# Transport and Permit System Technology to Manage Access to Milford Sound

## Summary Report



RESOLVE GROUP NAVIGATING COMPLEXITY

MILFORD OPPORTUNITIES

Department of Conservation *Te Papa Atawhai*

**Document Control**

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**Approvals**

| | | |
|---|---|---|
| **Prepared by** | | **Date** |
| Name | Kirill Yushenko | 28 March 2024 |
| **Reviewed by** | | |
| Name | Mark Walker | 15 May 2024 |



Every attempt has been made to ensure that the information in this document is correct at the time of publication. Any errors should be reported as soon as possible so that corrections can be issued. Comments and suggestions for future editions are welcomed.

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# 1 Executive summary

Piopiotahi Milford Sound is one of New Zealand's most popular visitor attractions and iconic destinations in the world. 870,000 visitors went to Milford Sound in 2019, with tourism growth forecasts (generated pre-COVID) reaching 1.2 million by 2023 and 2 million by 2035.

The current Milford Road corridor and Milford Sound itself are under stress. This requires new thinking to safeguard the core character and values, World Heritage status, conservation values and the visitor experience.

This report was developed for the Milford Opportunities Project (MOP) to assess current available technologies to implement transport and permits system technology that can be used to manage access to Piopiotahi Milford Sound.

System requirements were identified from a customer-centric perspective. Several scenarios involving visitors to Milford Sound were developed, then each scenario was analysed to determine how the system would be required to perform. These scenarios and requirements were documented and formed the basis for discussions with suppliers. A high-level system architecture was also developed to assist with visualisation of the system and interaction of the components.

Several existing systems were identified that may have some relevance to the development of a transport and permits system. In particular:

- The Department of Conservation (DOC) has implemented a system for booking accommodation and access to the Great Walks.
- New Zealand Transport Agency Waka Kotahi (NZTA) is currently developing the National Ticketing Solution (NTS), a system that will provide a single method of payment for public transport in New Zealand.
- Automatic Number Plate Recognition (ANPR) systems are being increasingly used to monitor and control vehicle activities such as access to car parking areas and use of toll roads.
- Fleet monitoring is now commonly used by public transport and freight operators to provide real-time information about vehicle locations. This can be very useful for both service planning and providing real-time information to customers.

In addition to reviewing existing systems that might be relevant to MOP, potential new suppliers were identified through a combination of online searching and publication of a Request for Information on the Government Electronic Tenders System (GETS). This resulted in engagement with ten different suppliers that can be grouped into three main categories:

**Category A – Software solutions purpose-built for parks and recreation**

**Category B – Software solutions for the tourism industry**

**Category C – Custom software development**

Category A suppliers would be able to support most of the functions required by MOP, with a focus on configuration or customisation rather than development from first principles. Functions that are available as part of a product are likely to have already been deployed in several live environments, reducing the likelihood of problems occurring during a new implementation.

The systems in Category B are not specifically designed for managing parks and recreation in the same way as the solutions in category A. They are designed to provide a cost-effective, stable platform for common tasks such as making reservations, accepting payments and checking in guests. These tasks are similar to the more straightforward MOP requirements e.g. issuing visitor permits online or reserving a parking space. However, the more complex MOP use cases, such as managing hop-on hop-off shuttles or allocating permits to different types of visitors, would not be a direct match with the functions of the systems that these companies provide. These companies generally do not offer customised solutions for their clients, so workarounds would be required to fit the MOP requirements to the functions available.

Category C suppliers are software development companies that offer fully customised software development solutions built from first principles. While custom solutions are guaranteed to meet MOP requirements, development of a system from first principles is highly expensive and requires the client to accept significant risk compared to purchasing a product that has already been developed and tested in the market.

Indicative costs for a solution were assessed based on information received from suppliers. It is estimated that the cost to implement a booking system that meets MOP needs is in the order of $500,000 to $1 million, with annual operating costs in the order of $465,000 to $1.12 million. The variation in cost relates to whether MOP would be prepared to accept an off-the-shelf product that meets most requirements, or if additional software development would be required to meet MOP's more unique requirements.

The cost of implementing an ANPR system to manage access by automatically reading number plates was also investigated. A system that reads number plates at one location and matches them with current permits that have been issued is estimated to cost $225,000 to implement, with an estimated annual operating cost of $45,000. This system would match vehicles with current permits, but there would still be a need to control access based on the results of the matching process. Access control could range from a park ranger being provided with a list of unauthorised vehicles, to a manually operated check point, to a fully automated barrier system. Due to the wide range of options available for access control, a cost estimate for this component has not been included.

The use of technology to manage hop-on hop-off shuttle operations was considered as part of the investigation. Real-time vehicle tracking is now commonly used by commercial operators, so the provision of real-time information could be specified as part of the operation of a shuttle service without significant additional cost.

Tracking of individual visitor movements for safety purposes would be more challenging as it would require visitors to "check in" and "check out" as they use different services. However, most system suppliers indicated that this would be achievable for additional cost.

Most of the solutions that were identified as part of this investigation were based on pre-booking activities. On-site or instantaneous bookings were also discussed with suppliers, these were generally considered to be feasible but required implementation/development of additional components.

In conclusion, this investigation identified several suppliers that are capable of providing systems for managing transport and access to Piopiotahi Milford Sound. The most cost-effective solution is likely to be an existing product that meets most of the MOP requirements, with some additional software development to address requirements that are more unique to MOP but considered essential.

The next step would be to prepare a Request for Proposal (RFP) based on a set of requirements prepared by MOP. The use cases and architecture included in this report provide a starting point for the requirements.

The RFP requirements should be categorised into:

- Non-functional requirements (e.g. availability, reliability, security, support)
- Must-have functional requirements
- Nice-to-have functional requirements

The objective would be to contract a supplier that is going to work collaboratively during the implementation, software development and operational phases of their engagement. For this reason, an interactive RFP process including interviews and demonstrations is recommended.

It is also recommended that MOP engage closely with NZTA and the National Ticketing Solution project to take advantage of what the project may have to offer.

