A NEW MODEL FOR ASSET MANAGEMENT: ALBANY LAKES PRECINCT

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1. ABSTRACT

Over the last decade, New Zealand has developed a "Low Impact Design" (LID) approach to subdivisions and land development. The approach, sometimes known as "sustainable urban design" (SUD), involves a strong focus on the management of stormwater and sustainable concepts. Whilst often effective in principle, the councils and managers of the vested assets have raised issues with the long term operation, maintenance and whole of life cost of the approach. Many of these concerns center around transportation assets, and in particular roads, as conventional maintenance contracts may not readily adapt to assets with multiple functions, non-standard solutions, or green engineering. Environmental or community stakeholders can also be disappointed when assets do not appear to deliver expected outcomes, or when amenity values or functional intent degrades quickly.

When North Shore City Council (now part of the greater Auckland 'Super City') opened the Albany Lakes and Civic Crescent projects (Albany Lakes Precinct (ALP)), it was realised that there was an opportunity to anticipate likely maintenance issues and establish a new approach to asset management. A project was therefore instigated to integrate asset management requirements for stormwater, streetscapes, parks, and transportation assets (which in this instance also included a public transport hub). The project aimed to enable the sustainable concepts behind SUD, to address implementation barriers, and identify and optimise interface efficiencies. It encourages asset owners to think beyond the asset, and especially beyond the pavement.

The project foreshadowed the regional restructuring of local government (and amended asset accountabilities). Furthermore, the constrained economic context also provided an additional imperative to seek cost effective means of improving efficiency, value for money, and quality long term outcomes. What started as a simple concept and strategy is now being developed into a new asset management approach and is being considered for wider roll out; not only in Auckland, but in other areas.

This paper explores this development in infrastructure management. It considers the maintenance of the high quality civic area in which SUD has been heavily embedded and the ongoing operational and maintenance approach necessary to maintain the quality outcomes sought. The approach provides a more holistic and responsive approach to asset management and establishes an industry step change.

Key words: Sustainability, asset management, efficiency, holistic maintenance, outcomes, complexity.

2. INTRODUCTION

2.1. Sustainable and Multifunctional Design

It is typically taken as a given that multifunctional assets are a good thing; a single asset achieving multiple purposes should have an inherent efficiency. It is hardly surprising therefore that there has been a trend toward the adoption of "Low Impact Design" (LID) approaches in New Zealand urban environments. In New Zealand, LID practitioners are encouraged to be holistic: "*LID is a design approach for site development that protects and incorporates natural site features into erosion and sediment control and stormwater management plans*." [1] (refer also to NSCC, 2008). This then encourages consideration of not only stormwater related matters, but soil conditions, fish passage requirements [2], and urban form (amongst others).

To encompass this integration with urban form (and to align with overseas terminology), we will refer to this as SUD; but encourage readers to take this to mean sustainable urban design rather than just sustainable drainage systems.

The SUDs based approach is well documented (eg ARC, 2000) and is widely accepted in New Zealand as a principle due to factors such as:

- Consistency with statutory drivers such as the Resource Management Act (RMA), 1991;
- Consistency with the prevailing best practicable option (BPO) approach to stormwater quality improvement adopted by many of our councils; and
- Recognition that ponds are not a one size fits all solution, and that a treatment train approach can be more suitable for urban environments, particularly in retrofit scenarios.

The New Zealand emergence of LID has been coupled with a revitalised focus upon quality urban design outcomes and a push to recognise the place of our communities and the environment within our urban areas. This has been underpinned in the New Zealand Ministry for the Environment (MfE) Urban design Protocols and has seen a drive for high quality assets and improved amenity, particularly in urban centres. The overall approach has also influenced transport related disciplines, not least because there is an improved awareness of the role transportation plays in shaping, rather than simply moving, communities.

2.2. Issues with Implementing Multifunctional Design

Whilst extensive work has been undertaken to quantify or simply expound the environmental and community benefits of SUD based design and development (eg Blom, 1998; Blom et al., 2002; Bracey et al., 2008; Feeney et al., 2009; Irwin, 2010, Van Roon, 2009, amongst others), less extensive information is available on quantifying or exploring operational impediments. Councils and their managers of the vested SUD assets frequently raise issues with the long term operation, maintenance and whole of life cost of these approaches. This concern is not unique to New Zealand (Goodson, 2010). Consequently SUD is generally seen as effective in principle but lacking in practice.

Many of the concerns raised center on transportation assets as conventional maintenance contracts may not readily adapt to assets with multiple functions, non-standard solutions, or 'green engineering'. Environmental or community stakeholders can also be disappointed when assets do not appear to deliver expected outcomes, or when amenity values or functional intent degrades quickly.

On-going maintenance is often a condition for approvals granted under New Zealand's national environmental legislation the RMA, and at this most basic level, consents and authorisations are frequently attached to assets. The on-going maintenance of consented works plays an important part in retaining the envisaged environmental integrity or designed outcomes assessed and consented as part of RMA processes. Frequently however, assumptions, design intent, and even the conditions of consent are not available to asset managers, who consequently "do not know what they do not know". A range of systemic issues have been suspected for some time, but were able to be specifically identified as part of the Project, including:

- SUD, and indeed many assets which provide multiple benefits, create administrative challenges:
  - Ownership of assets is not clearly established;
  - Developer contributions do not always account for whole of life costs;
  - Green assets are not always adequately maintained during the defects liability period resulting in additional / unplanned costs;
  - Inadequate budgets are often established to maintain assets as intended;
  - Questions over 'ascendancy' when operating requirements or aspirations overlap or conflict;
  - SUD frequently creates 'complex systems' which do not readily lend themselves to conventional linear asset management approaches;
  - Existing asset management conventions and tools do not lend themselves to systemic or holistic approaches.
- On-going asset management requirements arising from design are frequently poorly communicated to, and understood by, asset managers:
  - Owner's manuals are still a relative novelty outside stormwater;
  - As-builts tend to reflect the project owner's 'interests'. For example a transport led project is typically tailored to the transportation asset management requirements rather than the asset as a whole.
  - As-builts and hand over processes do not capture all necessary information (e.g. design intent, consents and related design assumptions, non-standard specifications (e.g. planting media, colour batching), and green infrastructure requirements (e.g. engineered outcomes using natural materials or systems, or natural features and assets).
  - Maintenance contracts tend to be focussed on tangible assets, and in the case of transportation, are vehicle centric and may not address 'beyond the pavement' requirements or broader objectives and outcomes;

  - SUD, despite its design simplicity, has complex functionality and intended design outcomes which are not well communicated to asset managers and operations staff.

