CONSTRUCTION AND MAINTENANCE

A critical part of the predator proof fence construction process that is often over-looked is the relationship with the selected vendor. Establishing clear lines of communication throughout the whole process, from bidding and contracting through construction and beyond, is critical to the projects success and avoid preventable delays. This project selected Xcluder Pest Proof Fencing Co, which at the time of contract negotiations, was the only pest-proof fencing company in existence with a commercial track record. Since the completion of the Ka`ena Point fence, several other vendors, all based in New Zealand, have also emerged. Regardless, because all vendors to date are international entities and must travel to the job site and import their materials, certain precautions must be taken to prevent delays and miscommunication. This section of the report describes the contracting process with the vendor, construction logistics and long-term maintenance of the fence.

Contract with fence vendor

Each project will have different contracting requirements depending on the vendor selected and agency/institution initiating the contract. During price negotiations, particularly with an international vendor, care should be taken to ensure that all shipping, customs and local taxes are included in the final cost as in some cases the vendor may not be aware of those costs. Care should also be taken to determine how the agency will deliver funds to the vendor to prevent delays in payment reaching then. In the case of Ka`ena Point, TWS was not able to wire money internationally and instead had to send a bank check which caused considerable delays for the vendor to receive the money.

The most valuable lesson that was learned from the contracting aspect of the Ka`ena Point project was that setting concrete timelines was crucial, but meant nothing without monetary penalties attached to those deliverable dates for work that went beyond the anticipated construction period. This can go for both the agency to ensure their permits are in place ahead of time, and for the vendor

to ensure the work is completed in a timely manner. In the case of Ka`ena Point, there was a degree of uncertainty on the exact start date due to the project being contingent on permit approvals and seabird breeding seasons, and the construction range stated in the contract was 1 November 2010- 31 January 2011. The construction started five days late as a result of permit delays on the project end, but as discussed later, this delay was not the ultimate cause for the protracted construction period, which ultimately ended on March 30, 2011.

Fence construction began on 06 November 2010 with the expectation that the fence would be completed prior to the holidays (22 December 2010). The contractor left for the holidays in mid-December indicating they would return after 12 January 2011. When contacted in early January, the vendor was elusive about their return date and ultimately did not return until late February when it was pointed out to them that they were in violation of their contract. The delay was caused because parts for the gate had not been ordered on time and had not made it onto a January barge for shipment to Hawai`i (despite the other fence materials being shipped in September) which meant that they could not work on the fence before the materials arrived at the end of February.

Future contracts would be well served by providing monetary penalties for work extending beyond a certain cutoff point, to provide incentives to the vendor to finish work on time. To facilitate clear communication, future contracts should also include clauses that have any off-island contractor provide copies of plane tickets/reservation so that arrival and departure times are known, copies of bills of lading with contents clearly outlined and a shipment schedule so that it is clear when materials will arrive. While a delay of one to three months may not seem significant, the commencement of the rodent removal was tied closely with the fence completion date, due to the breeding season of the rodents. As a result of the largely preventable delays, the predator removal began prior to the gates on the fence being completed which likely ended up extending the length of rodent removal due to continued immigration while the gates were not installed. In addition, since cultural and archaeological monitors were required to be present during certain phases of construction, that

additional cost, the protracted rodent removal and extended employment of outreach staff cost the project a considerable amount of money.

Finally, while most predator-proof fencing contracts will state that they provide on the ground training in the maintenance and use of the fence and its components, having written instructions, and including a field-ready tool-kit list as part of the contract deliverables would have been extremely valuable and saved considerable time once regular maintenance duties were taken over. This project ended up creating our own tool kit list and maintenance instructions (complete with pictures) so that staff that were not present at the time of training would still be able to fix the fence when needed.

Construction

A construction window was established during contract negotiations tied to weather, road conditions, seabird nesting seasons and ideal rodent removal periods. Permit regulations, particularly the presence of a cultural and archaeological monitor as required under the Section 106 agreement, also dictated construction logistics to a certain extent.

Immediately prior to construction, the fence contractor was given oral as well as written instructions by project staff on appropriate behavior in the reserve as well as training on endangered species identification. The area where machinery was allowed was clearly flagged, and all endangered plants and historical features that were not to be altered were also flagged to prevent damage to the landscape. Contractors were notified of authorized walking trails, were required to bring their own portable toilet facilities and were required to pack out any waste daily. Finally, a physical copy of all permits was given to the contractor and they were required to have these with them at all times on the job site and abide by the conditions set forth in the permits at all times. For the most part, despite the delays, construction went as planned with a few minor hiccups, the most major of which is described below.

While a chain of communication was established in the contract, there was not a clear clause on who had the ultimate authority to dictate the work

schedule. Because certain phases of construction were required to have both cultural and archaeological monitors present per permit requirements, there were days when work was not allowed when these monitors could not be on-site. Unfortunately there was an incident of mis-communication where the fence contractor did several hours of work without a monitor present even though they had been told not to work, which resulted in a written reprimand for both the contractor, as well as the USFWS by the permitting authority. As discussed in contract negotiations, monetary penalties tied to permit violations may have helped to prevent some of these issues.

Construction and dealing with vendors is an inherently challenging aspect of any project, and many of the issues encountered are common to any project, conservation and otherwise. While it is not possible to predict or control everything, the key changes described above could have saved this project several months, and several thousand dollars in staff time if they had been included during contract negotiations.

