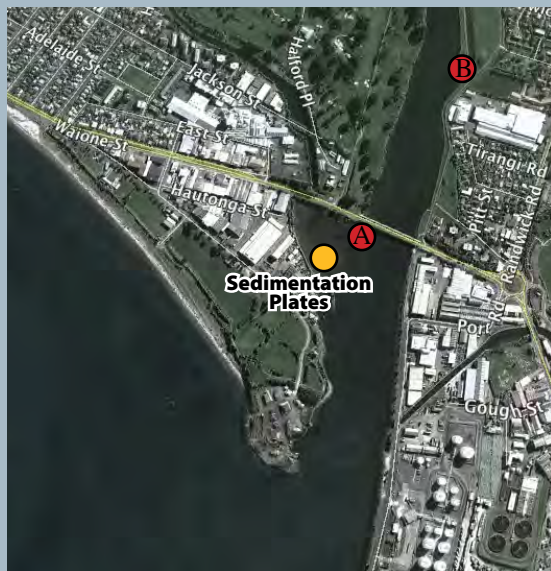
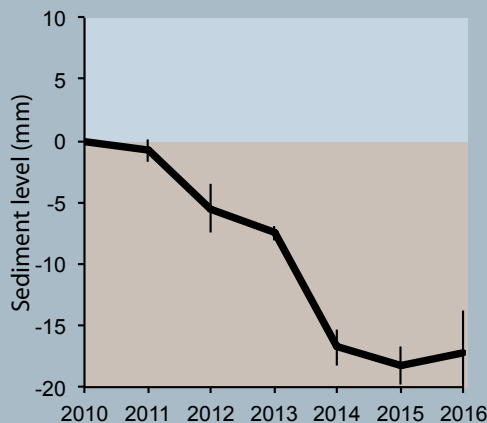


# HUTT ESTUARY: INTERTIDAL SEDIMENT MONITORING SUMMARY, 2015/2016

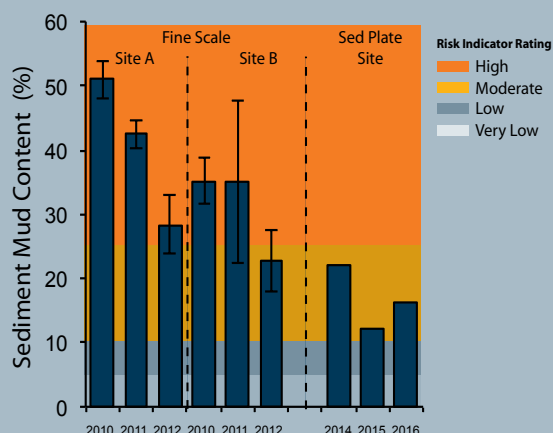
Prepared for Greater Wellington Regional Council by Leigh Stevens and Barry Robertson, Wriggle Coastal Management, June 2016



**Figure 1. Location of intertidal sediment plates and fine scale monitoring sites in the lower Hutt Estuary.**



**Figure 2. Change in mean sediment level over buried plates (+/- SE), Hutt Estuary, 2010 to 2016.**



**Figure 3. Sediment mud content (+/-SE, n=3), Hutt Estuary, 2010-16\*.**

\*2010-2012 = triplicate composite samples  
2014-2016 = single composite samples

This summary card presents the results of monitoring undertaken on 23 January 2016 to track changes to sediment indicators in Hutt Estuary. Detailed reporting is scheduled to be undertaken 5 yearly (next due 2017).

## Methods

The depths to four concrete plates buried in intertidal sediment in 2010 were measured to assess the long-term sedimentation rate (Figure 1 - see Robertson and Stevens 2011 for full details). Sediment condition was assessed by measuring grain size, visually assessing the apparent Redox Potential Discontinuity (aRPD) depth, and directly measuring sediment Redox Potential (RPmV@1cm).

## Risk Indicator Ratings

To help quickly identify the potential significance of sediment to Hutt Estuary, "risk indicator ratings" have been proposed (Table 1, see Stevens and Robertson 2014 for further detail) and are part of a suite of indicators being developed to assess the predominant issues affecting NZ estuaries (i.e. eutrophication, sedimentation, disease risk, toxicity and habitat change - Robertson and Stevens 2006, 2012, 2013, Robertson et al. 2016b). For each indicator, relative levels of risk (e.g. very low, low, moderate, high, very high) are assigned based on their relationship with water or sediment quality. Each rating is designed to be used in combination with relevant information and other risk indicator ratings, and under expert guidance, to assess overall estuary condition in relation to key issues, and monitoring and management recommendations.