# 2 Background

The Milford Opportunities Project (MOP) was established in 2017 as a multi-agency project to look at how visitors are managed into the future at Piopiotahi Milford Sound and along the Milford Road corridor. For more information on MOP refer to https://www.milfordopportunities.nz/

Milford Sound is one of New Zealand's most popular visitor attractions and iconic destinations in the world. 870,000 visitors went to Milford Sound in 2019, with tourism growth forecasts (generated pre-COVID) reaching 1.2 million by 2023 and 2 million by 2035. It is located in part of New Zealand's largest National Park (Fiordland) and holds UNESCO World Heritage status.

The current Milford Road corridor and Milford Sound itself are under stress. This requires new thinking to safeguard the core character and values, World Heritage status, conservation values and the visitor experience.

This report was developed for MOP to assess current available technologies to implement transport and permits system technology that can be used to manage the access to Milford Sound and along Milford Sound corridor environment to:

- Manage road access in an unobtrusive and subtle way (preferably, but not necessarily, without a physical barrier).
- Issue permits to people that apply under a variety of categories.
- Allow people to manage their own visitor experience as part of a highly interactive customer experience including a hop on hop off transport system with the aim to reduce the road usage by private vehicles.
- Manage bus circulation scheduling to respond to customer demand.
- Identify where visitors are, or are most likely to be, so that they can be located if necessary for safety management purposes.
- Manage parking of private vehicles.
- Work consistently in remote and challenging terrain.
- Allow people to use both a desktop or mobile to make the required bookings.

Information on possible solutions has been obtained through interviews with known suppliers and responses to a Request for Information (RFI) published on the Government Electronic Tenders System (GETS).

The report identifies opportunities and risks, and details options and estimated costs for implementation.

# 3 Identification of requirements

## 3.1 Use cases development

Resolve together with MOP held a workshop to discuss and develop use cases of the required transport and permits system. These use cases describe the typical top-level functions that the transport and permit system would be required to perform. This is not intended to be a complete list of use cases for the system, it is intended to describe a sample of scenarios that indicate to potential suppliers the type of functionality that is required. 11 use cases were developed, see Table 1.

**Table 1 - Use cases**

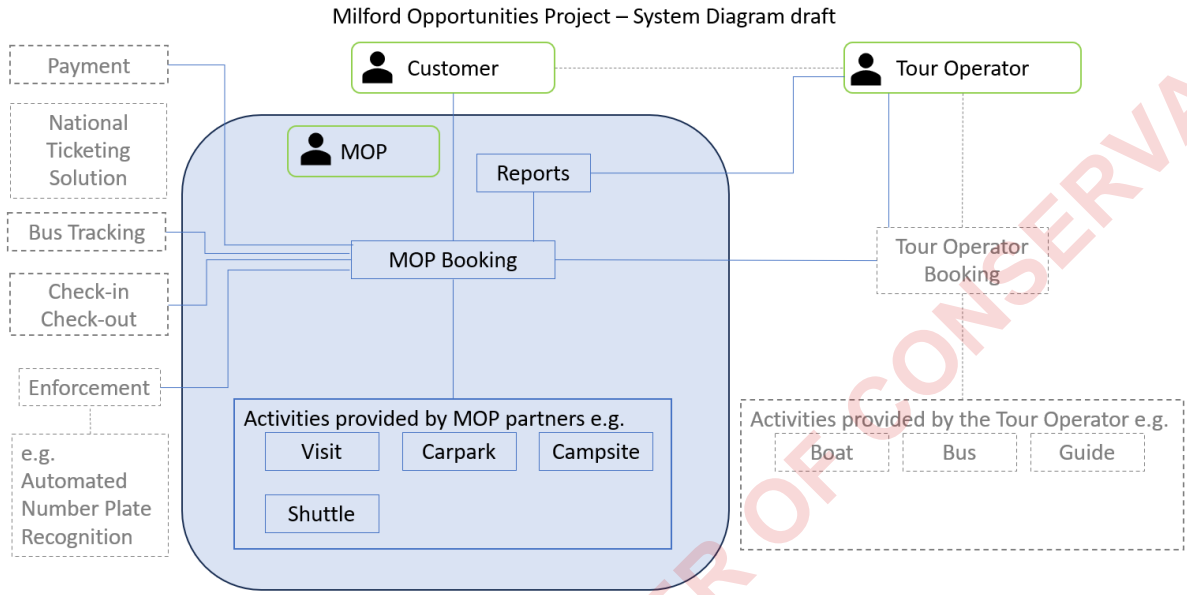
| Use Case # | Use Case Description |
|---|---|
| 1 | An international visitor driving themselves to Milford. Ability for an international customer to access the system via a website, create an account, obtain a visitor permit, book a car park, combine different products into a single booking, pay for a booking online using a credit card. |
| 2 | Booking and accessing multiple services e.g. a camp site and a bus ticket. Ability for a customer to book multiple services provided by MOP in a single booking. |
| 3 | A New Zealand Resident regularly visits Milford outside of peak hour. Ability to structure product prices based different customer types e.g. international visitor, New Zealand Resident, recreational user. |
| 4 | A tour operator booking on behalf of an international visitor. Ability for tour operators to obtain visitor permits from the MOP transport and permits system on behalf of their customers. |
| 5 | Visiting the National Park but not Milford. Ability to provide a link to the MOP transport and permits system from other websites. |
| 6 | Registering worker's vehicles. Ability for an organisation to register and manage permits for multiple employees and vehicles. |
| 7 | Obtaining a report on bookings. |
| 8 | Refund of payments. Ability for MOP to refund payments made using the transport and permits system. |
| 9 | Integration with other systems – enforcement. Ability for an enforcement system to request booking details from the transport and permits system. |
| 10 | Integration with other systems – National Ticketing System. Ability for a National Ticketing System to request booking details from the transport and permits system. |
| 11 | Bus information. Ability to track buses and provide location information to visitors. |

For a detailed description of use cases refer to Appendix A.

## 3.2 A proposed system architecture

Based on the use cases and corresponding system requirements, a proposed system architecture for a transport and permits system is described in Figure 1 below.

