RISING TO THE CHALLENGE: MANAGING MAPUA RABBIT ISLAND'S SEWER RISING MAIN UPGRADE

A.Halder, MWH New Zealand Ltd and K.Arnold, Tasman District Council

ABSTRACT

- How would you construct a new sewer pipeline in a popular tourist area?
- How about near archaeological and culturally sensitive sites?
- Or next to an area of significant natural interest?
- How would you manage having to overcome all of the above?

This paper outlines one of Tasman District Council's major wastewater infrastructure upgrades, highlights key challenges and demonstrates how a rigorous consultation process was critical for a successful outcome.

Rabbit Island near Mapua is used for a wide range of activities including forestry logging, mountain biking, orienteering and other sporting interests. The new 8.5km sewer rising main pipeline traverses the Island's beach access, a prime destination for locals and tourists, and the estuary areas which are popular for boating and water-sports. Part of the pipeline runs next to an area of significant natural interest containing rare plant species.

The Island also has a history of archaeological and cultural sites and a *Maikete* (a Māori site-seer) was required to perform a cultural audit of the proposed route to identify sensitive areas requiring an iwi monitor.

The paper will discuss the many complicating factors and challenges which required careful consideration and clever solutions during the project.

KEYWORDS

Consultation, iwi, Historic Places Trust, Stakeholders, Resource Consent, Wastewater pipelines

1 INTRODUCTION

The Tasman district has been one of the fastest growing regions in New Zealand over recent years. This has led to increased development in rural residential areas such as the township of Mapua which is approximately 15km west of Richmond and located in Tasman Bay.

Figure 1: Location Map

In 2009 Tasman District Council (TDC) commissioned MWH NZ Ltd to evaluate and report on the Mapua wastewater reticulation system. Due to the significant residential growth, and to also understand the effects of future growth, TDC needed to assess the performance of the present wastewater system under additional loading.

At this time, the Mapua wastewater system was reported to be operating close to capacity and the TDC growth projections predicted that the present population could double over the next 30 years. None of the existing pump stations would have sufficient capacity to handle the future peak wet weather flows mainly due to the existing configuration of pumps and inadequate rising main diameters. The pump stations would also need increased storage capacity in order to comply with TDC design standards.

As part of the report, an overall wastewater upgrade strategy was developed. This strategy comprised the staged construction of three new pump stations, upgrades to a further five and new rising mains to the catchment's wastewater treatment plant.

The Rabbit Island sewer rising main upgrade is the initial part of a 10 year capital works programme for the township of Mapua.

Whilst there were many technical challenges in this project, such as the design and construction methodology for the two estuary crossings, the operational and maintenance issues to consider and also the effects of surge on the pipe material and connections, this paper's focus is on the approach to overcome some challenging stakeholder issues.

2 PROJECT BACKGROUND

2.1 PIPELINE ROUTE

The pipeline upgrade included the installation of a new 355mm OD diameter PE rising main over a distance of 8.5km from the wharf at Mapua, across the Mapua estuary, along the length of Rabbit Island before crossing a second estuary, Blind Channel and onto Bell Island where it connects into the existing WWTP.

Figure 2: Proposed Pipeline Route

The proposed pipeline route was to run parallel to the existing 250mm OD rising main which has a history of frequent pipe bursts. This route follows a forestry track along the main length of Rabbit Island and part of Bell Island.

3 RABBIT ISLAND

Rabbit Island is the largest of a group of sandy islands lying in the Waimea Estuary at the head of Tasman Bay. Much of the island is covered in pine plantations owned by TDC; however the Council has set aside a large area of land adjacent to the beach as a public reserve.

The island is used by a wide variety of commercial and recreational groups, and has both environmental and cultural significance as described in the following sections.

Photograph 1: Aerial view of Rabbit Island

3.1 RECREATIONAL USES

The island is a very popular recreational asset with some of Nelsons finest beaches and is visited by around 150,000 people per year. Along its seaward side there are more than eight kilometres of sandy beach. The main beach is a safe swimming location, popular with locals and tourists whilst the back beach has a boat ramp adjacent to a water skiing area.

The island is also popular with mountain bikers and walkers. Mountain bike tracks lie to the west of the Rabbit Island picnic areas and for walkers, there is a perimeter road just above the beach around most of the island, popular with local walking groups.

The area around the Rabbit Island Bridge is a popular spot for white-baiters, while surf-casting can be productive from the front beach.

The tidal waters also provide sustenance for many different sea birds. These include the white heron, royal spoonbill, shags and oyster catchers.

3.2 LAND USAGE

Forestry activities are also very important on Rabbit Island and currently there is a sustainable cut of 20,000 tonnes per year which provides a significant source of income to TDC to off-set rates. The forestry operations are managed on behalf of TDC by PF Olsen and logging operations occur throughout the year.