- SUD is seen as costing more to maintain than conventional designs irrespective of upfront whole of life cost estimates suggesting otherwise:
  - Designs or fittings can be non-standard, particularly in high amenity areas;
  - Designs do not always provide for maintenance needs, particularly across all ‘disciplines’;
  - SUD often requires a variation to standard maintenance contracts;
  - Contractors charge extra for non-standard requirements (e.g. plant care in pavement dominant maintenance contract);
  - Maintenance and operations do not capture or realise the inherent multifunctional efficiencies within the design and therefore may not deliver the intended value for money.
- SUD proponents (designers, stakeholders, communities), can be disappointed by long term outcomes:
  - Maintenance can degrade design integrity;
  - Asset quality decays over time and maintenance practices seen as accelerated this;
  - Original requirements or design intent becomes lost over time and other considerations (e.g. traffic safety led requirements) prevail.

These issues are somewhat of an impediment to effective SUD; however rather than this being a show stopper, these issues were identified as a catalyst for change. Whilst existing asset management tools may be appropriate, it is considered that current short comings and unrealised opportunities cannot be addressed from within the existing approach or framework.

2.3. Albany Lake Case Study

North Shore City Council (NSCC) opened the Albany Lakes Precinct (ALP), which features SUD, in late 2009. The potential for the abovementioned issues to manifest during the operation and maintenance of the ALP was recognised and the ALP established as the platform for the development of a new asset management and operating framework which is the subject of this paper.

The ALP is located within the recently established Albany town centre (refer to Figure 1) to the north of Auckland, New Zealand, within a rapidly developing area. The ALP, being the spatial scope of the original project (the Project), encapsulates two Council capital works initiatives:

- Albany Lakes Park: This included development of the park, landscaping, and community amenity areas. Initially a separate development, the Albany Lakes – Stormwater Improvements was incorporated into the wider Parks development, and undertook to change the shape of the lakes and to improve their function. One of the key overlapping features of the works was the establishment of a feature bridge based on an eel weir.

- Civic Crescent: This part of the development included the upgrading of Civic Crescent, the installation of stormwater pre-treatment, and the delivery of the Albany Civic Crescent Bus Station.

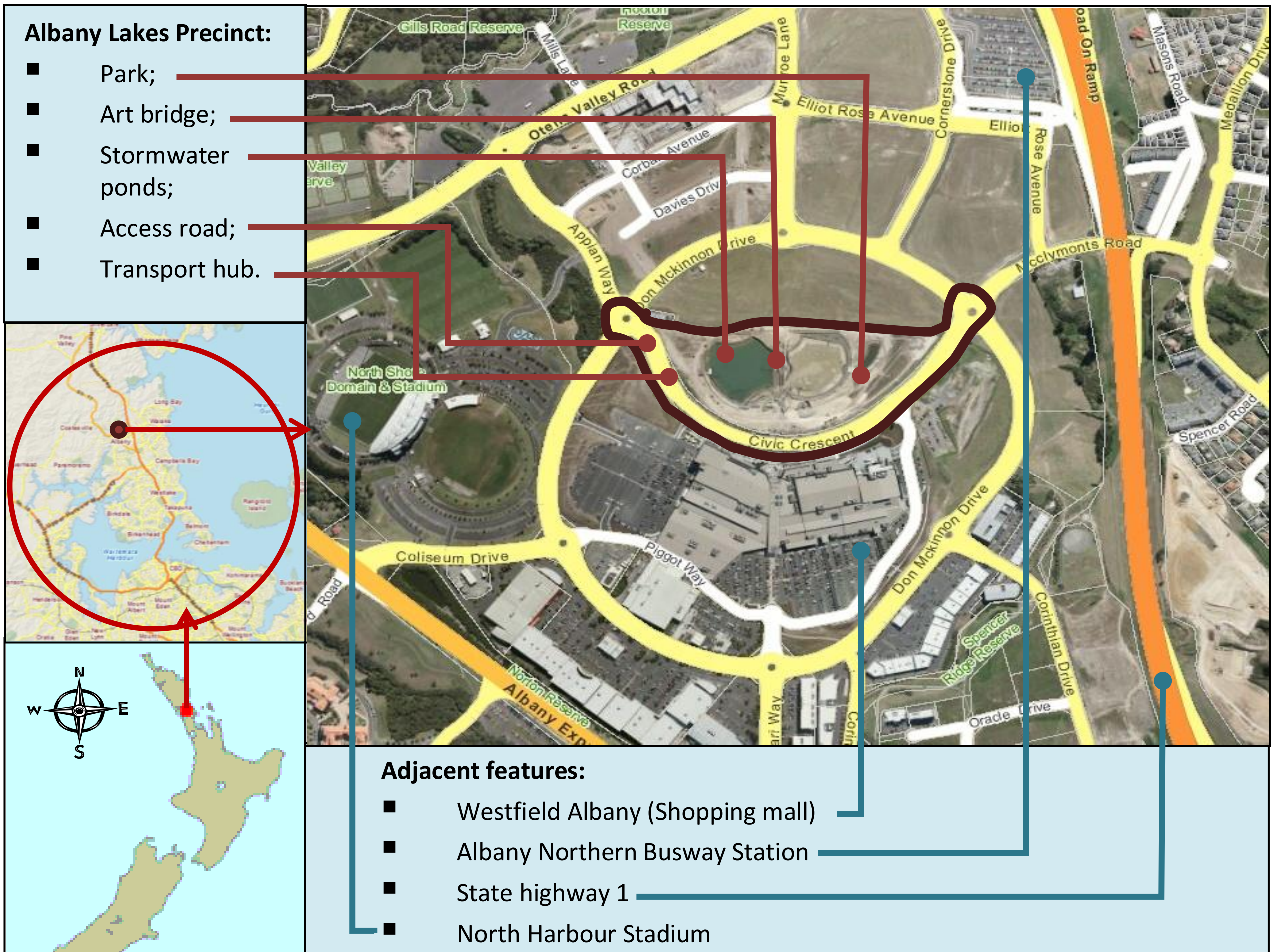


Figure 1: Project Location
Source: Auckland Council (Note: 2008 aerial taken prior to project completion).

The works were closely aligned, and were part of an overarching strategy to deliver a new civic space within the Albany Regional Centre (NSCC, 2004). The Lakes Park and Civic Crescent works were headed by different Council divisions, and involved a wide range of departmental stakeholders and third party commercial and community groups. The SUD features are described in greater detail within Irwin (2010).