**Figure 1- Milford Opportunities Project – proposed system architecture**




- The shaded blue area shows the core components of the transport and permits system.
- All **activities** in the system are managed through a **MOP booking**.
- A **MOP booking** is linked to a **customer**.
- **MOP booking** information can be shared with other systems using secure methods to manage:
    - **payments**
    - **check-in and check-out** through a site based device
    - **enforcement** through systems such as automated number plate recognition
    - integration with the **National Ticketing Solution** for public transport
    - etc.
- Real-time **bus tracking information** can be compared with **MOP bookings** and timetable information to operate and optimise shuttle services.
- Authorised **tour operators** can access the MOP system using secure methods to make bookings on behalf of their customers.
- MOP and authorised tour operators can access **reports** to review current and historical system information.

This proposed system architecture allows the core system (in blue) to be implemented, which can then interact with other systems and applications that provide specialist functions (the boxes with dashed outlines). Interfaces between systems and applications can be specified using industry standard protocols, enabling the system to grow and develop as requirements change.

# 4 Products used in New Zealand currently

As part of this investigation, several existing products were identified that may have some relevance to the development of a transport and permits system.

## 4.1 DOC accommodation and Great Walks bookings

The Department of Conservation (DOC) has implemented a system for booking accommodation and access to the Great Walks. The first implementation of the system was to manage bookings and accommodation for the Great Walks and was launched in 2018. Following the success of this implementation, the system was expanded to include bookings for all DOC huts and campsites in 2019.

The system was implemented by Tyler Technologies, a software development company based in USA. Tyler Technologies was invited to participate in this investigation, and they subsequently responded to the Request for Information.

## 4.2 Software used by tour operators in Milford

Southern Discoveries is one of the main tour operators in the Milford region. IBIS is the system supplier for Southern Discoveries and IBIS was interviewed as part of this investigation.

RealNZ operates several visitor centres in the South Island, including Milford, Te Anau and Queenstown. RealNZ uses Fareharbor to provide an online portal for visitors to book activities. Fareharbor was interviewed as part of this investigation.

## 4.3 National Ticketing Solution

New Zealand Transport Agency Waka Kotahi (NZTA) is currently leading a partnership with 13 Public Transport Authorities in New Zealand to develop the National Ticketing Solution (NTS), which is a range of easy-to-use payment methods for all public transport in New Zealand. Customers will be able to pay using contactless debit or credit cards, as well as prepaid cards and cash in some areas.

Canterbury will be the first region to implement the NTS in 2024. All other regions are expected to transfer to the new system by the end of 2026. Customers will then be able to use this single payment system on all participating public transport systems in New Zealand.

Yogesh Anand, leader of the NTS project, provided details of the project as part of this investigation. He invited MOP to participate in the stakeholder group for the project.

NTS presents an opportunity for any public transport service that is provided by MOP to be integrated into a national payment system. As the specific details of NTS are not yet available, integration with NTS has been included in this investigation as an opportunity for the future that should be considered when determining system architecture and developing a software solution for managing access to Milford.

### 4.4 Automatic Number Plate Recognition

Automatic Number Plate Recognition (ANPR) is a technology that enables vehicles to be identified by their registration plate using cameras. For MOP, this could be useful for managing access to Milford by matching number plates of vehicles entering the area with records of access permits that have been granted. Access could be enforced either by:

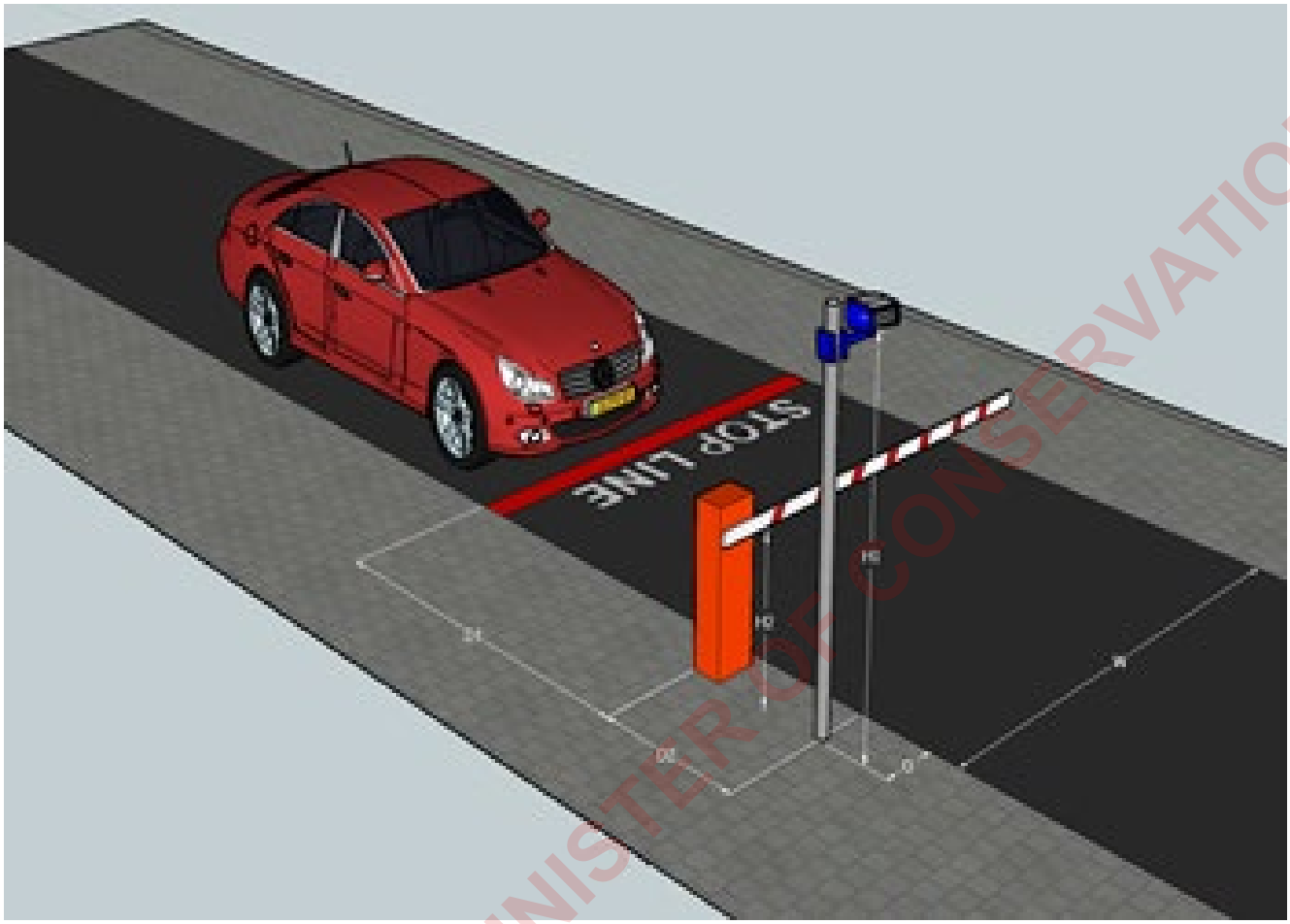
- using a physical barrier connected to the ANPR system, or
- providing real-time reports of vehicles that have entered the area without a permit, which can then be followed up by operations personnel