Maintenance

Proper and regular fence maintenance will be a critical step towards reducing the chance of re-invasion after predator removal, and a well-built pest-proof fence is only as good as the monitoring and maintenance program that supports it. Accidents, vandalism and acts of nature are likely at some stage leading to the fence being damaged or breached. A good maintenance and monitoring program will detect the breach immediately upon its occurrence, will have people and resources in place to make emergency repairs, and will reduce the likelihood of pests entering when a breach occurs. Fortunately, causes of the majority of fence breaches in New Zealand, such as treefalls, vehicles and livestock, are not issues at Ka`ena Point. Instead, human error, vandalism, and extreme wave events are more likely to cause damage at this site. A good maintenance program includes regular inspection, a rapid response protocol, and having appropriate tools and instructions available to mend repairs.

While it is anticipated that maintenance will be relatively minimal for Ka`ena Point during the first five years, there will likely be increased work required as the fence ages. Verbal training was provided by Xcluder in proper fence maintenance for all involved personnel at the conclusion of fence construction. Future projects could benefit by requesting written protocols and a toolkit list as part of their contract as this project had to develop their own which took a considerable amount of time. Fortunately, extra materials were ordered at the time of fence construction to cover the first five years of maintenance needs for the fence.

A small tool box of patch materials and tools was assembled and is carried by project staff on each visit. The most regular maintenance that needs to be performed (based on discussions with fence managers in New Zealand) are:

- Patching of any holes or warping in the mesh using wire and extra mesh on an as-needed basis (usually in response to breach reports)
- Painting of seams on hood and brackets to reduce corrosion on a regular schedule (such as quarterly)
- Regularly lubricating and tightening the screws to ensure the doors close properly and don't bounce open.
- Replacing the spring bracket in the door every 2-3 years

Inspections

A pest-proof fence will need to be physically inspected on a regular basis, ideally weekly. How regularly depends on the risks prevalent at the site. Proximity to the public (vandalism and accidental damage), the nature and size of animals adjacent to the fence (damage from large livestock such as cattle and horses), the volatility of sea-end coastlines (which could be damaged or modified in storms), the proximity, extent and size of trees, the regularity and severity of flooding, and the regularity of people entering and leaving the fenced area, plus the value of what exists inside the fence are all risks that

determine the regularity of inspection. At Ka`ena Point, a complete fence inspection is done on foot weekly when perimeter bait stations are serviced and fence repairs are done on an as-needed basis. By doing inspections at the same time as regular baiting, costs are reduced considerably. This includes testing gates for functionality, sweeping out gate tracks, checking the mesh, hood and skirt along the entirety of the fence line for breaks in welds, loose bolts and scratch marks on the hood indicative of cat entry. In reality, the fence is informally inspected daily by numerous visitors using the reserve, and often obvious damage or issues are reported the day they are encountered. The formal fence inspections often find less noticeable damage, such as a weld break in the mesh that the untrained eye may not see on first glance.

During the first several months of gate operations, multiple issues were encountered with the gate interlocking mechanism (which prevents two doors from opening at once), which had been set too tightly. Typically, one door will not open until the second door is closed. In the case of Ka`ena Point, which is a popular hiking destination, the door that didn't close most often was the door on the interior of the reserve which would become jammed with small pebbles. As a result, those entering the gates from the outside were not able to open the first exterior door, and could not see what was needed to fix it, and would pull on the door until it came off its tracks. After several weekends of this, the interlock mechanism was temporarily disabled, but the door closing mechanism was tightened so that doors would shut firmly after each opening. While this does reduce the pest-proof nature of the gates to a small degree, project staff felt that it was better to avoid further damage and risk the occasional double-door opening than have the gates completely broken. Repairs that were done during the first six months of fence inspections included one weld break, and two small acts of vandalism on the gates (kicking the door panel to where it bent, and jumping on the mesh roof panel). How to conduct fence repairs is beyond the scope of this report, and will depend on the fence design selected, and consequently, is not discussed below.

Buffer pest control

A buffer zone (using traps and poisons) is recommended around the outside of the fence perimeter to reduce the likelihood of pests entering the pest-free zone through a breach in the fence. The width of this buffer zone will depend on the species of pests present, their abundance, and the plants and animals at risk inside the fence. Several species, including rats and perhaps feral cats, seem to establish the fence as a territory boundary and regularly patrol it, increasing their chances of finding a breach before it is repaired. Consequently, pests that are strongly territorial and those that travel substantial distances often need to be the most extensively controlled. When a fence breach occurs it is important that any pests that do enter the pest-free area are detected early. If a breach goes unnoticed for some time and there is no pest detection program in place, it may become necessary for the entire fenced area to be re-poisoned or trapped to attain pest free status again.

The best way to detect pest intrusions is to establish a network of bait stations, traps or tracking tunnels around the inside of the fence line and also either a grid of stations throughout the protected area or at least scattered stations in strategic locations. Such a grid of bait stations or traps will probably have been established previously to achieve complete pest eradication; retention of the station grid will certainly assist with the early detection of any re-invaders. In one New Zealand example, a small hole occurred in a pest proof fence as a result of careless use of some farm machinery. The hole went unnoticed for a week and in that time up to 10 mice may have entered the pest-free valley. Only the established bait station and tracking tunnel network enabled the mice to be located and dealt with. The biosecurity protocols at Ka`ena Point are detailed later in this report and include all of the methods described above.