Since 1996 stabilised sludge (bio-solids) from the wastewater treatment plant on Bell Island has been applied to forestry areas on Rabbit Island as part of an investigation on the effects of bio-solids applications on tree growth, nutrition, and the ecosystem. The bio-solids spraying operation also occurs throughout the year.

3.3 ENVIRONMENTAL VALUE

The Waimea Inlet is identified in the Tasman Resource Management Plan (TRMP) as being an area with nationally important natural ecosystem values. The Waimea Inlet is considered to be of outstanding importance as a habitat for wading birds and one of the only sites where the endangered peppercress plant has been recorded. Also present in the Inlet are the endangered grey saltbush, white heron, royal spoonbill, Australasian bittern and banded rail.

A survey, undertaken in October 2008 by TDC, identified an area of Rabbit Island as a Significant Natural Area (SNA). The site supports an important vegetation sequence, from saltmarsh herb field through to tall manuka scrub which is very rare in the region. The vegetation includes a narrow to broad band of saltmarsh ribbon-wood, areas of estuary tussock, and mixed vegetation of sea rush, tall fescue and knobby club-rush.

The proposed pipeline route was to lie along the SNA's western edge.

3.4 CULTURAL HERITAGE/ARCHAEOLOGICAL SITES

The Waimea Inlet and both Rabbit and Bell Islands have an extensive history of Māori occupation and are of importance to *tangata whenua* (people of the land). The New Zealand Archaeological Association (NZAA) Site Recording Scheme has 35 archaeological sites recorded within approximately 200m of the Waimea Inlet, with 26 of these *midden* (shell heap or household rubbish dump) sites. These are often in conjunction with ovens or other evidence such as stone tool manufacturing areas, made horticultural soils, or artefact find spots.

The recorded and known evidence suggests that occupation on Rabbit Island was concentrated around the margins of the island, particularly the western side and eastern tip. There is evidence that the ocean front was used for fishing and gathering of shellfish, and processing of both. There was also historical evidence of burial sites on Rabbit Island. Further sites are recorded elsewhere on Rabbit Island and it was considered likely that there are other unrecorded archaeological sites in the area.

On Bell Island there are eight archaeological sites recorded. The sites include three sites close together on the "bulge" on the seaward side of the island, and midden/oven stones/argillite flakes found. This is a significant and extensive area of occupational evidence. The sites appear to be a specialist coastal processing site and is one of the few places around Waimea Inlet where there is evidence of an extensive range of fish, sea mammal (a whale), bird and shellfish harvested. Also noted were fishing camps at the south east end of the island.

4 MAPUA WHARF PUMP STATION AND ESTUARY CROSSINGS

The terminal sewer pump station for the Mapua catchment is located in the wharf area of Mapua and is situated next to a popular restaurant. From the pump station the rising main conveys sewage across the Mapua estuary to Rabbit Island. The construction of the new rising main across the estuary involved a combination of new pipework laid by open trenching in the shallow section of the estuary during low tide and slip-lining through an abandoned sewer in the deep section of the estuary.

Photograph 2: Mapua estuary crossing (at low tide)

The second estuary crossing is between Rabbit Island and Bell Island, known as Blind Channel. The proposed method of construction was a combination of open trenching at low tide and directional drilling for the deeper sections of the channel, approximately 450m in length.

Photograph 3: Estuary crossing at Blind Channel (at low tide)

5 NELSON REGIONAL SEWERAGE BUSINESS UNIT (NRSBU)

The Nelson Regional Sewerage Business Unit (NRSBU) is the joint committee of the Tasman District and Nelson City Councils and is responsible for looking after the two Council's interests in the Regional Sewerage Scheme.

The scheme serves the communities of Nelson South, Richmond, Brightwater and Wakefield as well as Mapua and the Rabbit Island rising main terminates at the Bell Island Wastewater Treatment Plant (WWTP).

In a separate capital works project, a new inlet works and clarifying tanks for the WWTP was due for construction close to the planned timing of the new rising main.

6 STAKEHOLDER CONSULTATION

6.1 INTRODUCTION

With the large number of parties potentially affected by the proposed works it was important that a well-planned and coordinated approach was implemented during the consultation process. The early identification of stakeholders was key, as was the production of a discussion document. This was prepared to provide a basis for discussions, informing stakeholders of the proposed works and to seek feedback. The discussion document was prepared early in the preliminary design phase to allow for flexibility in any pipeline alignment changes as a result of consultation outcomes. The document described the drivers for the upgrade, the proposed route, potential adverse environmental effects, and also suggested mitigation measures.

In addition to the circulation of the discussion document, the main stakeholders were also invited to attend a site visit to view the proposed pipeline route and discuss any concerns first hand. Whilst this coordination took time it was very important as it made the stakeholders feel part of a collaborative consultation process and ultimately resulted in a successful project.

The following sections describe the consultation processes, the outcomes, and the requirements of the key stakeholders.

