

MUDDY WATERS II: DEMISE OF THE HAYBALE

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ABSTRACT

In 2004, Greater Wellington presented a paper to the NZWWA stormwater conference describing the growing problem of sediment discharges from earthworks in the region, and the consequences for stream ecosystems. The paper proposed a number of methods and actions to up skill regulators inform developers and educate contractors and the public, with the objective of reducing sediment export to the region's waterways and bring consistency to the regulatory process.

This paper reviews progress since that time, and in particular, the development and application of a range of regulatory tools and educational initiatives in the areas of development advice, resource consent processing and regulatory response. Specific examples and trends of before and after are presented for earthworks sites across the Wellington region.

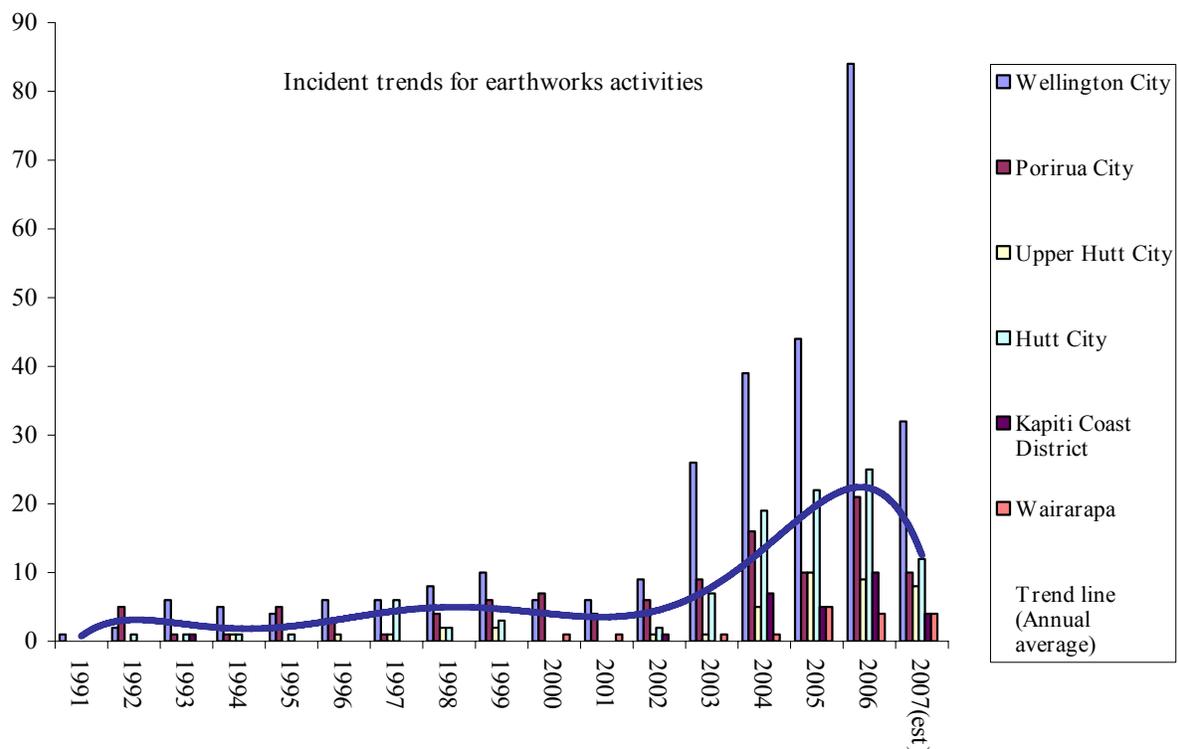
KEYWORDS

Sediment, Jurisdiction, Consent, Conditions, Compliance, Enforcement

1 BACKGROUND

The *Muddy Waters* programme was established following intensive investigation of the management and effects of earthworks in the Wellington region, which exposed excessive sediment loading on watercourses as the region's most significant water pollution issue. A review of incidents involving sediment discharges revealed that the number of sediment related incidents had sharply increased as a consequence of the residential development boom. (See figure 1)

Figure 1: Incident trends for earthworks



This was a concern particularly for Greater Wellington Regional Council (GW) as a Regional Policy Statement review of rules and guidance for earthworks activities in 2000 had resulted in the introduction of the Greater Wellington Erosion and Sediment Control guidelines (GW ESC guidelines 2002¹) and changes to rule 2 of the Regional Freshwater Plan in 2002. The increase in incident numbers since that time indicated that more needed to be done. In particular, sediment contributions from vegetation clearance and earthmoving associated with the development of sloping sites were having significant adverse effects on receiving waters and aquatic ecosystems. Developers have readily adopted modern construction techniques to enable houses to be built in areas that were previously too difficult, due to steep slope or space constraints. However, many have been less enthusiastic to adopt the necessary methods to deal effectively with the stormwater management problems associated with the development of such sites. Many of the more sensitive freshwater and estuarine habitats (in particularly the Pauatahanui Inlet) found within the region are currently at risk and face a growing threat unless future developments implement effective sediment control measures.

In 2003, GW initiated an appraisal of the regulatory controls, planning instruments and guidelines applicable to site development and earthworks operations in the Wellington Region, from both a regional council and territorial authority perspective. This work identified a general lack of resources, poor inter-agency coordination and a need to share information and resources with many of the parties involved in the earthworks and subdivision process.