Traditionally NSCC managed its assets within different maintenance and operating contracts. These include separate contracts (and specifications) for:

- Transportation assets;
- Stormwater assets;
- Street lighting; and
- Public art;
- Street cleaning;
- Civic and commercial areas.
- Parks;
- CCTV / security;

Variations to this did occur, with collaborative arrangements between divisions. However specifications and contracts still reflected the asset owners 'interests'. It is understood that this is not an unusual practice for territorial authorities in New Zealand. Indeed, interface issues between contracts and functional divisions almost always exist, and can relate to the shared / competing functions of the assets, specifications, levels of service (LOS), and the physical overlap of both the assets and the spatial extent of the varying contracts. Whilst the management of interfaces is par for the course, the SUD based approach and high amenity / quality requirements magnified these issues within the ALP; particularly when interfaces with third parties such as utility operators, adjacent landowners, and other stakeholders were considered. This complexity is shown in Figure 2.

Given the existing operating framework, a simplified approach was sought, but one in which the existing asset management tools and systems could be retained and adapted. The underlying premise was that multifunctional designs require an integrated operational approach; one that is focused on the outcomes sought rather than conventional delivery mechanisms. In this context a performance or objectives based approach was proposed as the basis for further development.

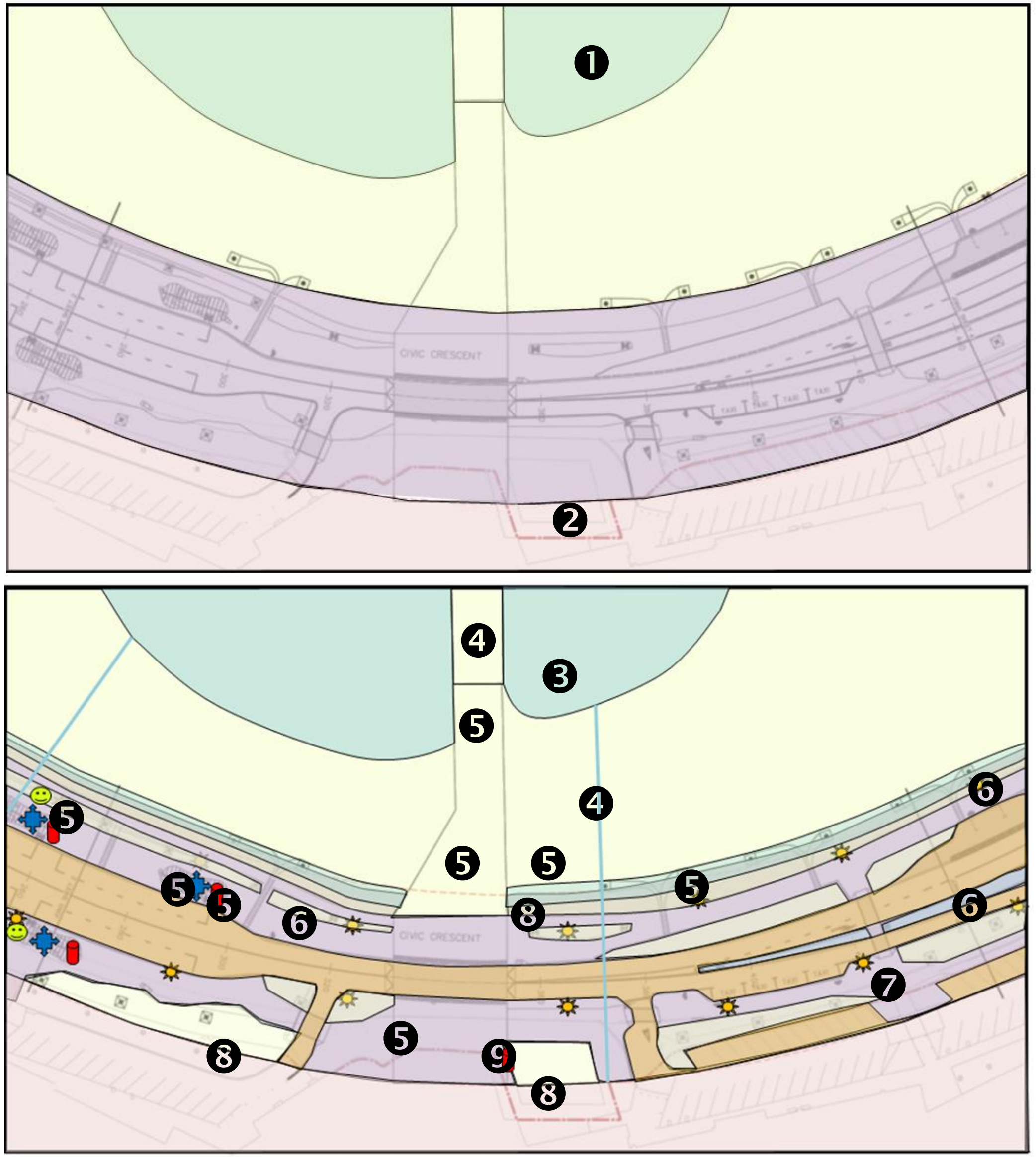
3. INTEGRATED OPERATING FRAMEWORK

One of the stated goals of asset management is to meet a required level of service in a cost efficient manner whilst providing for both current and future customers. Despite this, it is considered that over time the current asset management approach has created a disconnect between the strategic terms of reference (where sustainability principles are embedded), LOS, and asset management plans. The disconnect is such that the community aspirations and environmental integrity originally sought through the development of the infrastructure has at best been diluted, or at worst, completely lost. Asset management then becomes very much about the asset itself, and the asset management system runs the risk of becoming impenetrable and deterministic.

3.1. Framework Overview

The proposed new framework accommodates the complexity of integrated design and high amenity assets, without itself being complex. Importantly, it draws upon and uses existing asset management tools (e.g. RAMM) [3], but crafts a new framework within which asset and operations managers can operate; providing a holistic and integrated approach aimed at maintaining environmental integrity, community aspirations, and design intent over the longer term.

Quite simply, the framework seeks to work with existing organisational structures. However rather than establishing contracts based on existing departments, as currently occurs, a set of Co-ordinated Operating Requirements are defined (refer to Figure 3). This is more than just merged specifications or restricted to 'like' assets as the operating framework reflects Community Orientated Results and assigns the most appropriate party to manage the contract based on the outcomes sought (refer to Figure 4). It is envisaged that the Contract Manager (which may or may not be the asset owner) then reports back to the other departments or stakeholders on performance; providing the basis for an auditable system and improved accountabilities.