Using a physical barrier will result in higher levels of compliance, but it may not provide the type of visitor experience that MOP is seeking. Alternatives to a physical barrier could be signage that reminds visitors of the requirement to obtain and access permit, or monitoring of car parks by an attendant who has real-time access to a list of vehicles that have entered the park without a permit.

Two suppliers of ANPR systems were contacted as part of this investigation - SICE and Tattile. The suppliers were chosen based on their prior work with New Zealand Transport Agency Waka Kotahi (NZTA), where they were required to provide robust and reliable systems for toll road and traffic monitoring purposes.

**Figure 2 - Example of an ANPR camera**

**Figure 3 - Example of an access barrier controlled by an ANPR camera**




## 4.5 Identifying number of vehicle occupants

One of the challenges with operating an access permit system is identifying the number of occupants in a vehicle. NZTA was contacted regarding some research that they have conducted into determining the number of occupants in a moving vehicle using video analysis. NZTA has been investigating this as a tool for enforcement of transit lanes where only vehicles with two or more occupants are permitted to use the lane. NZTA's conclusion was that this technology is not yet considered to be reliable enough for implementation.

## 4.6 Bus monitoring

Fleet monitoring is widely used in New Zealand by both bus operators and freight haulage companies, so it is a widely available technology with a proven track record. The technology using Global Positioning Satellite (GPS) tracking systems linked to fleet monitoring software to provide both real-time and historic information about bus movements. This information can be shared with visitors to plan their trip and used by operations teams to optimise bus services.

# 5 Available booking software

Resolve Group conducted an online search to identify booking system suppliers and contacted them to learn more about the companies, their experience and potential solutions. Multiple local and international suppliers were contacted and the following suppliers participated in meetings:

- Checkfront (Canada)
- Rezdy (Australia)
- Fareharbor (Australia)
- IBIS (New Zealand)
- Booz Allen Hamilton (USA)

During these meetings suppliers demonstrated capabilities of their current systems, described functionalities of their systems, explained their approach to project delivery and explained costing plans.

Based on the inputs from the suppliers, Request for Information documentation was prepared. The inputs from suppliers assisted to ensure that the right questions were asked as part of the RFI process to obtain quality information from suppliers. The RFI response form contained the following 12 questions for respondents to answer:

| Questions for RFI Respondents |
|---|
| 1. Provide details of your company background and your experience providing systems of this type. |
| 2. Provide examples of similar systems that you have provided. Describe the client, the system functions and how it relates to the requirements of the MOP transport and permit system. |
| 3. Describe how your system addresses some or all of the use cases and requirements provided in RFI Section 2 (Our Requirements). |
| 4. Describe your high-level system architecture, for example:<br>a. Are applications web-based or installed on a device?<br>b. Are services provided in a modular structure, or all in one package? |
| 5. Milford Sound Piopiotahi receives approximately 870,000 visitors per annum, with 6,000 visitors per day in peak periods. Confirm that your system has the capacity to manage this level of demand. |
| 6. Visitor numbers to Milford Sound Piopiotahi are expecting to continue growing, with an unconstrained forecast of up to 2 million visitors per annum by 2035. Describe how your system is designed to scale up to manage increases in the number of customers and activities that are managed. |
| 7. Describe how your system allows interfaces with other systems to send and receive information, for example Application Programming Interfaces (APIs). Describe any limits on the number of transactions via these interfaces. |
| 8. Describe the method your system uses to manage payments from customers, including refunds and rebooking if required. |

| Questions for RFI Respondents |
|---|
| 9. Describe the level of internet connectivity that is required to use your system. Does the system allow any functions to be managed when an internet connection is slow or unavailable? |
| 10. How do you work with customers to develop/enhance the products that you provide? |
| 11. Do you have experience with tracking the movement of people and/or vehicles that have made bookings? For example, check-in and check-out processes, ticket scanning, automated gates, vehicle license plate recognition. |
| 12. Describe your licensing and pricing model, including:<br>a. Installation / commissioning costs<br>b. Fixed fees<br>c. Fees based on the number of transactions<br>d. Fees based on the number of users<br>Confirm the currency in which fees are charged. |

The RFI was published on the NZ Government Electronic Tendering System (GETS) in February 2024. Six companies provided responses:

1) Checkfront - Canada
2) DataCom - New Zealand
3) Intellico.co.nz Limited TA Stellar - New Zealand
4) Intouch Technology Group Limited - New Zealand
5) Tuten Limited - New Zealand
6) US eDirect Inc. subsidiary of Tyler Technologies - USA

The RFI responses were reviewed along with the information gained from initial interviews with suppliers. The review indicated three different categories of suppliers, which are summarised below:

### 5.1 Category A – Software solutions purpose-built for parks and recreation

Suppliers in this category are software companies that have developed a product specifically for managing parks and recreation.

These products have been designed to cater for parks and recreation organisations that vary in scale and complexity, from parks with a few camp sites to USA National Parks with thousands of visitors per day. As a result, the systems have a high level of flexibility, with the ability to pick and choose different functions or integrate with external systems as required.

Products in this category would be able to support most of the functions required by MOP, with a focus on configuration or customisation rather than development from first principles. Functions that are available as part of a product are likely to have already been deployed in several live environments, reducing the likelihood of problems occurring during a new implementation.