A paper was prepared about these findings and presented to the NZWWA Stormwater Conference in 2004². A follow up presentation was made to GWs Environment Committee recommending several actions, which became known as the *Muddy Waters* programme. GW has since worked with all territorial authorities in the region to develop and implement the *Muddy Waters* programme, which has been designed to address many of the above problems, with much of the co-ordination being via the Regional Pollution Prevention Officers Forum umbrella group (RPPOF). During all stages, draft documents developed by GW were circulated widely around Territorial Authority (TA) counterparts to ensure transparency and encourage ownership.

2 TERRITORIAL AUTHORITY OFFICER WORKSHOPS

Two *Muddy Waters* workshops were held in December 2004, and attended by 50 council officers from around the region. The workshops clarified and refined the issues into a programme which would develop tools and relationships required to address the regional problem of earthworks and effects on watercourses. The workshops were also intended to raise general awareness of sediment related issues associated with earthworks sites. Importantly, officers from different work areas within each Council attended so information was freely discussed between planning, engineering and compliance officers.

The workshops raised 37 items that regional officers considered important, these were characterised into four topic areas:

- Jurisdiction and Communication
- Applications and Assessments of Environmental Effects (AEE's)
- Consent Conditions
- Compliance and Site Visits

The priority items from each topic were drafted into a set of deliverables or a 'tool kit' that TA and GW officers could use to improve their ability to understand and respond to difficulties and challenges with earthworks in the region.

2.1 A NEW TOOL KIT

The main deliverables of the *Muddy Waters* 'tool-kit' are summarised in the following sections:

2.1.1 STANDARD CONSENT CONDITIONS

The workshops raised several issues with many of the existing conditions used for earthworks consents. These included a lack of consistency, difficulties with enforcement, measurability and a reliance on generic conditions.

A library of standard type conditions was established for managing the effects of earthworks. It contains conditions that could be used by the territorial authorities and GW. This was developed from a pooled resource of the conditions used for earthworks consents across the region. All territorial authorities were encouraged to contribute and council specific references were removed. A further selection of conditions was added from other regions after discussions with appropriate officers. The conditions were then put into topic areas to allow easy reference. The library was then circulated for comment and use.

The anticipated results are greater consistency around the region, more monitoring conditions, with the onus and costs on the consent holder, and most importantly 'raising the bar' to where the consent holder pays more attention to the ESC measures on site. The library has been in use for 15 months now.

2.1.2 CHECKLISTS (PRE-APPLICATION, SITE COMPLIANCE, AND ASSESSMENT ENVIRONMENTAL EFFECTS)

GW reviewed the resources available to officers processing applications and monitoring sites, taking into account feedback from the workshops, and community group perceptions of a misrepresentation of environment assessments of earthworks. GW has since developed and trialed three checklists to assist GW and territorial officers.

The checklists were designed to allow the efficient collection of information in the field and to review applications for key elements. They are also used in the field in conjunction with advisory notices to establish a record of information required or actions to be taken in relation to a particular site. GW officers have trialed the lists and found them to be very useful for confirming the information needs of applicants, or zeroing-in on critical compliance issues with consent holders or contractors. GW officers use the checklists regularly and they are now being reviewed by territorial authority staff to tailor for their own use.

The anticipated result from use of the checklists is an improved quality of resource consent applications. Consultants now have guidance on providing information upfront and unnecessary s92 requests for further information are avoided. After consents are granted, the site compliance checklist provides an automatic file note which can be issued onsite to demonstrate compliance or non-compliance.

2.1.3 SMALL EARTHWORKS GUIDELINES

Many contractors and users consider the 2002 GW ESC guidelines to be excessive for small sites, while the city and district council officers had no information to hand out summarising basic good practice for erosion and sediment control. It was observed that few controls are placed on small scale earthworks and resource constraints can hinder compliance for permitted activities. The Small earthworks guidelines were developed to provide straightforward advice to developers, land owners and contractors on effective practices for small earthworks sites, but also to assist regulatory officers in assessing small site activities.

The Small earthworks guideline was developed in-house, based upon the GW ESC. The Small earthworks guidelines employ a simple style, using straight forward language and actual photos taken at Wellington earthworks sites then rendered into a drawing. It was considered that the cartoon format would allow an easy understanding of the concepts and issues. They were published in a small A5 booklet that can be put in a vehicle glove box.

The guidelines fill a critical information gap realised through the workshops. This is at earthworks of small volumes which do not trigger rules in regional or district plans. The guideline aims to improve performance in the industry and is hoped to have a positive impact on reducing a significant cumulative source of uncontrolled sediment discharges.

2.1.4 UNIVERSAL SOIL LOSS EQUATION (USLE)

This formula has been set up on the GW website to estimate soil loss from earthworks. GW developed a web based programme for regulators and consultants, to enable quick accurate and standardised assessments of sediment loss from earthworks sites. GW consents officers have used the USLE to predict sediment loadings to the environment from earthworks sites since 2003. However, this was limited by the complicated nature of the factors involved, and the various versions of the USLE available. The version developed for the tool kit was based on that developed by the Auckland Regional Council to represent site specific sediment yields, but contains Wellington specific defaults and selection lists, thus making it more appropriate and effective. Although it is not intended to replace more detailed models used by consultants, there is a lot of enthusiasm for this easy to use formula from the TAs and the development community.