Legend	Contract
	Parks
	Stormwater
	Transportation
	Westfield (*3rd party*)
	Street Cleaning / Sweeping
	Rubbish and Waste (Town Centres)
	ARTA / MAXX (*3rd party*)
	Lighting
	CCTV

Notes

1. Albany Lakes 'ownership' required clarification as the asset was subject to consent for the discharge of stormwater from the Auckland Regional Council (ARC), obtained by the developer, and modified by Parks.
2. Long term ownership boundary did not correlate with construction boundaries. Potential conflict of requirements between stormwater (consent requirements) versus aesthetics, amenity values, and community expectations.
3. Utilities / structures within Parks areas not covered by contract specifications.
4. No specifications (includes requirements for works by utility companies within Council assets, special finishes, and higher levels of service (non-traffic related)).
5. Swales and rain gardens span contract boundaries. Transportation specification maintains to invert of swale from edge of pathway, Stormwater unspecified boundary but to edge of devices assumed (top of swale), Parks to edge of road reserve (variously to edge of path / swale invert). May result in:
   - No maintenance;
   - Duplicate maintenance;
   - Differing maintenance regimes.
6. Grassed areas within road reserve span contract boundaries – issues as per other examples.
7. Assets span ownership boundaries. May result in:
   - No maintenance;
   - Duplicate maintenance;
   - Differing maintenance regimes.
8. Overflow from bins and related interfaces not addressed.

Figure 2: Overview of Existing Operating Context – Asset Ownership (top) and Asset Maintenance Accountabilities (bottom)

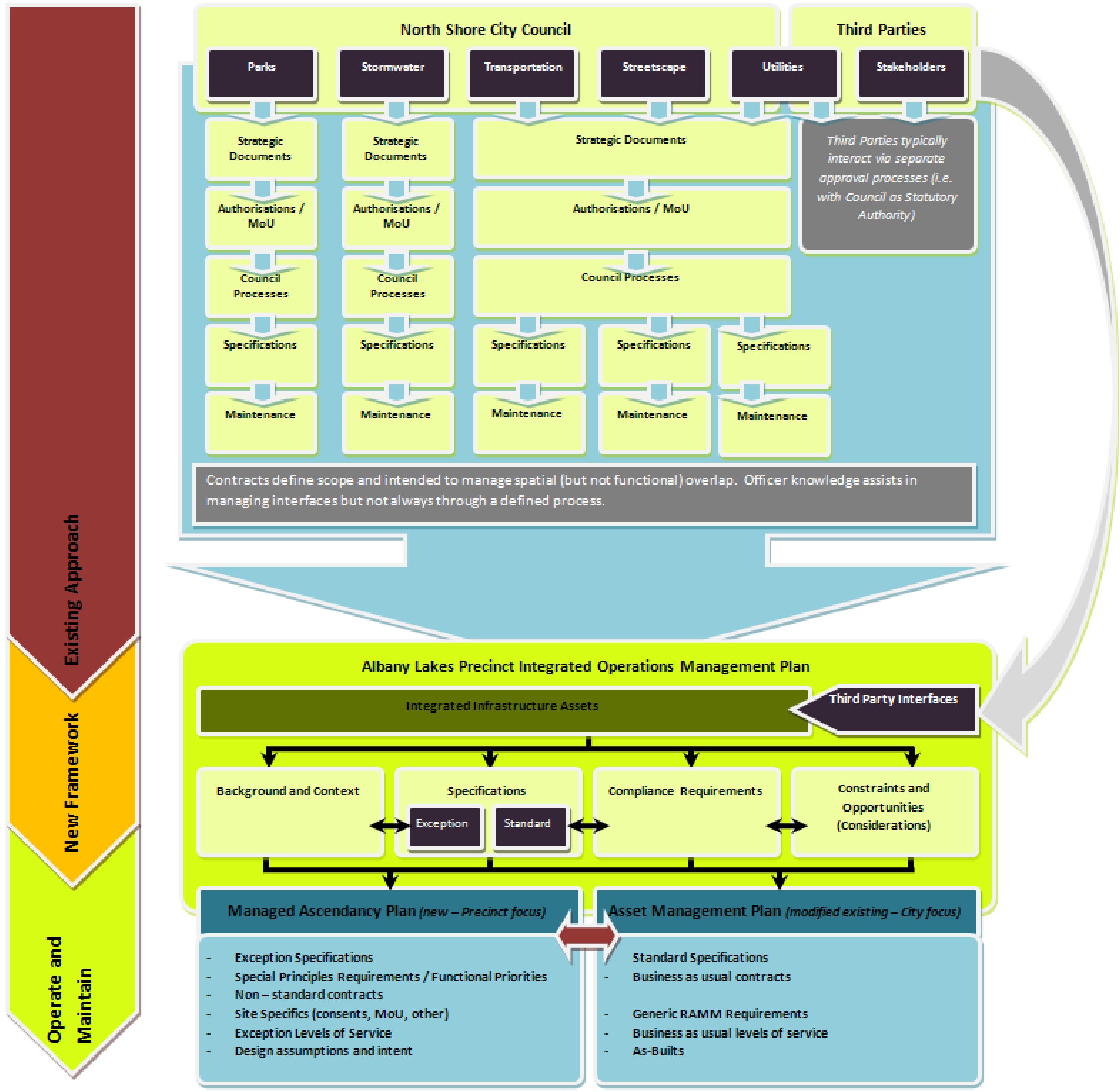
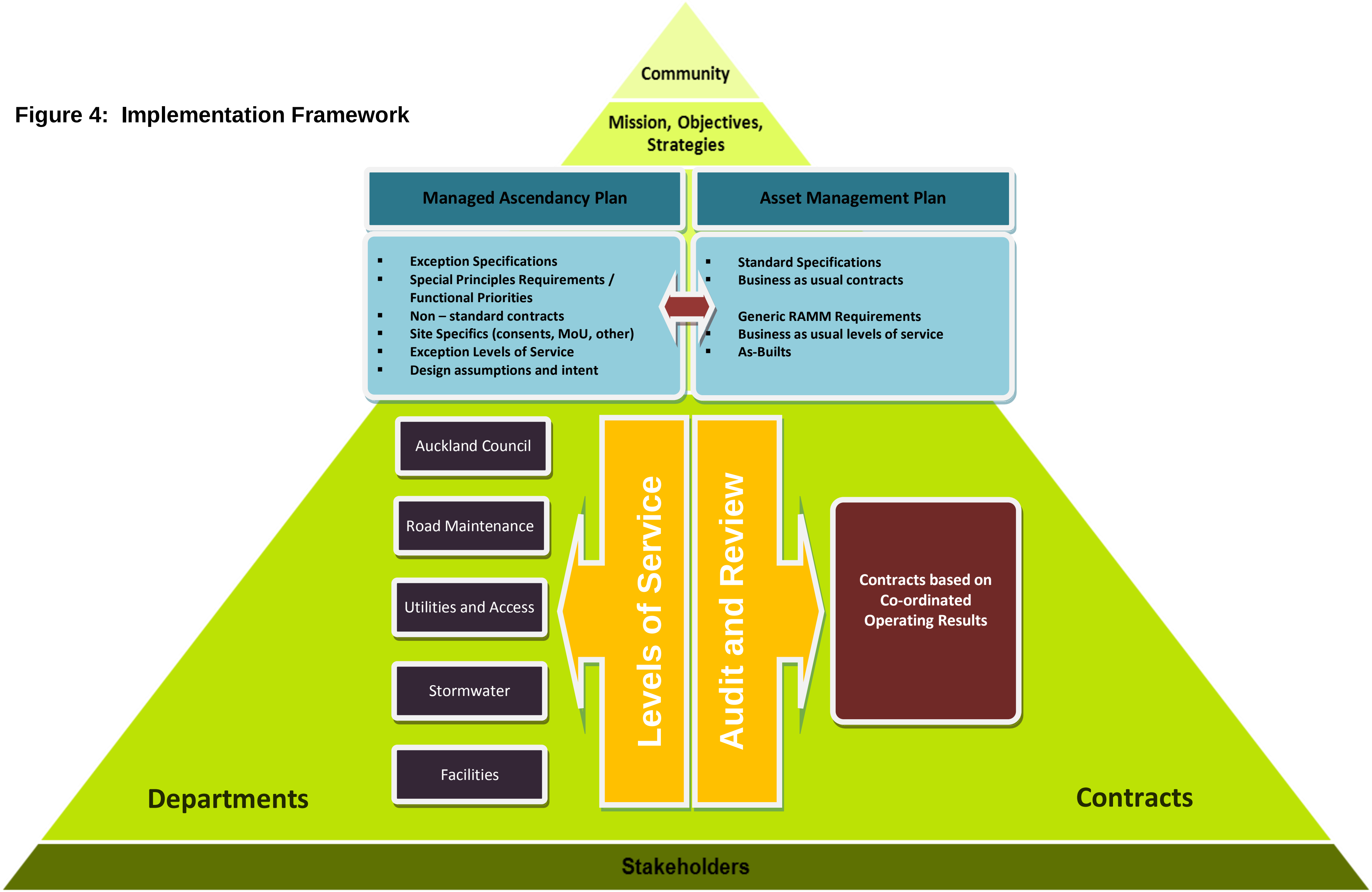


