Bentley
Advancing Infrastructure

Project Summary

Organization:
Tract Consultants Pty., Ltd.

Solution:
Land Development

Location:
Phillip Island, Victoria, Australia

Project Objective:
- Expand the Phillip Island Nature Parks' network of trails through Summerland Peninsula to enhance viewing of little penguins and their coastal habitat.
- Provide immersive experiences for eco-tourists without causing harm to the native flora and fauna or incurring excessive construction costs.

Products used:
OpenRoads, MicroStation, Bentley Navigator

Fast Facts

- The 3D model produced richly detailed site plans and displays that conveyed design intent to the client, stakeholders, and the community.
- Enhancing Australia's No. 1 wild-life tourist attraction will draw more national and international visitors to the area.

ROI

- Cost-conscious decisions such as aligning trails to avoid the need for elevated boardwalks vs. gravel paths contributed to the overall economy of the trailway expansion.
- OpenRoads automated the task of placing balustrades wherever required to meet code, reducing design time by an estimated 40 percent.
- Altering and alignment to avoid the need for balustrades lowered costs by 50 percent per linear meter.
- Optioneering made possible by Bentley software allowed Tract to develop design options within hours, cutting design time by a factor of eight.

OpenRoads Makes Way for Penguin Parade at Phillip Island Nature Parks

Tract Consultants Expand Trails for Eco-Tourists, Using OpenRoads to Balance Viewing Experiences and Habitat Preservation against Construction Costs

Master Plan Promotes Penguins

Just 90 minutes from Melbourne, Australia's most popular penguins attract more than 600,000 visitors annually from all over the world. The daily Penguin Parade on Victoria's Phillip Island is both a natural treasure and an icon for tourism. To enhance the visitor experience and increase domestic and international visitation, the Phillip Island Nature Parks asked Tract Consultants to execute phase one of a master plan that would expand the island's network of trailways and viewing areas. Tract used Bentley's OpenRoads civil design software to create a trail system that provided unprecedented views without impinging upon the habitat of little penguins and other native wildlife. The AUD 2.8 million project won multiple awards for seamlessly achieving these economic and ecological goals.

Cost-conscious Environment

Dedicated to excellence in nature conservation and eco-tourism, The Phillip Island Nature Parks manage five major attractions, including Australia's No. 1 wildlife tourist attraction, the Penguin Parade. This natural phenomenon features the island's resident colony of little penguins making their daily trek from a day of fishing at sea to a night of sheltering in their burrows. Eco-tourists view the parade from elaborate tiered platforms designed to enhance sightlines without disturbing the 33-centimeter-tall birds, which are the smallest species of penguins.

The Penguins Plus Viewing Area is located in the southwestern tip of Phillip Island, on Summerland Peninsula. The peninsula's unique habitat presented a rare opportunity for conscientious expansion of eco-tourism on the island. The parks first hired Tract, a recognized leader of landscape architecture in Australia, to create a master plan for managing and preserving the spectacular coastal scenery and unique wildlife. To attract and prolong visits to the island, the plan called for creation of diverse eco-tourism and recreation experiences that would complement the Penguin Plus Viewing Area, such as a new underground viewing facility for visitors to observe penguins at ground level. The improvements would also alleviate overcrowding in the existing infrastructure and remove built structures that overlapped penguin habitat.

Phillip Island Nature Parks retained Tract to implement the first stage of the master plan, which would expand the network of trails throughout the peninsula, and add a series of elevated boardwalks and viewing experiences at the Penguin Parade facility. The challenge was to create immersive experiences with minimal impact on the coastal flora and fauna. Above all, the new boardwalks could not obstruct penguin paths or borrows. At the same time, some sections had to be accessible to pedestrians, wheelchairs, and bicyclists, which required compliance with safety standards for handrails and balustrades under specific grade/height conditions. To control costs, the trail network would have to be based upon sound landscape design principles, so construction cost estimates could be made with a high degree of certainty.

The rigorous analysis technology powered by OpenRoads allowed Tract to model the terrain and design more than 10 kilometers of winding trails without impinging upon the fragile ecosystem.