2.1.5 JOINT PROCESSING PROTOCOL

Prior to *Muddy Waters* there were occasions when larger earthworks projects were processed jointly by GW and a city or district council (for instance, Aotea Block in Porirua, 2002). The *Muddy Waters* programme developed the joint processing procedure into a protocol that gives both parties certainty of outcome and manages jurisdictional crossovers. Since the start of *Muddy Waters*, GW and the TAs have where appropriate assessed earthworks applications with a particular focus on landuse activities cooperatively. This often means the consent conditions placed on final consent certificates of both GW and TA consents have carried similar standardised conditions.

The TAs indicated that these resources and better information sharing will go a long way to addressing some of the problems currently faced while processing applications for earthworks activities and undertaking compliance monitoring, specifically:

- Reducing confusion and misinterpretations caused by variations in the experience of regulators and developers;
- Helping consents officers interpret the often large and complex Erosion and Sediment Control Plans that can accompany applications;
- Ensuring that erosion and sediment control proposals are site-specific as opposed to generic, thus improving their likely effectiveness; and
- Enabling regulators to impose measurable criteria for assessing maintenance conditions and effectiveness of pollution control features.

3 PROMOTING FURTHER CHANGES IN PRACTICE

Muddy Waters has seen an evolving focus from one which concentrated on Greater Wellington's needs, to incorporating the interests of city and district councils and the broader community. Some of the other *Muddy Waters* initiatives included

3.1 CONSULTANTS AND DEVELOPERS WORKSHOP

The information gathered during and after these workshops was used to deliver the findings and information to the regional consultants and developers. A *Muddy Waters* workshop, held in June 2005 was well attended by consultants and covered a broad range of topics, including site assessments and compliance tools, erosion and sediment control technology, and environmental effects. The consultants were given an opportunity to review and comment on the proposed tools and consent conditions during the workshop.

3.2 STAFF TRAINING:

Erosion Management Ltd. (Brian Handyside and Claire Feeny)^{3,4} held a three day erosion and sediment control training course in June 2006. The course was specially tailored for a Wellington regional context, catering for GWRC and TA staff. The result has been an up-skilling in our collective capabilities to assess the effects of earthworks on large sites as well as dealing with sometimes complex practical problems on site.

3.3 AN ONGOING FORUM 'CHAMPIONS OF EXPERIENCE'

Through *Muddy Waters* several tangible 'tools' were developed, however the most important outcomes have been the improvement in officer confidence and enhanced networks amongst regulatory officers in the region. A six monthly forum for regulatory officers continues to strengthen these relationships and share experiences. GW has hosted four forums to date, the last being in late April 2007. These have proved highly successful allowing for open and frank discussion about key concerns affecting both GWRC and the city and district councils. The forums have allowed the less tangible parts of *Muddy Waters* such as officer relationships and interests in new technologies and enforcement experiences to be explored and maintained. The forum agenda defines respective priorities for the participating councils, and sets future programmes. A challenge for GW officers has been to ensure that tasks and outputs being considered will generally benefit us first, while not creating an excessive and unrealistic workload.

3.4 DIGGER SCHOOL

Each year, GW staff have presented the *Muddy Waters* findings as part of the syllabus at ‘Buchanan’s Earthworks School’ in the Wairarapa, where backhoe and bobcat operators learn about erosion and control methods to reduce sediment problems in watercourses.

3.5 GULLIES AND EPHEMERAL STREAMS WORKSHOP

A half day workshop held in October 2005, for officers involved in the *Muddy Waters* from GW and the city and district councils, introduced ideas around the values of small streams and their loss through extensive subdivision activities in the Wellington region. John Maxted (Auckland Regional Council) presented his findings⁵ from an Auckland Regional Council study into the effects on small streams from subdivision activities in the Auckland region.

3.6 WORKSHOPS FOR 2007

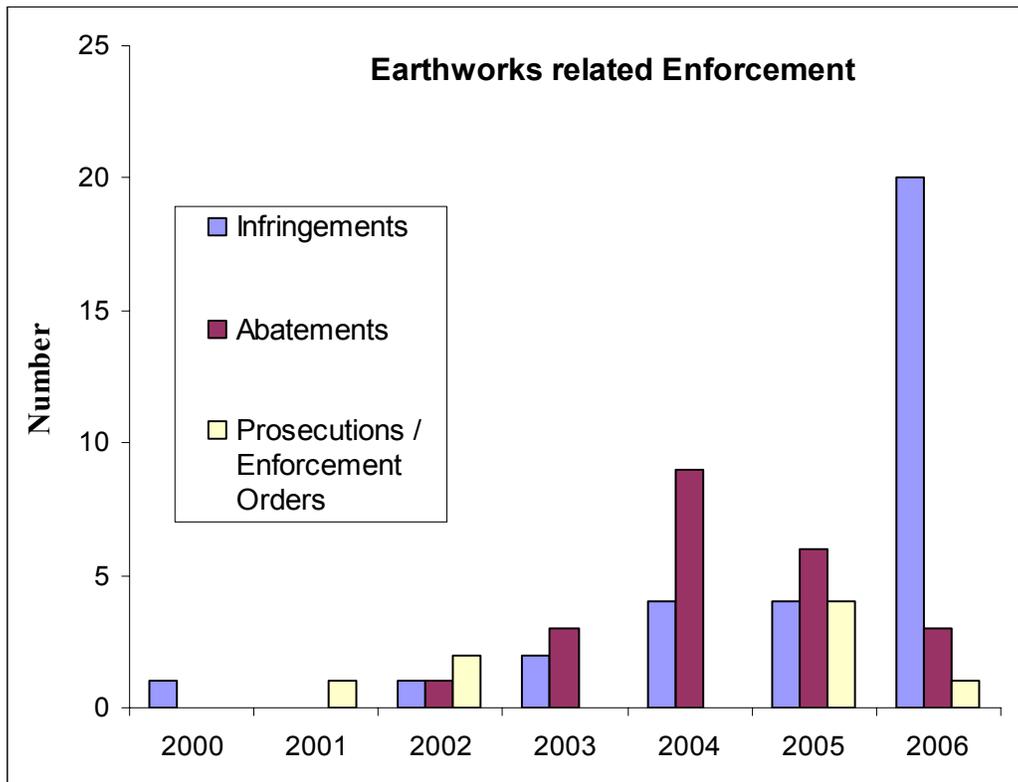
In May and June 2007, three workshops are proposed for the Wellington region. A *Muddy Waters* workshop will be held for contractors involved in vegetation clearance and earthworks in the Wellington region the workshop will cover the effects, available controls methods and the consequences of poor performance of erosion and sediment control. Two urban streams workshops will be held one for city and district council officers and the other for developers and consultants. The workshops will cover stream values, best practice for stream works and jurisdictional issues.