Figure 3: Integrated Operations Management Framework

The **C**ommunity **O**rientated **Re**sults and **C**o-ordinated **O**perating **Re**quirements are at the CORe of the Framework. Complexity is accommodated as an opportunity rather than a risk; however the framework itself is very simple and comprises simple building blocks (discussed below) which aim to establish clear accountabilities, improve efficiency, and to be auditable without imposing additional layers of management.

Figure 4: Implementation Framework



The key features of the framework include:

- Outcome centric rather than asset centric;
- Adaptive and responsive to community aspirations and environmental conditions;
- Shared, simplified systems;
- Ascendancy and priority of function and performance agreed up front; and
- Processes that enable accountability and transparency.

3.2. Framework Building Blocks

Although the proposed framework is in itself very simple, it is comprised of a number of building blocks. Again each of these is based on a simple construct, but collectively provides a mechanism for managing complexity and leveraging effectiveness within operations and asset management. Each building block is therefore needed to enable the full range of potential benefits of the framework to be realised.

Life Cycle Management and Managed Ascendancy Plan

The current form of asset management follows a linear approach to asset function, which manages assets by type. Even more recent integrated asset management strategies still sit within this paradigm (e.g. 'three waters'). Strategic policies may inform an asset management plan, however the 'business as usual' (BAU) operating state is effectively linear (refer to Figure 5). Whilst the implications of failure or risk of one asset upon another is considered (e.g. water main failure on a road), generally shared design intent or interdisciplinary requirements are not.

Some of the key issues and risks identified in the development of the CORe framework relate to the handover transition from capital works. Three of the building blocks of the framework (refer to Figure 3) relate directly to this and the need in particular to document background and contextual information [4], compliance requirements, and constraints, opportunities, and other considerations. It would be expected that this information would be readily available and accessible. However experience has shown that despite extensive data and document management systems, this is in fact not the case at present. So this approach enables the following questions to be addressed:

- Where in the current operating systems are compliance, stakeholder agreements, community aspirations, and sustainability matters captured and managed?
- How can community or environmentally focussed LOS be achieved if there is no operating accountability or more importantly integration of these aspects?

Project briefs and specifications for capital works require operational and asset management input to contribute to the project's operational and management efficiency and effectiveness. Information to enable the intended outcomes to be collated and transferred in a way that is useable, accessible, and relevant is also required. However in order for this to occur, it needs to be asked for and included within the project development and delivery requirements. As a minimum, a comprehensive Owner's Manual is required. This is now common practice for stormwater assets, particularly for stormwater quality devices such as ponds.