6.2 FORESTRY OPERATIONS

The proposed pipeline runs along the verge of the forestry track on Rabbit Island and part of Bell Island. For any works in the forestry areas of Rabbit and Bell Islands a permit was required. In addition to the general requirements of the permit it was agreed to coordinate on a minimum weekly basis to advise of the progress of construction so that any clashes in forestry operations and logging truck movement could be minimised. It was also agreed that there would be designated areas for pipe material storage and pipe welding sites and also the requirement for fire extinguisher equipment to be present in all plant and machinery. The permit also stated that in extreme fire danger access to the forest may be denied.

To assess this risk the historical records were reviewed to check the number of times the Island had been closed in the past due to fire danger. The forestry managers advised that the fire season ran from 1 October to 31 March and that the fire weather index is measured and monitored daily throughout the fire season. Only a code red could result in closure; however records indicated that it had been several years since this last happened. In addition, predictions for the coming season were that a code red was unlikely to occur. It was concluded that the risk of closure due to fire danger was minimal and accepted.

6.3 COUNCIL PARKS AND RESERVES AND DEPARTMENT OF CONSERVATION

Of concern to Council Parks and Reserves and the Department of Conservation was the proposed pipeline route's close proximity to Rabbit Island's designated SNA. This section of the pipeline route was a pinch point due to a narrow corridor with the SNA on the eastern side of the proposed pipeline, dense pine trees to the west and existing services within the corridor.

Whilst the pipeline trench could be excavated without entering the SNA it was agreed that a representative from either Parks and Reserves or the Department of Conservation would provide a briefing to the contractor and monitor the works through this section. It was also agreed that no machinery, materials or excavated earthworks would be stored in this area.

6.4 NZ HISTORIC PLACES TRUST

The NZ Historic Places Trust (NZHPT) was established in 1955 to promote the identification, protection, preservation and conservation of the historical and cultural heritage of NZ. Their role includes:

- assisting Māori communities to identify and recognise *wahi tapu* (a place sacred to Maori in the traditional, spiritual, religious, ritual or mythological sense)
- maintaining the Register of historic places, historic areas and wahi tapu areas
- issuing and monitoring compliance under the Historic Places Authority of activities that may destroy, damage or modify archaeological sites
- negotiating and executing heritage covenants
- providing statutory advocacy, advice and information to support protection and conservation of heritage places.

The *Historic Places Act* 1993 (HPA) makes it unlawful for any person to destroy, damage or modify the whole or any part of an archaeological site without the prior authority of the NZHPT. This is the case regardless of whether the land on which the archaeological site is located is designated, or the activity is permitted under the District or Regional Plan, or a resource or building consent has been granted, the Act also provides for substantial penalties for unauthorised destruction, damage or modification.

An archaeological site is defined in the HPA as any place associated with pre-1900 human activity, including shipwrecks, where there is evidence relating to the history of New Zealand that can be investigated using archaeological methods. Sites are protected under the HPA whether recorded or not.

The NZ Archaeological Association (NZAA) maintains site records on Archsite (www.archsite.org.nz) which is a Graphical Information System (GIS) digital database containing information about recorded sites.

6.4.1 HPT AUTHORITY

HPT Authority is required when an archaeological site is likely to (or there is a reasonable cause to suspect) be affected by construction works. Requirements include assessments of effects on archaeological values, plans of work/extent of sites in relation to areas of work and site management plans. HPT Authority is required before any construction can start.

As described in section 3.4 there are a number of known archaeological sites on both Rabbit Island and Bell Island. An archaeologist was engaged to provide advice on HPT procedures and it was assessed that an HPT Authority was needed.

The application for an HPT Authority requires:

- a description of the activity that will affect the site
- a description of the archaeological site
- an assessment of the archaeological values of the site and the effect of the work on those values
- an assessment of any Maori values of the site and the effect of the work on those values
- a statement about consultation
- the consent of the landowner (if the landowner is not the applicant).

In addition to this information, the Resource Consent application and Assessment of Environmental Effects were also supplied.

Once the Trust received the completed application, a decision was made imposing a number of conditions for compliance which included notification of the construction start, a site management plan which outlines the roles and responsibilities of MWH (as project managers), the Contractor and the project archaeologist. The Authority also requires that any earthworks that may affect any archaeological sites were monitored and reported on by the project archaeologist.

6.5 IWI - *TIAKINA TE TAIAO*

As discussed in section 3.4 the Waimea Inlet and both Rabbit and Bell Islands have an extensive history of Māori occupation and are of importance to *tangata whenua* (people of the land).

One of the responses to the discussion document, issued to *Tiakina te Taiao*, who represent four of the six Nelson /Motueka iwi, was the release of a previously unavailable location plan showing *urupa* (burial sites) on Rabbit Island, some of which were within close proximity to the proposed pipeline route.

On the basis of this new information the proposed pipeline route was re-assessed to see if it could be diverted away from the *urupa* (burial sites). Whilst this could be achieved it would add significant additional length to the rising main, and hence cost, and would also not be the preferred alignment from an operational perspective.