4 EMERGING TRENDS

4.1 INCIDENT TRENDS

The number of sediment-related pollution incidents continued to increase in the Wellington region until 2006 (see Figure 1). This was attributed to greater community awareness of the issue, and a better understanding of how to report pollution incidents. By 2006, the effects of the *Muddy Waters* initiatives began to take effect, as illustrated by the decline in incident numbers.

Figure 1: Earthworks related enforcement



4.2 ENFORCEMENT TRENDS

While incident trends appear to indicate a reduction in sediment related incidents, GW has initiated more enforcement action for moderate to significant incidents of non compliance. GW has also enjoyed a significant improvement in its success in regulatory actions, for sediment-related investigations since Muddy Waters programme began (see figure 2). This increased regulatory success is attributed to the improved awareness and capability of officers, who better understand the issues around erosion and sediment control and are able to investigate and report with greater certainty.

4.3 ENVIRONMENTAL EFFECTS

Although it is difficult to identify a corresponding improvement in water quality or freshwater ecosystem health, resource consent applications for earthworks have improved markedly as a consequence of the *Muddy Waters* process. In particular, the quality of the assessments of environmental effects from earthworks activities has improved. With many councils now requiring developers to baseline monitoring prior to works commencing, this has the benefit of increasing the overall understanding of the regions ecology and sensitivity to changing land use. Contractors during site inspections now tend to demonstrate a greater understanding of effective onsite control measures, rather than relying upon hay bales and in sump filters.

4.4 STATUTORY INSTRUMENTS

Draft policies in the next Regional Policy Statement (notified in 2007) direct all district plans to include rules controlling sediment runoff from earthworks and vegetation clearance. The Upper Hutt District Plan has already increased restrictions on earthworks activities, The Wellington City Council are developing earthworks rules to replace their Earthworks Bylaw. These changes have been undertaken by city council officers involved in *Muddy Waters*.

5 DISCUSSION

5.1 COMMUNICATIONS

Muddy Waters has substantially increased the competence and confidence of council officers from city and district councils as well as GW, while providing greater certainty to developers, consultants and contractors about regulatory requirements and expectations. Council officers have also gained a better appreciation of how developers, contractors and consultants interact, and in doing so are better able to target regulatory and educational initiatives. There has also been a substantial improvement in intra-agency relationships especially through combining the skills from the TA and GW officers during the early stages to develop tools and continuing through the officers' forum. GW officers have also undertaken further specialist training generally from Auckland based regulatory and practice based experts as available to keep up to date with the latest technologies and methods.

Staff turnover was highlighted by consultants in the initial investigations as a serious concern where each new officer would be unfamiliar with a project that may run for several years. While the average duration of staff at GW and the city and district councils is still around two years, regular contact between councils and the availability of resources allows new officers to quickly get up to speed with erosion and sediment control issues and current solutions.

There have also been benefits for many in the construction industry (particularly those designing, selling and installing erosion and sediment control measures). Consultants have also benefited from improved environmental awareness. While developers have been able to reduce their regulatory risk exposure, and others have realised that they can benefit from leaving vegetation in place, or now market their properties on their green credentials.

5.2 APPLICATIONS AEE

It has also been noted by officers processing resource consents that the standard of applications has improved significantly since 2005, particularly regarding the assessment of environmental effects, proposals for site-specific erosion and sediment control and descriptions of physical works. This has the added benefit of reducing the need for further information requests, and fewer difficult meetings with applicants unable to grasp the options (or need) for effective erosion and sediment control measures. However, there is continuing difficulties

with earthworks applications when determining requirements for reclamations in gully's, particularly for urban areas.

Consultants have informed GW that the costs to the developer(s) to provide effective erosion and sediment controls for earthworks in the Wellington region have increased by 500%. This has occurred from an increased attention to individual site requirements and a move away from generic erosion and sediment control solutions. They also report that AEE provided in applications have become more complicated and often involve the use of 'experts' to provide ecological assessments.

GW has been asked by the city and district officers through the regional stormwater action plan, to develop a set of parameters to determine stream health and establish an environmental baseline prior to earthworks. Officers are also requesting ecological assessments during an application when pre-application site visits and the predictive models indicate a high standard of fish habitat.