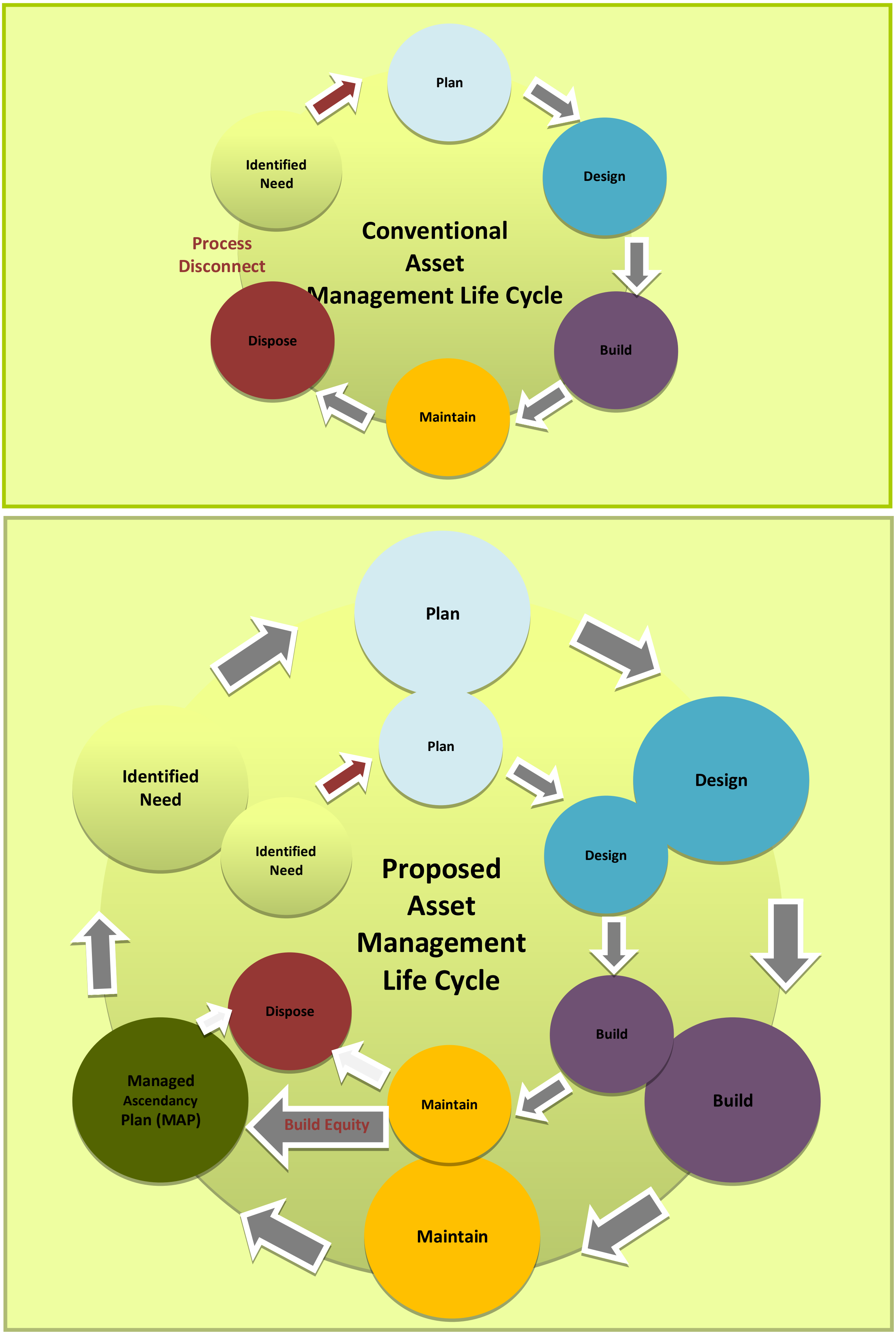


Figure 5: Lifecycle Approach

A further initiative proposed is the Managed Ascendancy Plan (MAP) - a live summary of currently known constraints, design intent, statutory requirements, and departures from standard specifications. As such, the MAP:

- Focus is to document and communicate on-going environmental requirements, constraints, and opportunities;
- Purpose is to assist the:
    - Systematic identification, assessment and management of environmental issues, aspects, and undertakings to inform both on-going operations and subsequent site works / projects; and
    - Resolve conflicting requirements and determine priorities or ‘ascendancy’ where required.

It is therefore imperative that all such requirements are tracked, reported and monitored for the MAP (and the overall Framework) to be effective. This requires the MAP to be continually updated in the event that changes arise from operations, maintenance, renewals, or future capital works.

The ideal long term scenario would be for the MAP to be ‘held’ within the asset management and operating system (perhaps linked to GIS [5]) and, rather than starting ‘cold’ during project investigation and development, information can be extracted from the system and used by investigation and works teams. Updated information arising from any capital works would then feed back into the system; thereby building knowledge and risk management equity over time until a self-sustaining operating equilibrium is established (refer to Figure 5).

Asset Service Levels

In reviewing the standard specifications for the ALP it was found that there was a single provision for high service level assets and that across the stormwater, transport, parks, utilities, and streetscapes specifications reviewed, this solely related to vehicle use. A broader definition for high service level assets was found to be needed, and one of the changes proposed for the ALP (and part of the overarching framework proposed) is the following Hierarchy:

- **High Service Level Assets (HSLAs):**
  A generic category for those networks, communities, projects, or assets requiring a higher level of service or performance.
    - **High Service Level Roads (HSLRs):**
      This retains the current definition based on vehicle use and capacity.
    - **High Amenity Asset (HAA):**
      These are networks, communities, projects, or assets that require higher levels of amenity and / or quality of finishing and may include civic spaces, public transport facilities, and cycling or walking tracks (for example).

A HSLR may also be a HAA either in part or as a whole.

Whilst the detail of this aspect will vary from organisation to organisation, the key is to review asset service levels and categories from a wider, multidisciplinary basis.

Specifications

The framework is more than simply the creation of a set of fully integrated maintenance specifications across a network, community, project, or asset. However it is a significant starting point. As noted earlier, this is also more than just the establishment of a common specification for like assets (e.g. three waters); it is actively merging, reconciling, and embedding multidisciplinary requirements across all specifications.

This does not preclude BAU maintenance requirements however we have found there to be a need for a set of specifications that are network, community, project, or asset specific and capture non-standard designs, materials, or departures from standard maintenance or operating regimes. These aspects are not currently well provided for within existing operating systems, asset management, or maintenance contracts. Furthermore, the ability to communicate operational and maintenance information or otherwise manage interfaces between infrastructure lifecycle phases is exacerbated by design or project related changes occurring during construction and owner interest driven asset management and operating systems which do not accommodate wider issues.

During the construction of the ALP project changes ranged from different architectural paving materials, fixtures, concrete colour batching, changes to approved planting regimes, consent variations through to interdepartmental agreements. The materiality of these changes is variable and may not be captured by as-builts or asset management systems. However without this information there is no reference for repairs, renewals or regular maintenance particularly on non-standard assets. This could give rise to a direct non-compliance with a statutory requirement, stakeholder agreement, community consultation, or degrade the asset or environmental integrity; financial, performance, or reputational risks that could be minimised, managed, or avoided. Consequently appropriate project information is needed before any Co-ordinated Operating Requirements or any integrated system (including shared specifications) can be fully prepared for a network, community, project area, or asset. Anything else is simply guesswork.

One of the anticipated benefits of the drafting of both sets of specifications should also be the ability to better understand and cost the whole of life costs of alternative design approaches and higher amenity or service level assets. It is important therefore that the specifications are truly integrated so that the approach does not unduly complicate processes or inflate maintenance costs and requirements. Iteration is therefore expected to enable the revised BAU equilibrium to be established.