Given that the location of the burial sites were indicative and not in the direct path of the proposed pipeline, it was decided that the preferred option would be to retain the original alignment and discuss the mitigation measures that *Tiakina te Taiao* would be willing to accept to allow construction to proceed on the preferred alignment.

6.5.1 *MATAKITE* (MĀORI SITE-SEER) CULTURAL AUDIT

Tiakina te Taiao has developed a protocol for work on Māori archaeological sites which covers the Nelson-Motueka-Tasman regions. Included in this protocol is the ability to request that a *Matakite* (a Māori site-seer) is engaged to perform a cultural audit.

Due to the main concern of the pipeline route being in close proximity to burial sites *Tiakina te Taiao* implemented this and requested that a *Matakite* undertake a site walk over of the pipeline route and identify areas of cultural significance.

Whilst the discussions and timeframes to arrange this were drawn out over a number of months, and with limited availability of the *Matakite* (who is based in Hamilton) this ultimately proved an important milestone for both Council and *Tiakina te Taiao* in the consultation process. During discussions it was agreed that the cultural audit would follow the proposed route but would also cover a wider corridor to include all the existing services. This would provide clear direction on which areas would need an iwi monitor present for not only the new pipeline but also for any future works within the corridor. Conversely, it was also agreed that any areas deemed insignificant from the cultural audit would not require any further consultation with *Tiakina te Taiao* in future.

The cultural audit involved a detailed walk over the entire pipeline route and took a week to complete. To aid the *Matakite* and provide reference points on the route it was requested that the pipeline chainage at 50m intervals be marked on the route.

The *Matakite's* preferred method of working was to provide a verbal commentary as he walked the site, on which areas were potentially culturally sensitive and would require an iwi monitor to be present. This commentary was captured on film as the format of the deliverable.

Shortly after the start of this audit process it quickly became apparent that capturing the *Matakite's* verbal commentary on film would not be an appropriate method of conveying the information to other parties eg. tender information for the contractor. It was agreed that a member of the project team could accompany the *Matakite* and write up the verbal commentary notes directly onto the location plans. This allowed for an accurate record of areas where an iwi monitor would be required and the marked up site plans were then drafted up as areas of cultural significance. These location plans were then able to be used as supporting information for

the resource consent application and were also to form part of the contract document. A snap shot of one of the location plans is shown in Figure 3.

The green hatched area on the plan is where the *Matakite* identified that an iwi monitor was required. Parts of the pipeline route without the green hatching were deemed not of cultural significance and no iwi monitor was required.

Figure 3: Aerial showing the pipeline route (in red) with culturally sensitive areas (hatched green) requiring iwi monitoring

6.5.2 AGREED CONDITIONS

Upon completion of the cultural audit and a further meeting to discuss the findings it was agreed that:

(a) an iwi monitor would be required to monitor all earthworks excavations in the eastern/coastal area of Rabbit Island and the western end of Bell Island and at all other locations identified during the cultural audit.

(b) iwi would advise on a preferred location for an internment site (one each on Rabbit and Bell Islands) for any artefacts unearthed during excavations. It was agreed that no artefacts would leave the islands.