**Table 1. Risk indicator ratings for sedimentation rate, sediment mud content, and sediment oxygenation (RPD depth and RP at 1cm).**

RISK INDICATOR RATING	SEDIMENTATION RATE	MUD CONTENT	aRPD DEPTH	RP (mV@1cm)
Very Low	<1mm/yr	<5%	Unreliable	>+100
Low	>1-2mm/yr	5-10%	Unreliable	-50 to +100
Moderate	>2-5mm/yr	>10-25%	0.5-2cm	-50 to -150
High	>5mm/yr	>25%	<0.5cm	>-150

## 2010-2016 Sedimentation Rate

Figure 2 and Table 2 summarise sediment level changes since the 2010 baseline. Changes in sediment levels over individual plates range from -13 to +6mm/yr, with an annual site average range of -0.8 to +1mm/yr. The overall mean sedimentation rate across the six years of monitoring is a decrease of 2.9mm/yr. Regular dredging of sediments from the channel in the lower estuary, and scouring of tidal flats during high river flows, are likely reasons for the low mean annual erosion rate recorded at the monitoring site.

## 2016 Sediment Mud Content and RPD depth

Sediment mud content was 16.4% (Table 3), reflecting firm muddy sands, less than the 23-51% recorded from the nearby shallow subtidal fine scale sites (Figures 1 and 3). Average aRPD depth was 0.8cm (Table 3), with a measured RP at 1cm of -72mV. The 2016 aRPD and RP and mud content all fall within the "moderate" risk indicator rating.

## Conclusion

The sedimentation rate over the past 6 years showed slight erosion, but the elevated sediment mud content and shallow RPD depth indicate the estuary is susceptible to sediment related impacts from muddy intertidal substrates, poor clarity and with a macrofaunal community dominated by mud tolerant species - a common situation in NZ tidal river estuaries.

## Recommended Monitoring

Continue annual monitoring of sediment rate, RPD and grain size to measure sediment deposition and temporal change on the only significant remaining intertidal flat within the estuary. Report results annually via a summary card, with detailed reporting undertaken 5 yearly in conjunction with fine scale monitoring (next scheduled for 2017).

# HUTT ESTUARY: INTERTIDAL SEDIMENT MONITORING SUMMARY, 2015/2016

**Table 2. Sediment monitoring results for Hutt Estuary, April 2010 - January 2016.**

SITE	Measured Mean Depth to Sediment Plate (mm)							Change in Sediment Level Over Plate (mm)						SEDIMENTATION RATE 2010-16	
	11/04/2010	15/01/2011	21/02/2012	15/01/2013	22/01/2014	18/01/2015	23/01/2016	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	(mm/yr)	RISK RATING
Hutt Plate 1	257	256	247	246	240	235	237	-1.0	-5.0	-3.7	-4.3	-5.5	-5.0	<b>-2.9 (SE=0.95)</b>	<b>VERY LOW</b>
Hutt Plate 2	250	248	245	242	232	234	225	-2.0	-2.5	-2.7	-4.5	-4.0	-6.3		
Hutt Plate 3	295	297	290	289	276	273	278	2.0	-2.5	-2.0	-4.8	-5.5	-4.3		
Hutt Plate 4	287	285	285	282	274	274	280	-2.0	-1.0	-1.7	-3.3	-3.3	-1.8		
<b>Mean Change in Sediment Level (mm/yr)</b>							<b>-0.8</b>	<b>-4.8</b>	<b>-2.0</b>	<b>-9.3</b>	<b>-1.5</b>	<b>+1.0</b>			

**Table 3. Grain size results for the Hutt Estuary sedimentation plate site.**

Date	RPD mean depth	Mud	Sand	Gravel
22 Jan 2014	1.5cm (SE=0.2)	21.9%	74.5%	3.6%
18 Jan 2015	1.5cm (SE=0.1)	12.3%	77.6%	10.1%
23 Jan 2016	0.8cm (SE=0.1)	16.4%	74.8%	8.8%

Note: Grain size results are based on a single composite sample comprising 4 sub-samples collected from the site. Mean aRPD depth is derived from 4 replicate measures.

## References

- Robertson, B.P. 2013. *Determining the sensitivity of macro-invertebrates to fine sediments in representative New Zealand estuaries*. Honours thesis, University of Victoria, Wellington.
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- Stevens, L. and Robertson, B.M. 2014. *Whareama Estuary: Intertidal Sediment Monitoring 2013/14*. Prepared for Greater Wellington Regional Council. 6p.

## Location of sedimentation rate monitoring plates in Hutt Estuary.

Site	NZTM East	NZTM North
Plate 1	1759101	5433548
Plate 2	1759097	5433548
Plate 3	1759093	5433548
Plate 4	1759089	5433548
Peg 1	1759103	5433548
Peg 2	1759099	5433548
Peg 3	1759095	5433548
Peg 4	1759091	5433548
Peg 5	1759087	5433548



Measuring sediment plates in the lower Hutt Estuary, Jan 2016.