There remains a need to understand the long term cumulative effects from earthworks being undertaken in a single catchment over several years. The Wellington Regional Growth strategy has highlighted the Porirua Stream catchment as being the likely area of future growth. GW is undertaking baseline studies in this catchment and the sensitive Onepoto estuary of Porirua harbour into which it is received. These studies include sediment deposition modelling and ecological indicators to monitor stream health.

5.3 CONSENTS CONDITIONS

The library of consent conditions is anticipated to be a 'living' document and allow changes in practice and ideas around methodology to develop. The library allows all officers in the region to share these conditions and issues involved in testing them during the life of a resource consent. There is an increasing use of more directive conditions and on the use of conditions requesting plans requiring approval prior to works. This is a move away from conditions using generic references to guidelines and standards. Contractor and consultants have expressed concern with directive conditions where they may become inflexible causing frustration and sometimes highlighting errors in construction planning adding costs to a job. However, conditions enabling ESC plans to be modified during the life of the consent have reintroduced an appropriate level of flexibility. Overall, there is a vast improvement in the range of conditions where conditions requiring flocculation of sediment ponds are more prevalent as are conditions requiring monitoring and maintenance of sediment ponds. This improvement allows a greater scrutiny of the effectiveness of the consent granted and means of measuring the performance of erosion and sediment controls.

Administrative systems are still evolving to cope with a significant increase in workload associated with the rapid evolution of resource consent conditions, and the issue and tracking of statutory notices and reminders. In addition, many current developments are subject to resource consents that were issued before the *Muddy Waters* programme, and are a constant reminder of how 'broad-brush' and limited some of our earlier controls were.

Since *Muddy Waters* began three years ago there has been a dramatic change in the conditions placed on earthworks consents both in terms of comprehensively covering the works during the consent and holding the consent holder and parties undertaking the works responsible for the offsite effects from poor performance.

5.4 COMPLIANCE

The development of the checklists has been a valuable process as it produced criteria for measuring performance at earthworks sites. Advisory notices are now regularly used to provide feedback during compliance visits and their use is also now common for other compliance work. The increasing use of enforcement activity and better reporting to council committees ensures that a Google search on any developer can reveal if they have faced any enforcement because all committee reports are available online, providing an insight into their compliance profile. The regular enforcement activity has also provided an excellent organisational structure for the training and rapid development of enforcement officers where there are plenty of precedents and a level of maturity in the decision making process.

5.5 CONCLUSIONS

Perhaps the most obvious indicator of success for the *Muddy Waters* programme is that, when responding to pollution incidents, it is now rare that officers see hay bales in the gutter when they arrive on site. Instead, they

are much more likely to encounter silt fences, diversion drains, check-dams, geotextile protection, or even flocculated sediment ponds. We believe the basis of the programme's success was that it was founded on good environmental data and inputs from a range of stakeholders (regulators, developers, contractors, consultants and the community). Furthermore the tools delivered by the programme outputs were designed to be basic and user-friendly, and were developed in close liaison with end-users.

The Small earthworks guideline is an example of a successful output from the programme as it was developed as a collaborative text and this was endorsed by the printing of 12,000 copies, three quarters of which were ordered by the city and district councils. This publication is widely used and routinely handed out with resource consents for small earthworks. There has been little dispute by consultants and contractors with the methodologies it contains and several applications have referred directly to these guidelines.

Although it is difficult to assess the programme's effect in reducing impacts on receiving water quality, there has been a marked reduction in the number of incidents reported to GW that are attributed to inadequate erosion and sediment control since 2006. This is approximately one-year after the regulator workshops and checklist use, and six months after release of the Small Earthworks guideline and standard consent conditions. In the absence of any marked downturn in development activity in the region, this can (at least in part) be attributed to improved on-site erosion and sediment control provisions.

The success of *Muddy Waters* has provided GWRC with a model for similar such initiatives in the future, such as the upcoming streams and gully's workshops and investigation into the loss of small and ephemeral streams in urban areas and a trial delegation of stormwater enforcement powers to Hutt City Council officers. It is hoped that these projects achieve the same level of success enjoyed by *Muddy Waters*.

6 APPENDIX - CASE STUDIES

Four Case studies are presented, which look at the four key areas identified in the *Muddy Waters* programme.

6.1 CASE STUDY 1 “JURISDICTION AND COMMUNICATION”

Chichester Drive, Upper Hutt

6.1.1 BACKGROUND

The site was previously a pine plantation which was harvested in 2002 in accordance with a Forest Harvest Notice issued by Upper Hutt City Council (UHCC) in December 2001. In January 2003, the landowner constructed an access track through the site which reclaimed an 80 metre section of an unnamed tributary of the Witako Stream (the stream) with a pipe without resource consent from GW. These initial works were completed with resource consent from UHCC for minor earthworks and a road for a proposed subdivision.

In October 2004, a neighboring landowner undertook earthworks on land located above the applicant’s site. These earthworks resulted in large uncompacted batters of excavated material being created upstream of the pipe, which failed during heavy rainfall in January 2005, blocking the stream and unconsented piped section. UHCC undertook emergency works but were unable to unblock the pipe inlet so they reinstated the stream bed above ground. A new channel running the full length of the pipe was cut into ground and the stream was diverted into this channel.

After the emergency works were undertaken by UHCC, a meeting was held between representatives of UHCC, GW and the landowners. At this meeting it was decided that the landowner responsible for the slips upstream of the applicant’s site would build a rock silt trap at the entrance to the blocked pipe that would also stabilise a short section of stream bank that was too steep. The construction of this rock silt trap involved the delivery and placement of an erosion protection structure (large rocks) into the new stream channel formed by UHCC. A resource consent was not sought for the emergency works undertaken by the neighbor.