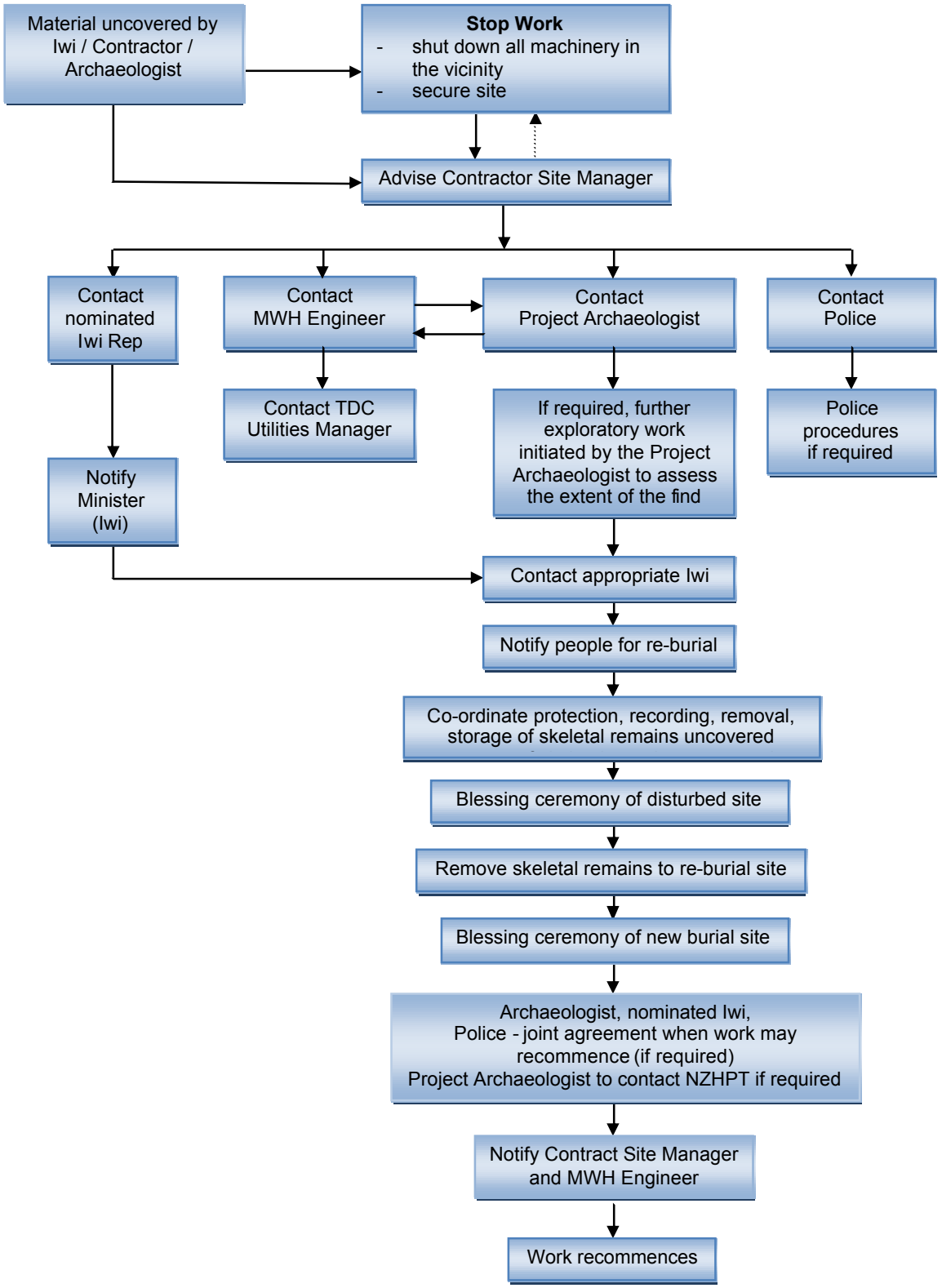
(c) iwi would appoint an 'iwi liaison person' who would be responsible for coordinating the iwi monitors to ensure the project ran smoothly and there were no unnecessary delays in construction.

(d) should any artefacts or koiwi (human remains) be found during construction, the iwi liaison person would be responsible for advising where the material was to remain until the end of the construction works; and

(e) at the end of construction any artefacts found would be returned to the interment areas and either fenced off or a large boulder placed on top to prevent future disturbance.

In addition to these agreements *Tiakina te Taiao* also issued their procedures for the discovery of *koiwi* during construction. This procedure is shown in Figure 4.

Figure 4: Procedures for discovery of Koiwi (human remains) during construction



6.6 MARITIME NZ

As discussed in Section 4, it was proposed to install the pipeline across the channel between Rabbit Island and Bell Island, known as Blind Channel, by a combination of open trenching at low tide and a 450m directional drill for the deeper section of the channel. Maritime NZ, as part of the navigation safety bylaw required that an application for a temporary reservation of this section of the channel was made to TDC Harbour Master.

This allowed for the construction activity to take precedence over the reservations for water-skiing and personal water craft in that area. A three week reservation was requested to allow for some flexibility in the construction programme for crossing the channel.

6.7 MAPUA WHARF

On the Mapua side, the new rising main would connect downstream of the valve chamber of the existing pump station within the foreshore at Mapua Wharf. This pump station is located next to the Smokehouse Café, a popular restaurant which has an outside deck area over-looking the foreshore. For access, the connection had to be undertaken during low tide and this determined the timing of the works. However, it was agreed that the tide times would be assessed so that work would not take place during peak dining times or towards the end of the week when the restaurant was generally busier.

Photograph 4: Mapua Wharf pump station site and the adjacent Smokehouse Cafe

6.8 NRSBU - BELL ISLAND WWTP

An additional impact to the proposed new rising main, however, was that construction had recently begun for new inlet works and clarifying tanks at the wastewater treatment plant at Bell Island where the rising main discharges. Whilst the new inlet works was due to be completed prior to the construction of the new rising main it was important that there was good communication between MWH and the NRSBU throughout the project so that any changes to the treatment plant upgrade were notified early so that the alignment and connection detail of the new rising main could be adjusted if required.

7 RESOURCE CONSENT

A typical pipeline construction project would generally be a permitted activity and not require a Resource Consent. However, due to the environmental and cultural importance of the Islands a Resource Consent was required for the following activities:

- Minor land disturbance and earthworks near known archaeological sites, in the vicinity of the Waimea Inlet and in close proximity to a significant natural area.