The CORe

It is important to note that the proposed framework is not also proposing a change to the existing tools and systems used to manage assets. These are discipline specific and have been refined over time and expected to be subject to incremental improvement. Rather, what *is* proposed is a multidisciplinary ‘hub’ or CORe which ties these tools and systems together and provides broader contextual relevance – back to the communities and place.

It is envisaged that Co-ordinated Operating Requirements would be established across an organisation and contracts established based on ability to deliver outcomes rather than necessarily by department or division. For each contract therefore, each department or operating group (and potentially other stakeholders) will have an interest to varying degrees. The contract manager is then responsible for delivering against the defined LOS and performance criteria so that the individual departments / stakeholders and the entity as a whole may achieve their respective performance targets. Figure 6 depicts how this might 'look' with some departments or interests falling wholly within a given contract, and others not exerting any influence at all [6]. This approach enables existing systems to be used by each of the stakeholders to manage their own interests and specific requirements. However the external terms of reference through the common LOS and the Community Orientated Results should act as a counter balance to any tendency to become asset centric.

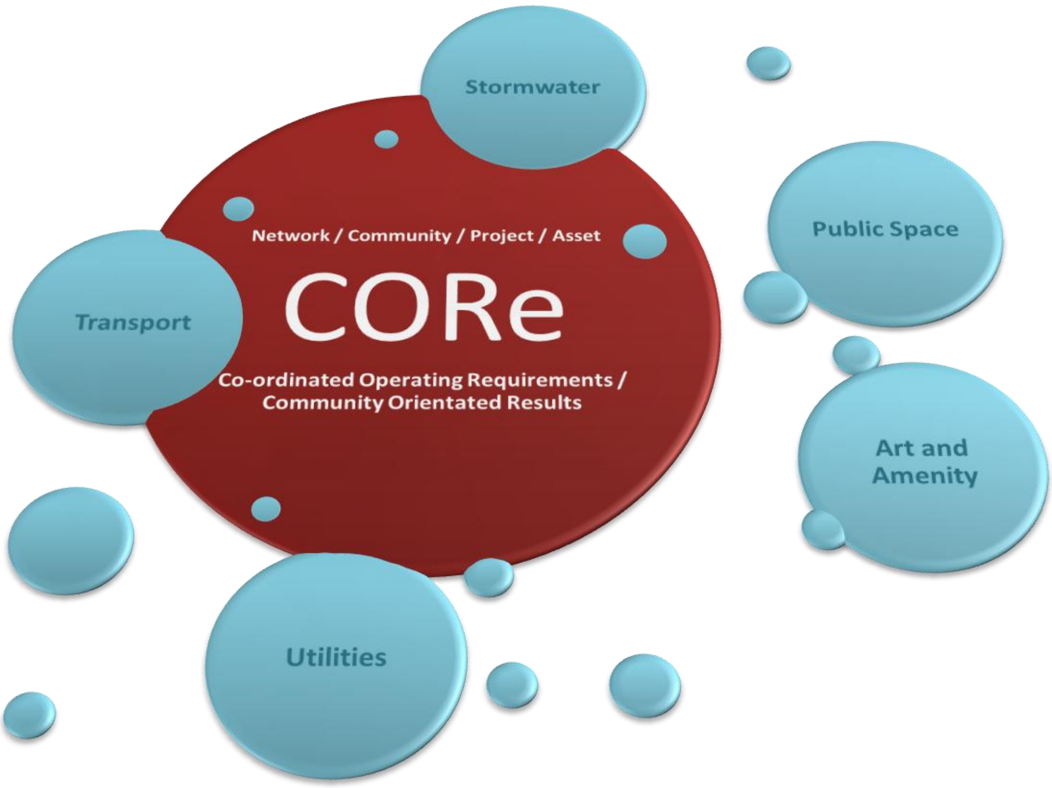


Figure 6: Contract Influence

The approach should also enable BAU operating costs to be better understood, especially for SUD or multifunctional assets; something that has not always been forthcoming to date. For some situations however, there may be either a need, statutory requirement, or community will to provide a higher level of amenity, quality, and / or service. Value for money, ability to pay (funding), competing priorities, and political will can act as a counter balance to this. This aspect is seen as an 'outer skin' to this framework as shown in Figure 7, reflecting governance processes, the 'willingness / ability to pay / fund' and community consultation. Whilst shown as concentric circles, it is envisaged that these 'orbitals' may vary by department or discipline (i.e. the 'willingness to pay' is not evenly distributed across all aspects or interests).