The MOP functions that suppliers in this category indicated were not part of a standard product and may require development included:

- Tracking visitor activities for safety purposes. Many products have ‘check-in’ facilities that enable a visitor’s location to determined when they register at a specific point. Typical check-in points include car parks, accommodation and guided activities. However, these check-ins are generally a single step in a

booking i.e. a visitor can only check-in once. More extensive tracking would require the ability for multiple check-in events under a single booking, which would require some software development.

- The ability for tour operators to make bookings on behalf of their customers can be challenging. An example of this would be a bus tour operator obtaining access permits for all of their guests. Some systems allow this by allocating a quota of permits/tickets for tour operators, so that the operator can make a bulk purchase without providing details of individual visitors. If individual visitor details were required, then the tour operator would either need to enter these details manually, or some development work would be required to allow automatic transfer of data from the tour operator's booking system to the MOP booking system.
- Integration with public transport/shuttle operations. Most booking systems can manage the sale of transport tickets and they often include the ability to check-in when the ticket is first used. More complex tracking of ticket usage (e.g. tracking every time a visitor uses a hop-on/hop-off shuttle) would require custom development, or integration with a system such as the National Ticketing Solution being developed by NZTA.
- Integration with ANPR. Some development would be required to match records of permits that have been issued with number plates that are observed in the field.

## 5.2 Category B – Software solutions for the tourism industry

There are several software solutions available for the tourism industry, generally built around the concept of managing reservations and payment for activities, experiences and accommodation.

These solutions are not specifically designed for managing parks and recreation in the same way as the solutions in category A. They are designed to provide a cost-effective, stable platform for common tasks such as making reservations, accepting payments and checking in guests. These tasks are similar to the more straightforward MOP requirements e.g. issuing visitor permits online or reserving a parking space. However, the more complex MOP use cases, such as managing hop-on hop-off shuttles or allocating permits to different types of visitors, would not be a direct match with the functions of the systems that these companies provide. These companies generally do not offer customised solutions for their clients, so workarounds would be required to fit the MOP requirements to the functions available.

## 5.3 Category C – Custom software development

Companies that offer custom software development solutions are a further option. While custom solutions are guaranteed to meet MOP requirements, development of a system from first principles is highly expensive and requires the client to accept significant risk compared to purchasing a product that has already been developed and tested in the market.

## 5.4 Other responses to the RFI

A response was received from a company offering a parking management solution. This was relevant to one aspect of the investigation (access management using ANPR), but a solution like this would require significant customisation to address other MOP requirements.

# 6 Indicative costs

## 6.1 Booking system costs

The suppliers that responded to this investigation provided a range of responses when asked about system costs. Some proposed solutions were highly customised to the individual client, which means that costs would only be determined following detailed analysis and agreement of system requirements. Other solutions were standardised products, with fixed costs but also fixed functionality that might not meet all the MOP requirements.

An estimate of likely costs has been developed based on reviewing all the information provided and identifying a mid-range solution that meets the majority of MOP requirements without developing a completely customised system.

### 6.1.1 Implementation costs

Implementation costs are one-off costs at the beginning of the project to cover development, configuration, testing, installation and commissioning. All systems have some degree of implementation cost, even if it is just configuration of an off-the-shelf product for the specific client.

The cost of implementation is dependent on the number of functions performed by a system and to what degree these functions are already included in the base product offered by a supplier. For this estimate, the development of the system for DOC accommodation and Great Walks bookings has been used as a guide.

The DOC system cost approximately $460,000 to implement. While this system is a smaller scale than MOP, it still required some specific software development. As such, it is considered to be a good indicator of the likely implementation costs for a system based on an existing software product that would provide MOP with most of the functionality that is required.

As discussed in section 5.1 above, there are some functions that MOP is considering that are more specialised and unlikely to be provided as part of a standard product from a software developer. These functions include:

- Tracking visitors for safety purposes
- The ability for tour operators to make bookings on behalf of their customers
- Integration with public transport/shuttle operations
- Integration with ANPR

The cost of implementation of these functions is difficult to determine due to their specialised nature. A solution that incorporates these features could require no additional cost if it can be delivered by re-purposing an existing product feature, or it could significantly increase cost if a function requires development from first principles.

For the purpose of this estimate, implementation costs in the range of $500,000 (for a solution based on existing product features) to $1,000,000 (for a product with additional customised features) are proposed.

### 6.1.2 Licensing Costs

Licensing costs are fees that are charged for the base use of the service. They include the cost of providing user support, system maintenance and regular system updates as agreed between the client and the software provider. There are several versions of this type of fee in the software industry including number of users, consumption based, or just a flat fee.

The structure of this fee is closely related to transaction fees below. It is quite common for software providers to charge a combination of a fixed annual licensing fee to cover base costs, plus a transaction fee based on the actual number of transactions that are processed.

The estimated licensing cost for MOP is $2,500 per month. Licensing costs can be as low as $250 per month for a generic tourism industry product with limited functionality, through to $10,000+ per month for a highly customized solution that requires a dedicated support team.

### 6.1.3 Transaction Fees

Transaction fees cover the cost of system resources that vary depending on the number of transactions being handled. This may include fees from third parties such as credit card payment processing agencies.

Transaction fees are often on-charged to the end customer, so that operational costs associated with an increase in demand for a service are recovered.

The example transaction fees provided by suppliers as part of this investigation ranged from $0.50 per transaction for high volume, low value transactions (e.g. booking a car park) through to $8 per transaction for lower volume, high value transactions (e.g. purchasing an annual pass).

For MOP, the licensing and transaction fees have been estimated at an average of $1 per transaction.

There were 870,000 visitors to Piopiotahi Milford Sound in 2019. Prior to the COVID pandemic, the number of visitors was forecast to reach 1.2 million by 2023 and 2 million by 2035.It is assumed that there is an average of two visitors per booking. Analysis of actual visitor data would assist in refining this assumption.

This means that annual transaction fees are estimated to range from $435,000 based on 2019 visitor numbers, to $1 million based on 2035 forecast visitor numbers.