- The disturbance and occupation of the coastal marine area (foreshore and seabed), by installing a new pipeline.

- Earthworks exceeding 1000m² over a 12 month period within 200m of the coastal marine area.

- Constructing a new pipeline, within the coastal environment area; and

- Discharge of groundwater to coastal water.

As part of the consultation process, written approvals were obtained from all the key affected stakeholders. In addition to this, TDC included suggested draft conditions that they were willing to agree to being placed on the resource consent. This pro-active approach and extensive consultation, was noted when TDC were awarded of a non-notified consent. The award of a non-notified consent eliminated a potentially costly and lengthy process of hearings and appeals whilst also developing a sound understanding of both stakeholder and TDC issues and project needs.

8 CONTRACTOR PROCUREMENT

Where feasible, TDC procurement strategy is to use the Lowest Price Conforming methodology for its Utilities Capital Works contracts. However, as a higher value, technically more complex construction project TDC adopted the Weighted Attribute tender evaluation method as described in NZ Transport Agency's Manual of Competitive Pricing Procedures under the NZS 3910 Conditions of Contract.

The selection of the Weighted Attribute tender evaluation method was also influenced because of the need for a contractor who could demonstrate a good understanding of the stakeholder issues. Whilst the tenderers price would still play the significant determining factor in the award of the contract this evaluation method meant the tenderer had to consider and demonstrate in detail how they would work with the stakeholders as part of their methodology.

Tender documentation provided clear guidance to tenderers of the requirements to meet not only the resource consent conditions but to ensure a sound understanding of the need to pro-actively work with the key stakeholders, in particular the forestry operations, iwi monitors and the archaeologist. It was also important that the level of effort during the consultation process is not wasted due to the contractor not being made aware of the agreed stakeholder requirements.

As part of the contractor's methodology for construction of the works, information was required from tenderers on the following areas:

- *a detailed description of how the contract requirements are to be met, in particular the Resource Consent conditions and the forestry permit conditions*

- *a detailed description of proposed methods of working with iwi monitors through the areas of cultural significance*

- *a detailed description of proposed methods to consult and coordinate works with other affected parties such as PF Olsen (Rabbit Island) and NRSBU (Bell Island), to include coordination with other activities on Rabbit Island eg. logging operations, sporting activities, bio-solids spraying etc.*

To help tenderers fully understand the tender requirements, all tenderers were invited to a site walk over where the stakeholder issues/resource consent requirements were discussed and any queries answered. This proved a useful exercise for contractors and their sub-contractors to appreciate the risks associated with resource consent compliance and enabled them to price for this accordingly. The benefit to TDC was that by taking the opportunity to discuss issues with tenderers prior to submission, the tenderers would have a better understanding these risks and so would able to price the management of these risks more competitively.

9 CONSTRUCTION

9.1 STAKEHOLDER INTERACTION

Once the contract had been awarded, start-up meetings were held with the iwi monitors, the archaeologist and the forestry managers. These meetings allowed processes for communication and specific areas of concern to be openly discussed and agreed. It was also an opportunity to reinforce the common objective of a smooth running project for all parties without any unnecessary construction delays.

As with all stakeholder interaction, good communication is essential. By helping to establish relationships early in the project it was easier to manage the expectations of everyone involved. Once construction had started, the onus of communicating with the iwi monitors, the archaeologist and the forestry managers was placed on the contractor as they were in the best position to advise on the progress of construction and hence the areas of interest to these parties. In particular, it was important for the contractor to liaise with the iwi monitor on a daily basis to advise them when they would be excavating through the culturally sensitive area.

9.2 RESOURCE CONSENT MONITORING AND COMPLIANCE

MWH NZ Ltd has developed a database system called NM2 for tracking the key dates involved in the monitoring of resource consent conditions. Once the resource consent had been granted, these conditions were loaded into NM2 and the actions required during the contract monitored. This enabled the Engineer's Representative and the Contracts Manager to work closely together to ensure compliance had been achieved. This tracking tool was particularly useful as most of the consent conditions were linked to the construction programme and this helped manage the risk of construction delays due to non-compliance e.g. insufficient stakeholder notifications. Currently all of TDC resource consents are loaded into this database and actions tracked on a monthly basis.

Photograph 5: Pipeline installation on Rabbit Island

9.3 STAKEHOLDER ISSUES DURING CONSTRUCTION

Careful planning can ensure that project risks are well understood and management systems are in place. Nevertheless issues or unforeseen circumstances are likely to arise particularly during construction. Some of the main stakeholder issues encountered during construction were:

- **Clashes with existing services adjacent to the SNA site** – as described in Section 6.3 the section of the pipeline route adjacent to the SNA site was a pinch point due to a narrow corridor with the SNA on the eastern side of the proposed pipeline, dense pine trees to the west and existing services within the corridor. During the preliminary design, pot-holing was undertaken at key locations to determine the exact position of existing services. Whilst the frequency of pot-holing was increased at this pinch point there was a balance between the number of pot-holes over a distance of 8.5km and cost.