In May 2005, a contractor employed by the landowner undertook further earthworks without resource consent from the GW. Following an investigation by the GW Pollution Control Team, the landowner applied for resource consents to complete the earthworks and to undertake works in the bed of the stream.

In addition to the works relating to the stream, the applicant undertook stump removal works required by the landscaping plan in early 2005. During these works, a small gully located in the approximate centre of the site (in which slipping had occurred since the harvest) was cleared of slumped material and subsoil drains were installed.

In June 2005, a GW Pollution Control Officer observed sediment laden water running off-site into a stormwater drain on Blue Mountains Road and into the Witako Reserve Stream through an over loaded silt fence at the site. Following the letter the landowner received from the Pollution Control Officer, a resource consent application was submitted on 8 July 2005.

6.1.2 THE DEVELOPER

The landowner purchased the property with the intention of removing the pine trees and developing the land further as a small urban subdivision. The works throughout the period of the project have been undertaken with a minimal amount of supervision from either UHCC or GW. The landowner maintained that the original works had been an honest misunderstanding.

6.1.3 THE REGULATOR

GWs first contact with the landowner was a phone call requesting information regarding a crossing of an ephemeral stream. A letter was sent in Dec 2002 from GW permitting a ‘crossing’ under the permitted activity rules.

UHCC and GW had little contact in the early stage of the work and many of the subsequent issues are a result of this lack of communication. The UHCC District Plan required resource consent for works closer than five metres to a stream. This planning ‘trigger’ has been identified by the *Muddy Waters* process to act as a notification point for GWs interest in an earthworks activity. The UHCC officers at this time had little understanding of GW requirements, and as a result, UHCC officers supervised the planning and works associated with the 80 metre section of pipe including the inlet. GW received no notification of these works, however UHCC verbally

requested the landowner to contact GW. The landowner's call to GW revealed a poor understanding of UHCC District Plan requirements and GW made no contact with UHCC to determine what was occurring. Although the works were clearly outside UHCC jurisdiction no further advice was sought from GW regarding these works.

The other observation for this case study is that it while it identifies risks through a lack of understanding and communication between authorities. It also highlights barriers to communication arising from staff turn-over. During the period of the works, UHCC had two different officers involved with this issue (one has since left), while GW had three Pollution Control officers (two have since left) and four Resource Advisors (3 have since left). During these events the UHCC has become a member of the regional compliance officers forum RiPPOFF and as part of Muddy Waters UHCC officers participate in the six monthly forums.

6.2 CASE STUDY 2 "APPLICATIONS AND AEE'S"

Aotea Block Subdivision, Porirua

6.2.1 BACKGROUND

The Aotea Block Development started in March 2003, comprising 245 hectares of suburban zoned land on the north-west side of Porirua City. The land was to be developed over a 10-15 year period to provide further housing opportunities within the Porirua District. Resource consents have already been granted for the following stages of Aotea Block:

- The applicant gained consents from PCC and GW through a publicly notified process in early 2003 to enable the development of Stage I of Aotea Block, which consisted of approximately 20 hectares.
- GW granted consents for Stage II of the development (3.7 hectares) in 2003 through a non-notified process.
- GW granted consents for Stage III (11.8 hectares) of the development in 2004, through a non-notified process.
- GW granted consents for Stage IV of the development (15.2 hectares) in May 2005, through a non-notified process.
- GW granted consents for Stage Va of the development (6.17 hectares) in October 2005, through a non-notified process.
- GW granted consents for Stages V, VI and VII (approximately 22 hectares combined) in 27 January 2006, through a non-notified process.
- GW granted consents of a Central Recreation Reserve (1.65 hectares) in March 2007, through a non-notified process.
- GW granted consents for Stages VIII (approximately 5.47 hectares) in 30 March 2007, through a non-notified process.

The USLE was used to derive a conservative estimate of soil loss from this development, and indicated that the proposed works could release approximately 850 tonnes of sediment into the adjacent Kenepuru Stream. During the first four years, the project reclaimed around 28 ephemeral streams, which were piped and connected to Kenepuru Stream. The works also removed much of the moderate to high value remnant native bush on the site.

6.2.2 THE DEVELOPER

In 2002, the applicant commissioned an ecological assessment⁶ of the existing Aotea Block environment and to assess the effects of the proposed development on the existing ecological values of the area. This report focused on issues relating to the PCC consent applications, but provided a brief assessment of the existing Kenepuru Stream environment and the effects of the overall Aotea Block proposal on the streams ecology. The report stated that although Kenepuru Stream is highly modified in places, it has the capacity to support high densities of a reasonably diverse native fish fauna. No further assessments were made by the applicant. The establishment of the first works through consent allowed further works to be a continuation of a 'permitted level' of effects at the

development site. In immediate terms this is true as the each successive development has undertaken the same works effecting the same receiving environment. However, little effort has been made to determine a cumulative effect from the project site and whether this in balance makes the initial AEE from the site no longer relevant. The report also suggested that stormwater discharges from the existing residential catchment of the Kenepuru Stream were an equally detrimental as sediment to the stream.

6.2.3 THE REGULATOR

The initial stages of the Aotea Block were processed through a notified process, and the summary report stated;

“In respect of the adverse effects of the reclamation of the tributaries of the Kenepuru Stream and Aotea Lagoon... these activities have no more than minor adverse effects...”