**Table 2 - Estimated booking system costs**

| Description | Estimate | High Estimate | Range |
|---|---|---|---|
| **Implementation Cost** | **$500,000.00** | **$1,000,000** | $500,000 for commonly used functions - $1 million including specialised functions |
| | | | |
| **Annual Operational Costs** | | | |
| Licensing fee $2,500/month x 12 months | $30,000 | $120,000 | $3,000/year generic tourism industry product - $120,000 highly customised product |
| Transaction fee $1.00 x 435k transactions | $435,000 | $1,000,000 | $435,000 based on 2019 visitor numbers – $1 million based on 2035 forecast visitors |
| **Total Annual Operational Costs** | **$465,000** | **$1,120,000** | |

## 6.2 ANPR costs

Automatic Number Plate Recognition (ANPR) systems are most commonly used in car parks and toll road operations. Two suppliers of ANPR systems were contacted to provide rough costings for MOP. The two suppliers were SICE and Tattile. The suppliers were chosen based on their prior work with New Zealand Transport Agency Waka Kotahi, where they were required to provide robust and reliable systems for toll road and traffic monitoring purposes.

Based on the information received from the two suppliers, the estimated cost to provide an ANPR system for MOP is shown in Table 3 below.

Annual operating costs (maintenance of the site equipment and software) have been estimated as 20% of the implementation cost.

The estimate assumes that there is a nearby electricity service and cellular/fiber optic telecommunications available. This could be achieved by locating ANPR sites near to existing infrastructure such as car parks.

**Table 3 - Estimated ANPR costs**

| Description | Amount |
|---|---|
| **Implementation Cost** | |
| Install 2 x ANPR cameras, including pole and roadside cabinet | $75,000 |
| Monitoring software, integrated with the booking system | $150,000 |
| **Total Implementation Cost** | **$225,000** |
| | |
| **Annual Operational Costs** | **$45,000** |

### 6.3 Shuttle tracking

Part of the objective of the Milford Opportunities Project is to provide a safe and reliable shuttle service that encourages visitors to use shared transport services rather than private vehicles.

A key component of a safe and reliable shuttle service is the ability to track the shuttles so that their location can be shared with visitors. Tracking also helps to analyse the shuttle operation and identify where improvements to timetables could be made.

Vehicle tracking is now commonplace in vehicle fleet management – fleet operators are able to receive real-time information about the location of their vehicles as well as access historical data for analysis. It is becoming increasingly common for public transport operators to provide real-time information to applications such as Google Maps using open-source data formats, which the application providers will then publish at no charge.

Obtaining real-time shuttle tracking information could be achieved at no extra cost by specifying it as a requirement of provision of the shuttle service by a transport operator.

Providing information regarding the number of available seats on a bus is more challenging. The open-source data formats used by applications such as Google Maps allow this information to be published, but it requires monitoring of passenger boarding/disembarking. This may be possible through the National Ticketing Solution, but the likely cost is unknown as the NTS is still under development.

Tag-on and tag-off facilities are often used on public transport to manage fare collection. This can provide some limited information about available seats and tracking of passengers for safety purposes. The accuracy of this information could be improved through additional system development. Measures to ensure that all passengers tag on and tag off correctly, for instance locating the tag point next to the driver, could also assist with improving information quality and safety.

Another consideration is whether on-board or instantaneous shuttle bookings are required. Most of the solutions that were identified as part of this investigation are based on pre-booking tickets, with on-board or instantaneous booking a possible option that could be implemented at additional cost. We are however aware that there are solutions that appear to offer dynamic ticketing systems including how many seats are available that are being considered by the project.

# 7 Potential solution

## 7.1 Availability of potential solutions

Market research has identified several suppliers that offer solutions to manage visitor activities. The solutions range from off-the-shelf products to systems that are custom designed and built from first principles based on the specific requirements of the customer.

There is a corresponding range of costs and implementation risks associated with these solutions:

- Off-the-shelf products are generally less expensive than custom designs because a large base of customers share the cost of a common set of features. However, this means that an off-the-shelf solution may not meet unique customer requirements and workarounds may be required.
- Off-the-shelf products are generally lower risk to implement than custom designs, as they have been tested and implemented by previous customers. With a custom-built system, development activity is unique to the customer and there is uncertainty around the amount of work that will be required to successfully complete development.
- Off-the-shelf products have lower operational costs than custom designs because the cost of ongoing system support is shared amongst a group of customers and support systems are already in place from earlier implementations by other customers.

## 7.2 Assessment of potential solutions

There are software solutions available that have been purpose-built for the parks and recreation sector and therefore meet most of the needs of MOP. These systems have often been developed with scalability and flexibility so that customers can configure the system to meet their particular requirements. The systems offer a high level of collaboration, where customers can start by implementing a base product that meets most of their needs, then work with the supplier to develop solutions for their more niche requirements. Customers are part of a community of similar organisations with similar needs, which encourages continuous improvement and allows customers to benefit from the innovation of their peers.

Many of the solutions for the parks and recreation sector have been designed in a modular fashion, so that a customer can choose from a suite of functions and implement them quickly. They also allow interfaces with other systems and applications using industry standard protocols, making it possible to combine different systems when one system cannot provide all of required functionality.

DOC has had some experience implementing a system of this type for accommodation and Great Walks bookings, which could provide some valuable lessons learned for MOP.

The more generic software solutions for the tourism industry are likely to meet some of the MOP requirements but may be missing some critical functionality. Implementation and operational costs are likely to be lower as these systems are less customised. Implementation of one of these systems would require assessment to determine whether minimum MOP requirements can be met and other MOP requirements can be either not delivered or managed through a workaround.

There are software development companies that offer to provide solutions based on custom development from first principles. This introduces a relatively high level of delivery risk to MOP without adding significant additional value and so solutions of this type are not recommended unless they are absolutely necessary.

The Milford region creates challenges for information systems due to its remoteness. Several suppliers have indicated that they can provide solutions with a mix of online and offline functions, allowing remote workers such as DOC Rangers to be able to access and record essential information using a portable device, which can then be synchronised when an online connection is available.

# 8 Next steps

Based on market research and a review of MOP's requirements, the suggested solution for MOP is to procure an existing software product, with additional software development to address any unique or specialised requirements. This approach has the following advantages compared to fully customised development:

- Lower cost
- Lower risk
- Lower ongoing operational costs
- Opportunity to benefit from enhancements developed for other customers using the same product
- Rapid implementation of a base product with most features, followed by gradual introduction of new features as budget and resources allow.