  As the pipe installation entered into the area adjacent to the SNA it became clear that a cast iron bio-solids pipe from Bell Island would clash with the proposed alignment for the new rising main. The new rising main was made of PE welded in continuous strings. As PE has a limited bending radius it could not pass under or over the cast iron pipe. Alternatively, the cost of diverting the bio-solids line was cost prohibitive.

  The easiest construction solution was to lay the pipe away from the bio-solids pipeline however this would result in the new pipeline encroaching into the SNA.

  A site meeting was arranged with a representative from TDC Parks and Reserves to discuss this issue, there was a risk that with the contractor, close to reaching a critical point, would need to stand down if resolution could not be achieved.

  The end result of discussions was an agreement to allow the pipeline to encroach into the SNA but with the requirement that any flora had to be carefully removed and re-planted within the SNA. The contractor sought a five day extension of time with no costs, and this was granted by the Engineer to the Contract.

- **Discovery of argillite on Bell Island** – A piece of mineral called argillite was discovered by an iwi monitor in the excavated material through part of the pipeline route on Bell Island. Māori value argillite's strength, hardness and ability to hold a sharpened edge which makes it ideal for making tools. Argillite however, does not occur naturally on Bell Island and is associated with Māori occupation.

  Due to the lack of other evidence in the vicinity of the find-spot and the mixture of local and imported materials it was unclear how the argillite got there. It was therefore proposed by the project archaeologist to record the location as a find-spot but with a question as to whether it was brought there by Māori or with imported materials.

  The final resolution was that the piece of argillite was returned to iwi - *Tiakina te Taiao* to be buried at an internment site on Bell Island as agreed with *Tiakina te Taiao* and stipulated as part of the resource consent conditions.

  Whilst this discovery was minor in nature and did not impact on the construction programme it highlighted the importance of agreed procedures to deal with artefacts before and not during the construction.

- **Delays with the completion of the Bell Island WWTP upgrade** – As described in Section 6.8, a potential impact to the proposed new rising main was the construction that had begun for new inlet works and clarifying tanks at the wastewater treatment plant at Bell Island where the rising main discharges. Whilst any issues were able to be managed during the design phase it was the late completion of the WWTP upgrade that affected the timing of the commissioning of the new rising main.

  Commissioning of the new rising main had always been planned to take place a few months after construction in order to accommodate the WWTP upgrade. However, this eventually occurred five months later. Once more, this was not a significant issue but did result in protracted coordination of all the parties involved.

- **Delays in the timing of the directional drilling in Blind Channel** – due to programme delays the initially secured dates for the reservation of the Blind Channel could not be met. This required a delayed start to reservation period. However, there were then issues with the availability of the sub-contractor to start the work and again new dates for the reservation were required.

The process of obtaining revised dates or extensions to the reservation of the channel was relatively straightforward; however there was a risk of negative publicity from those using the channel for recreational purposes.

- **Other issues** – Some of the other issues included the stock-piling of excavated material which blocked access to parts of Rabbit Island for the logging trucks and conversely some logging operations that affected the access routes for the contractor's plant and machinery. These issues were relatively minor and did not affect the construction programme or result in Variations to the contract.

10 LESSONS LEARNT

It is clear that some valuable lessons were learnt by the TDC, MWH, the Contractor and also the affected stakeholders. Significant time was spent on the consultation process and this was to continue throughout the design and construction phases of the project. Some of the main lessons learnt include:

- **Allocation of budget and timeframe for consultation for Capital works in Council's Long Term Plan –** A large proportion of the early part of the project was spent on the consultation phase and whilst the preliminary design could run in parallel, the detailed design and contract documentation could not be finalised until the consultation process had been completed. It is recommended that for Capital works projects where the consultation process is likely to be complex this is considered when setting budget spend in Council's Long Term Plan. The next phase of this ten year upgrade the capital spend spread out over two years with budget for consultation in year one and design and construction in year two.

- **Early consultation and discussion document –** the early identification of affected stakeholders and the preparation of a discussion document was key to driving the consultation process. In particular, the discussion document was prepared early in the preliminary design phase allowed for flexibility in any pipeline alignment changes as a result of the consultation outcomes. The discussion document was also able to be used to form part of the resource consent application and tender information.

  In addition to the circulation of the discussion document, the main stakeholders were also invited to attend a site visit to view the proposed pipeline route and discuss any concerns first hand. Whilst this coordination took time it was important as it made the stakeholders feel part of a collaborative consultation process.

- **Historic Places Trust -** The NZ Archaeological Association (NZAA) maintains site records on Archsite (www.archsite.org.nz) which is a GIS digital database containing information about recorded sites. It is important that as part of the identification of affected stakeholders this database is checked to see if proposed works are close to any recorded archaeological sites. Construction cannot start in these areas without an HPT Authority and this could potentially result in a three month delay (with significant costs) if a contract has been awarded without one.