In the following stage the officer reports in the AEE states;

“As a by-product of the significant earthworks required for the development, the beds of three ephemeral streams will be reclaimed. The natural contours of the site will be altered by cut and fill to the extent that the small gullies from which the ephemeral streams arise will be eliminated. No significant gullies or ephemeral streams will exist on site when the works are completed...”

The two previous reports were prior to *Muddy Waters*, and although a thorough assessment of the effects of sediment is made in the notified report, little consideration is given to environmental effects of the existing earthworks on the stream ecology.

The AEE for stages 5-7, written six months after the *Muddy Waters* workshops considers not only the onsite effects but also the offsite effects on the wider catchment including the Aotea lagoon and the final receiving environment Onepoto estuary, noting in particular;

“Further downstream of the proposed site, at the confluence of the Kenepuru Stream and the Porirua Stream, there is good inanga spawning habitat. This is a particularly important area, because there are few other areas of inanga spawning habitat left in the Porirua catchment.”

GWs initial assessment confirmed that the middle and lower catchments of the Kenepuru Stream have reasonably good habitat for native fish including *Inanga*, and *Giant Kokopu*. Although the upper parts of the catchment are affected by barriers to fish passage, *Shortfinned* and *Longfinned Eel* habitat is also found throughout the catchment.

Since late 2003, streams identified as the principal receiving environment were evaluated by GW Point Click Fish predictive model (2004)⁷ to determine the likelihood of providing habitat for several native fish, this tool provides an important first step in assessing AEE's for earthworks

A shortfall of AEE's based on the predictive Point Click Fish data is that often no attempt is made during the application process to 'ground truth' data about fish habitat from Point Click Fish. The Pre-Application checklists developed by *Muddy Waters* will ensure that this information is checked by officers conducting a site walkover as part of the AEE. Site walkovers have become a regular feature following *Muddy Waters* to increase familiarity with the site and discuss sensitive environmental areas with the developer.

The most recent officer report discusses in detail the ongoing loss of the ephemeral streams at Aotea Block, and the applicant has agreed to create a 2.17 hectare reserve in the upper catchment of the stream being reclaimed as a mitigation measure. These changes although presented in isolation for this one project site, are typical of a change in approach and attitude by not only council officers but by consultants preparing reports for large earthworks projects. Many recent developments have been encouraged to leave, retain or relocate the streams on their sites, with native planting and remediation plans for reinstated areas.

6.3 CASE STUDY 3 “CONSENT CONDITIONS”

Staites Drive Stages I and II, Porirua City

6.3.1 BACKGROUND

The works are part of rapid urban expansion in the Pauatahanui Inlet catchment area. The Pauatahanui Inlet is a regionally significant receiving environment with important social and ecological values. There are three catchment areas within the subdivision site. Stage I is for approximately 1.6 hectares of earthworks within two catchments and was processed through a non notified process by GW and was publicly notified by PCC. The

third larger catchment area Stage II, to subdivide the land into 92 residential lots with approximately 8.4 hectares (ha), was jointly publicly notified in January 2007.

6.3.2 THE DEVELOPER

The developer has a history of major earthworks projects in the Wellington region and employed a subcontractor to undertake the earthworks. Neither the contractor nor project manager had previous involvement with GW, or experience with earthworks projects, although the consultant had attended one of the *Muddy Waters* workshops. Large scale earthworks were rapidly undertaken in both catchment areas, leaving little or no vegetation on the site. Sediment control ponds were established early at the site, but without reconfiguration in response to site changes, rapidly become functionally redundant.

The project included re-laying a significant bulk water main through the site, which led to delays and presented an extra challenge as it provided a flow corridor down the southern catchment, and a problem when it was necessary to pump-out large quantities of accumulated sediment laden water.

6.3.3 THE REGULATOR

The initial consents granted for stage one by GW in 2005 were non-notified because the effects were determined to be minor. The three consents granted contained minimal erosion and sediment control related conditions.

The last condition related to the decommissioning of the sediment pond.

Early site visits concluded that the southern catchment was not developed as proposed in the application, as the discharge from the sediment pond was in breach of rule 1 of the Discharges to Land Plan. This led to six water pollution incidents, resulting in the issue of six infringement notices and an abatement notice in 2006. This poor performance by the developer and his contractor increased the scrutiny on the next stage of the development.

The conditions proposed for stage II works include a first for the western region; a limitation on the calendar period when earthworks can occur. Other conditions proposed for the second stage include:

- All contractors involved in the project required to be aware of all conditions and ESC measures which must be undertaken, to ensure contractors responsibility.
- Payment of a bond for works relating to the stream restoration work.
- A stream planting programme, including ongoing maintenance.
- 23 ESC conditions including reference to contingency measures, cleanfill materials, chemical flocculation, monthly self audits and weekly monitoring of pond discharges.

This rapid evolution in the complexity and number of consent conditions is typical of the *Muddy Waters* process, where a quick reaction to poor performance is based on a broad organisation experience and a pool of resources. The new conditions above are included in the library of consent conditions so are available to all officers processing earthworks consents in the region. Many of them were also discussed with consultants and developers at the *Muddy Waters* Consultants workshop.