Modeling Rugged Terrain

Tract used OpenRoads, Bentley's powerful civil design software for road design and analysis, to model the undulating terrain and plan the trailway system. Bentley's applications allowed Tract to accurately design a trail network that hugged the natural terrain without having to perform the labor-intensive process of grading by traditional CAD methods. LiDAR technology generated the point-cloud data for geolocation and horizontal and vertical alignments within

Find out about Bentley at: www.bentley.com

Contact Bentley
1-800-BENTLEY (1-800-236-8539)
Outside the US +1 610-458-5000

Global Office Listings
www.bentley.com/contact

the project area, while MicroStation® produced the dynamic templates used for design modeling and optioneering.

OpenRoads provided the rigorous analysis technology needed for the project team to establish the best locations for scenic outlooks and seating areas. Slope maps indicated suitable alignments and grades to maintain accessibility throughout the network, even when bridging valleys and ridges. The software's mapping solutions helped determine where to route the trail to avoid the costly construction of balustrades. However, boardwalk heights in excess of 950 millimeters triggered a design rule requiring the installation of balustrades in order to meet code.

Bentley's digital terrain modeling technology enabled Tract to create richly detailed site plans and displays early in the project. This was essential to providing the client, stakeholders, and the community a realistic perspective on

Choosing cost-conscious trailway design options saved 50 percent per linear meter.

the opportunities and constraints of the site. Because the plans and views were easily interpreted by all parties, Tract was able to communicate the design intent simply and efficiently.

Tract used OpenRoads modeling applications to illustrate how the trailway design would preserve and enhance scenic views. If an alignment impinged upon the landscape, vegetation, or coastal overlooks, the project team easily selected an alternative route and quickly updated the project model. Fly-through views revealed where the trails would be visible from the road, so adjustments could be made to keep trails out of sight and preserve the scenic coastal drive experience.

Accuracy Lends Confidence

Using OpenRoads early in the project lifecycle enabled Tract to create a typology for the Phillip Island Nature Parks trail system and, at the same time, easily make exceptions as needed to protect the habitat and its inhabitants. As a result, more than 10 kilometers of trails were designed to wind their way through rough and rolling terrain with minimal disturbance to the fragile ecosystem. InRoads® templates helped to determine which trail typology (gravel path vs. raised boardwalk) to implement as trails passed through

different coastal zones. This created significant savings when it was possible to choose the less costly gravel paths. When boardwalks were indicated, safety and accessibility features were specified as required.

The project team also realized benefits from working with software applications that supported collaborative design review. Because MicroStation and OpenRoads used DGN file format, team members were able to share files and collaborate across disciplines without loss of data integrity. Bentley Navigator was used to review 3D i-models both internally and externally, which saved considerable time during review cycles. This also made it easy for Tract to create multiple design options for the client's consideration. By enhancing the design team's productivity and efficiency, Bentley software helped to ensure Tract stayed within budget.

InRoads supported a high level of accuracy from the earliest stages of the project, providing a degree of confidence in the trailway design that would prevent changes during construction. This proved invaluable to avoiding delays in the highly restrictive construction zone. As a result, the project was completed on time and without overlapping with the penguins' breeding season.

Not-for-Profit Economy

As a not-for-profit organization, Phillip Island Nature Parks rely on revenue generated by the Penguin Parade to maintain the parks' assets, provide conservation and education programs, and fund major research. It was imperative that no harm to the penguin habitat result from the expansion of the trail network, yet costs had to be carefully considered. Tract presented various design scenarios that balanced visitor expectations against construction costs, so the client could weigh the cost benefits. The optioneering made possible by Bentley software allowed Tract to develop alternatives for review within hours instead of days. Tract estimates that the software cut design time at this phase by a factor of eight, contributing to further savings.

Throughout the project, Tract consistently applied design rules that factored in the cost of materials and construction. Executed in OpenRoads, this powerful template reduced design time by an estimated 40 percent. The 3D model also allowed the team to choose a design option that negated the need for balustrades, which saved 50 percent per linear meter. Tract's proven ability to reduce both design time and construction costs earned the firm the contract for the next phase of expansion, extending the trail network to other parts of the Summerland Peninsula.

The Penguin Plus Viewing Area received the 2016 Australian Institute of Landscape Architects (AILA) Victorian Chapter Award of Excellence in Tourism, as well as the United Nations Association of Australia 2016 World Environment Day Award for Infrastructure Innovation. The uniquely contoured viewing locations blend in with the coastal landscape and seamlessly connect to the new boardwalk system, creating an unprecedented wildlife viewing destination.

Bentley
Advancing Infrastructure