The next step would be to prepare a Request for Proposal (RFP) based on a set of requirements prepared by MOP. The use cases and architecture included in this report provide a starting point for the requirements.

The RFP requirements should be categorised into:

- Non-functional requirements (e.g. availability, reliability, security, support)
- Must-have functional requirements
- Nice-to-have functional requirements

Non-functional requirements and must-have requirements can be based on market research with the confidence that there are solutions available that meet these requirements.

Nice-to-have requirements are the requirements that are unique to MOP and therefore will require software development.

Proposals would be assessed based on:

- Ability for the base product to meet must-have and non-functional requirements
- Methodology for development of nice-to-have requirements
- Implementation costs for the base product
- Development costs for the nice-to-have requirements
- Ongoing operational costs
- Transaction fees

The objective is to contract a supplier that is going to work collaboratively during the implementation, software development and operational phases of their engagement. For this reason, an interactive RFP process including interviews and demonstrations is recommended.

It is also recommended that MOP engage closely with NZTA and the National Ticketing Solution project to take advantage of what the project may have to offer in terms of ticketing, payment systems and customer tracking.

# Appendix A – Use Cases

MOP has developed the following uses cases to help describe the typical functions that the transport and permit system would be required to perform. It is recognised that these functions may not all be performed by a single product.

**Use Case 1: An international visitor driving themselves to Milford.**

An international visitor wants to travel to Milford, do some activities (a short walk, a boat trip) and then return on the same day. They do their own research into transport options and decide that they want to drive themselves to Milford. They visit the MOP transport and permits website and set up an account so that they can obtain a visitor permit and book a visitor car park. They pay for their permit and parking fee through a single online payment on their credit card and receive confirmation of their permit and car park booking by email.

Requirements demonstrated by Use Case 1

1.1. Customer access to the system via a website

1.2. Ability for a customer to set up an account

1.3. Customer can obtain a visitor permit

1.4. Customer can book a car park

1.5. Customer can combine different products into a single booking.

1.6. Customer can pay for a booking online via credit card.

1.7. Customer receives email confirmation of their booking.

**Use Case 2: Booking and accessing multiple services e.g. a camp site and a bus ticket.**

A visitor has a campervan and wants to use the camp site at Cascade Creek for two nights, using the hop-on hop-off bus to access Milford on day 2. They book their visitor permit, camp site and the hop-on hop-off bus ticket online and pay for everything in one transaction. The visitor receives confirmation of their booking by email. On arrival to the campground, the visitor checks in using their booking confirmation. The visitor also uses their booking confirmation to check in and check out each time they use the hop-on hop-off bus. MOP staff have access to check in and check out information so that they can determine the last known location of a visitor for safety purposes.

Requirements demonstrated by Use Case 2

2.1. Customer can book multiple services provided by MOP in a single booking.

2.2. The booking is used to access services.

2.3. Customers use their booking confirmation to check in and check out when accessing services.

2.4. MOP staff can access check in and check out information so that they can determine the last known location of a visitor for safety purposes.

**Use Case 3: A New Zealand Resident regularly visits Milford outside of peak hours.**

A New Zealand Resident regularly drives to Milford to do some rock climbing early in the morning. The day before they are planning a climbing trip, they visit the MOP transport and permits website and log in to their existing an account, then select a New Zealand Resident permit and book a car park that is allocated to recreational users for a few hours in the morning. As they are a New Zealand Resident the permit is free and as they are parking early in the morning they pay a reduced parking fee. They pay for their permit and parking fee through a single online payment on their credit card and receive confirmation of their permit and car park booking by email.

Requirements demonstrated by Use Case 3

3.1. Ability to structure product prices based different customer types e.g. international visitor, New Zealand Resident, recreational user.

3.2. Customer can re-use an existing account.

3.3. Product pricing that varies by time of day.

**Use Case 4: A tour operator booking on behalf of an international visitor**

A tour operator receives a booking through the tour operator's website from an international visitor who wants to take a family of two adults and two children on a day trip to Milford. The visitor books a tour that includes a return coach to Milford, a guided walk and a boat trip. The coach, guided walk and boat trip are all provided by the tour operator, but the tour operator needs to obtain visitor permits on behalf of their customer. The tour operator has integrated their booking system with the MOP transport and permits system so that the visitor permits are automatically obtained and permit details are provided to the tour operator with a single booking reference for the family. The customer pays for their booking directly with the tour operator. On a monthly basis, MOP invoices the tour operator for visitor permits issued to the tour operator's customers.

Requirements demonstrated by Use Case 4

4.1. Ability for tour operators to obtain visitor permits from the MOP transport and permits system on behalf of their customers.

4.2. Ability to book for multiple people in a single booking transaction.

4.3. Ability to for other systems to send and receive details from the transport and permits system, for example via a REST Application Programming Interface (REST API).

4.4. Ability for MOP to view and report on bookings made by a third party e.g. a tour operator. Note: generation of invoices is not a mandatory requirement of the transport and permits system, this would likely be performed by a separate financial system.

**Use Case 5: Visiting the National Park but not Milford.**

A visitor wants to walk to Key Summit, but doesn't want to visit Milford. They plan to park at The Divide car park. They do some research on the National Park website and identify that they need to register as a visitor to the National Park, but they don't need to book a car park. They follow a link from the National Park website to the MOP transport and permits system, set up an account and obtain a visitor permit. There is no fee for this activity. The visitor receives confirmation of their permit by email.

Requirements demonstrated by Use Case 5

5.1. Ability to provide a link to the MOP transport and permits system from other websites.

5.2. Ability for visitors to obtain a visitor permit for the National Park without booking any other services.

**Use Case 6: Registering worker's vehicles.**

Milford Road Alliance is an organisation responsible for maintaining State Highways in the region. They register multiple vehicles and multiple employees for a fixed period of time. There is no fee for registering these vehicles or employees.

Requirements demonstrated by Use Case 6

6.1. Ability for an organisation to register and manage permits for multiple employees.

6.2. Ability for an organisation to register and manage permits for multiple vehicles.

**Use Case 7: Obtaining a report on bookings.**

A shuttle operator logs on to the MOP transport and permits system and obtains a report that tells them how many visitors have booked for a specific date/time.