6.4 CASE STUDY 4 “COMPLIANCE AND SITE VISITS”

Brooklyn Valley Rise, Ohiro Rd, Wellington

6.4.1 BACKGROUND

A major catalyst for *Muddy Waters* was repeated non-compliance associated with an intensive development of steep valley slopes in Brooklyn, on Wellington’s urban fringe. The work was conducted by two companies under the same director, and involved the removal of regenerating bush, piping of streams and extensive cut-to-fill, with plans to build over 500 closely-packed houses on a steep 16 hectare site. The first phase of the development was complicated by two major stormwater outlets that discharge from up-slope residential streets. These were inadequately controlled by the developer, consequently once vegetation clearance began, un-checked surface water run-off resulted in soil erosion and sediment loss from the site during most rainfall events. This massively increased sediment loading and turbidity in the adjacent Owhiro Stream, which is one of Wellington’s few remaining urban streams.

6.4.2 THE DEVELOPER

Initially, site runoff was diverted into Wellington City Council (WCC) stormwater manholes on-site to avoid discharges down the site access road. Although site earthworks were extensive, they were staged in such a way that they avoided the need for GW consent. A resource consent to install a bridge resulted in construction of what was in effect a culvert that converted a first order stream into a heavily modified watercourse, thereby relaxing available controls for subsequent work upstream.

Following increasing attention from GW Pollution Control officers, silt ponds were installed, and flexible plastic pipes used to divert upslope-stormwater around working areas. However, the development still lacked effective erosion and sediment control, as the diversion pipes discharged onto unsealed land on his site. Furthermore, joints repeatedly failed due to a combination of high flows and steep gradients.

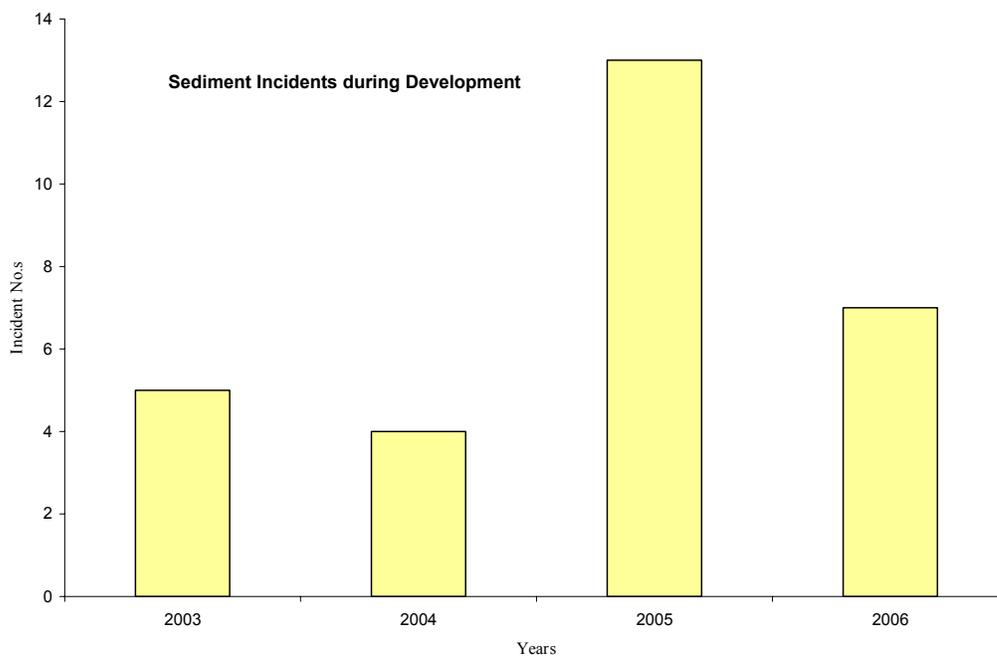
During escalating enforcement action the developer replaced his generalist environmental consultant with a specialist erosion and sediment control consultant. Once this relationship became established, site improvements were dramatic, particularly with the installation of an effective stormwater diversion which removed most of the site's stormwater problems.

6.4.3 THE REGULATOR

The enforcement response to the initial stormwater problems at this site in 2003 was tentative. Prior to *Muddy Waters* policy within WCC and GW encouraged officers to give the developer a number of chances to do the right thing, and (embarrassingly in retrospect) recommended that hay bales be installed on the road below the site. This did little to improve stormwater quality, and nothing to address the cause of uncontrolled discharges from the site. It also established a very poor precedent, and an impediment for subsequent enforcement action.

It rapidly became apparent that the site was becoming a major contributor of sediment to the Owhiro Stream, which increased enforcement officer scrutiny. Several officers embarked upon a rapid learning curve with respect to erosion and sediment control, and became the initial driving force behind *Muddy Waters*. This information enabled them to better assess the adequacy of on-site stormwater and sediment control measures, leading to a series of escalating enforcement actions by both the regional and city councils over a four year period (See Figure 4).

Figure 1: Incident trends for Brooklyn Valley Rise works 2003 to 2006.



GWs enforcement activity in response to sediment-related non-compliance at this site has included two infringement notices, two abatement notices, two enforcement orders and one successful prosecution, while WCC issued three infringement notices, three abatement notices and took one successful prosecution. GW also

submitted against a proposed district plan change by the developer. Although evidence presented to Commissioners focused upon how the application failed to acknowledge ecosystem, water quality and hydrologic effects (the proposal understated the magnitude of the downstream flooding by a factor of four) of the proposed development, the biggest impact on the decision came from evidence of how the existing development had repeatedly failed to address sediment control problems.

Enforcement officers from GW and WCC now apply a zero-tolerance approach to this site. Inadequacies in consent applications and site management plans result in them being rejected, while any further uncontrolled sediment discharges from the site are likely to lead directly to prosecution.

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