- **iwi** - TDC now work more closely with *Tiakina te Taiao* (iwi) to identify Capital works that are likely to be of concern to them. This is includes the issue of the Capital works forward programme and regular monthly meetings where upcoming projects are discussed.

  The engagement of the *Matakite* to undertake a cultural audit of the pipeline route was an unforeseen part of the consultation process with iwi. As part of the regular monthly meetings with *Tiakina te Taiao* the projects that may need a cultural audit are also now considered. This allows for better forward planning.

  The capture and documentation of the results of the cultural audit need to be carefully managed. Very little was known about what format the cultural audit would take place. Due to the *Matakite* only providing a verbal commentary on which areas would require an iwi monitor it would have been extremely difficult to translate this into something that could be signed off by all parties and then monitored during construction. Having a member of the project team accompany the *Matakite* to write up the verbal commentary notes directly onto the location plans was essential but this was only something that became apparent once the

audit had started. It is important that the scope and deliverables of the cultural audit are clearly understood before the start so that any other project requirements can be met.

Whilst the whole process to obtain iwi sign off was lengthy and onerous, there is no doubt that should a major issue have occurred during construction all parties would have had a clear understanding of the processes for resolution and this would have minimised any significant construction delay and cost.

- **Tender Documentation -** It is important that the tender documentation provides clear guidance on the requirements to meet not only the resource consent conditions but to also ensure a sound understanding of the need to pro-actively work with the key stakeholders. Arranging a pre-tender site visit proved a useful way for contractors and their sub-contractors to appreciate the risks associated with resource consent compliance and enabled them to price accordingly for this. The benefit to TDC was that by taking the opportunity to discuss issues with tenderers prior to submission, the tenderers were able to price the management of these risks more competitively. It is also important that the level of effort during the consultation process is not wasted due to the contractor not recognising the stakeholder requirements.

- **Stakeholder interaction during construction -** Once the contract had been awarded, start-up meetings were held with the iwi monitors, the archaeologist and the forestry managers. These meetings allowed processes for communication and specific areas of concern to be openly discussed an agreed. It was also a good opportunity to reinforce the common objective of a smooth running project without unnecessary delays in construction. As with all stakeholder interaction, good communication is essential, and by helping to establish relationships early in the project, it was easier to manage the expectations of everyone involved.

- **Resource Consent Compliance Monitoring –** The use of a database system to track the key dates involved in the monitoring of resource consent conditions is an effective tool. It enabled the Engineer's Representative and the Contracts Manager to work closely together to ensure all compliance had been achieved. As most of the resource consent conditions were linked to the construction programme, this helped manage the risk of construction delays due to non-compliance eg. insufficient stakeholder notifications. TDC use this database system to monitor all their resource consents including notifications for consents due to expire. Having good visibility of all resource consents allows for better forward planning and creates efficiencies in the processes such as data collection for renewal applications.

11 CONCLUSIONS

The construction of the new Rabbit Island sewer rising main was the initial stage of a 10 year upgrade programme for the township of Mapua. Due to the environmental value and diverse use of Rabbit and Bell Islands, both past and present, there were a large number of affected stakeholders.

Consultation of this nature can be lengthy and often protracted and so it is important to identify as far in advance as possibly the likely stakeholders. Planning for this when budgeting in Local Council's Long Term Plans can help ensure the construction of the Capital works is delivered to programme.

Regular meetings with stakeholders such as iwi to discuss forward Capital works programmes can also ensure better advance planning of consultation needs.

Inadequate consultation and a failure to understand the issues of affected stakeholders have the potential to severely impact upon a construction programme. Without a clear definition of issues and agreed documented mitigation measures before the start of any physical works, the risk of project delays and higher costs substantially increases. It is also important that the outcomes of the consultation processes are followed for the full duration of any project and that good communication between all parties is also maintained.

The consultation process for the Mapua Rabbit Island rising main upgrade required a high level of effort but resulted in successful project delivery.

REFERENCES

MWH NZ Ltd (April 2009) Discussion Document - Mapua to Bell Island Wastewater Pipeline Upgrade. Report prepared for Tasman District Council

MWH NZ Ltd (July 2009) Mapua to Bell Island Wastewater Pipeline Upgrade - Resource Consent Application and Supporting Information. Report prepared for Tasman District Council

NZ Historic Places Trust (2007) Applying for an Archaeological Authority

NZ Historic Places Trust (2009) Mapua to Bell Island Wastewater Pipeline Upgrade HPT Authority. Issued to Tasman District Council

Tasman District Council (2008) Significant Natural Area (SNA) Survey Programme - Site Assessment Report

Tiakina te Taiao (2009) Procedures for discovery of Koiwi (human remains)

Young, A (2009) Archaeological Assessment: Rabbit Island & Bell Island. Report prepared for Tasman District Council, MWH NZ Ltd