Requirements demonstrated by Use Case 7

7.1. Management of different user profiles and their permissions.

7.2. Ability to obtain reports from the system based on specified parameters e.g. type of booking, date/time.

**Use Case 8: Refund of payments.**

The road to Milford is closed due to avalanche risk. MOP refunds the booking fees for visitors who booked a camp site but couldn't get to Milford.

Requirements demonstrated by Use Case 8

8.1. Ability for MOP to refund payments made using the transport and permits system.

**Use Case 9: Integration with other systems – enforcement.**

Visitors are driving into the park without registering their vehicle. MOP develops a system that can request vehicle license plate details from the transport and permits system and match them to license plates that have been read by an automated camera system, so that unregistered vehicles can be detected.

As technology improves, the monitoring system can identify the number of occupants in the vehicle, which is matched against the booking details from the MOP transport and permits system.

Requirements demonstrated by Use Case 9

9.1. Ability for an enforcement system to request booking details from the transport and permits system, for example via a REST Application Programming Interface (REST API).

9.2. Ability to develop new interfaces to the transport and permits system as technology improves.

**Use Case 10: Integration with other systems – National Ticketing System.**

The National Ticketing System is a New Zealand Government initiative to develop a single payment system for public transport throughout New Zealand. The National Ticketing System will associate a user's credit/debit card with their public transport account, so that the user can access public transport without requiring a special card. MOP may wish to integrate public transport services in the National Park with the National Ticketing System, for example:

A visitor that has registered to visit the National Park also purchases a day pass on the hop-on hop-off shuttle. The National Ticketing System periodically requests information on shuttle passes that have been purchased so that visitors can get on the shuttle using the credit/debit card linked to their National Ticketing System account.

Requirements demonstrated by Use Case 10

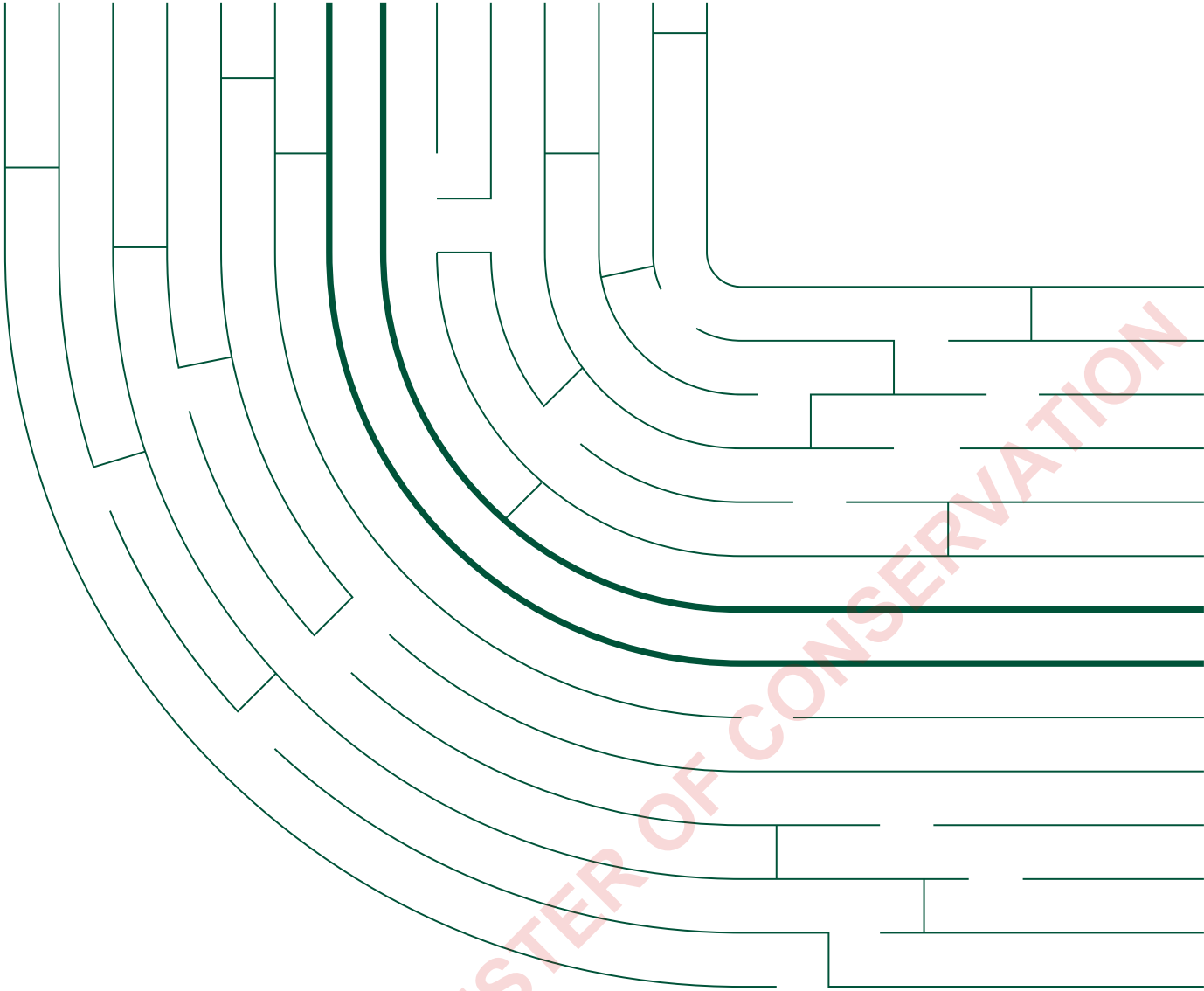
10.1. Ability for a National Ticketing System to request booking details from the transport and permits system, for example via a REST Application Programming Interface (REST API).

**Use Case 11: Bus information**

The hop-on hop-off buses operating in the National Park broadcast their location. Visitors are able to access this information so that they can determine when the next bus is arriving at a particular stop.

Requirements demonstrated by Use Case 11

11.1. Ability to track buses and provide location information to visitors.





RESOLVE GROUP NAVIGATING COMPLEXITY

resolve@resolvegroup.co.nz
+64 9 303 3461