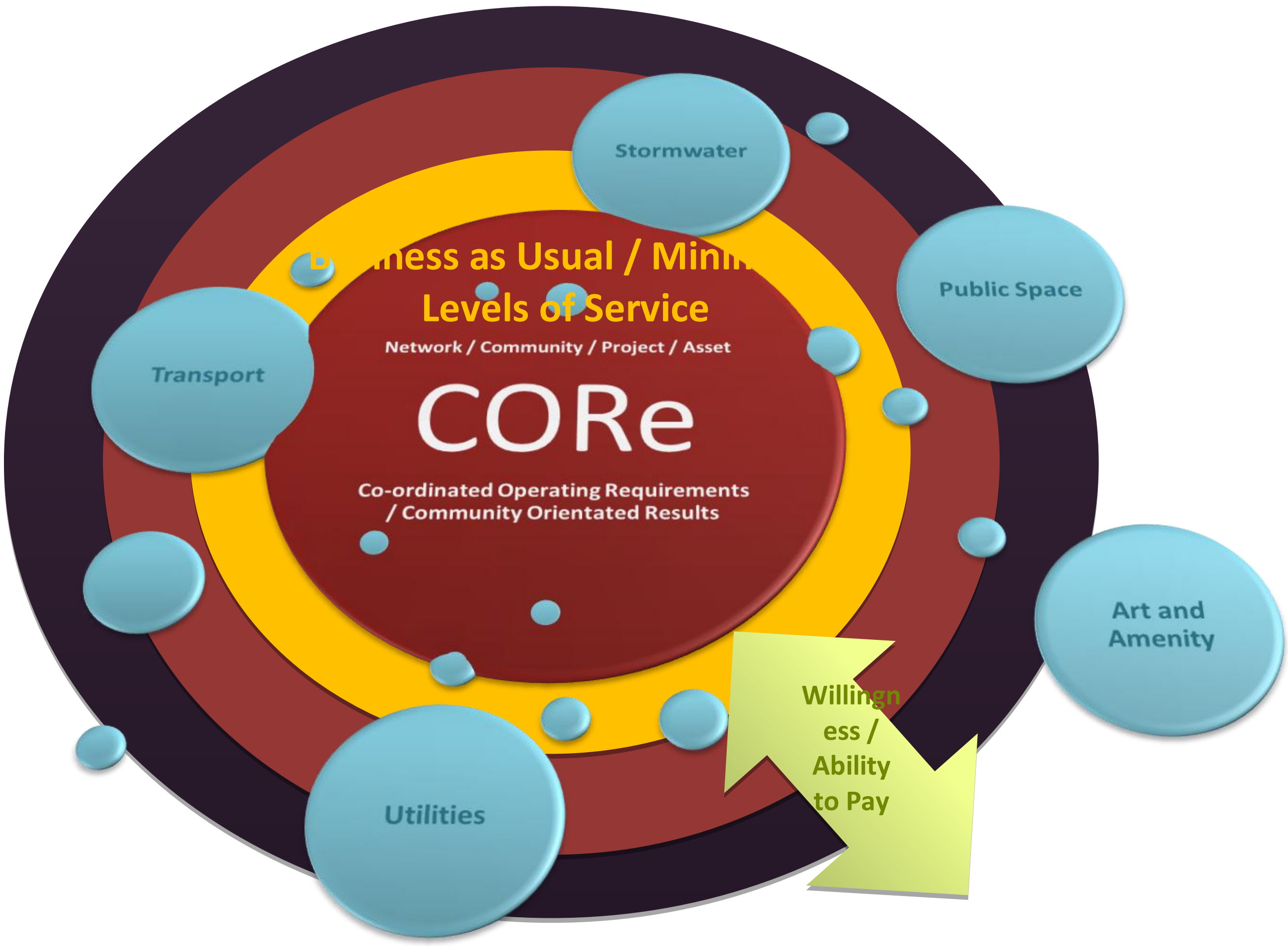


Figure 7: Accommodating Funding and Consultation Outcomes
Note: Departments /disciplines are purely arbitrary and should not be taken to infer that eg art and amenity is not important / relevant or would not be funded.

3.3. Implications of Approach

The stormwater features of the ALP have been selected to explore the implications of the CORe approach as these are the most integrated aspect of the pilot, and have the greatest number of stakeholders. Using the stormwater devices then, the implications of the framework and approach would be as follows:

- Data capture and information retention:

  The design and assessment of stormwater proposals include numerous assumptions, parameters, and frequently statements of intent (often agreed with a third party). Whilst systems exist to capture consent conditions, the underlying requirements (often included within design documents or an Assessment of Environmental Effects) are often overlooked and not communicated through to asset management. This information can be captured for future reference; ideally in the form of an Owner's Manual so that as-built information can also be included and maintenance occurs as intended by design.

- Statutory compliance: Stormwater consents frequently include maintenance conditions as treatment devices cannot function over the longer term unless they are appropriately maintained. The framework requires all statutory requirements to be identified, actioned, and reported. This approach does not preclude the use of existing databases or systems for compliance management. Where such systems are not in place, it prompts means to be established to close such gaps.
- Establishes operational context: In addition to information obtained from an Owner's Manual, as-builts, or consents, the framework provides for spatial and other information to also be retained for future reference. The intention is that this be integrated with GIS systems for ready reference. By documenting the operating context and not just the requirements, asset managers should be able to make more informed decisions. This should benefit stormwater assets, especially those where a SUD approach has been used, as often the environmental and community context is important and has informed the final design and asset configuration.
- Managed ascendancy: Because the framework establishes contracts that are based upon the delivery of outcomes, it requires upfront agreement of matters such as operational conflict, priority, and functionality. Again, areas of 'ascendancy' can be mapped using tools such as GIS so that requirements can be communicated to asset managers and contractors.

  In the ALP, swales and tree pits along Civic Crescent, whilst partially within the park area, are first and foremost stormwater devices and any related requirements prevail as these are linked to a consent. The choice of tree species within the tree pits, in the event that the tree pits need re-engineering, must however be consistent with the Outline Plan of Works. This in turn has highlighted the need for a process for any re-engineering works to manage and provide for parks and community expectations around specimen trees. This links back to the agreed LOS between departments / stakeholders and the establishment of integrated specifications (which should prevent the re-engineering of tree pits without reference to Parks and the appropriate plant related controls).

- Extended influence: Because the framework is based on outcomes, it is expected that each stakeholder / department / discipline would influence in some way the operational requirements as a whole; thereby providing an opportunity to influence a broader array of outcomes. This is not about exerting power, but rather the inclusion of a range of different factors. These might be 'considerations' or may extend to specific requirements (such as consent conditions), and is aimed at avoiding situations where contracts are established to address specific but limited requirements.
- Co-ordinated management and integrated outcomes (specifications): Revising and integrating Standard Technical Specifications across a range of departments and disciplines has the general benefit of:
  - Collating and aligning all specifications from the given departments to reduce the extent of overlap;
  - Uplifting the specifications to better reflect the requirements of environmental management and community outcomes focus (including improved urban design);

- Ensuring that recognition of community outcomes results in appropriate accounting for multiple objectives;
- Starting the process of breaking down the silos in 'anticipation' of integrated design solutions (which is increasingly becoming business as usual);
- Providing for High Service Level Assets (HSLAs) that may have different drivers than the presently identified HSL Roads (i.e. High Amenity Assets (HAAs)).

Non-standard specifications can also be accommodated, but also need to be integrated in the first instance, then consolidated as variations to maintenance contracts.

The approach has some real benefits for SUD and stormwater where treatment trains (such as are commonly used in New Zealand), or the device or system as a whole (rather than a single aspect of it) is crucial. This is essentially reflective of natural systems where linear approaches are rarely appropriate. Whilst each of the building blocks within this framework is considered to impart a benefit in its own right, there is also an overall benefit of completing the infrastructure life cycle process. Whilst this is likely to have more relevance and significance when considering the asset as a whole, it is nonetheless considered to be of relevance and benefit to SUD based development.

4. APPLICABILITY

The framework has been developed for the high amenity urban centre at Albany and specifically tailored to address the identified short comings in the ability to implement SUD. The strategy and Plan is however in the process of being rolled out for the ALP despite the considerable gaps in the information available to support the full implementation of the plan. This in itself is valuable as it should prompt gaps to be addressed. Notwithstanding this, further action is required to embed the approach in the ALP in order for the framework to fully realise its potential.

The ALP Project has resulted in the development of an outline Integrated Asset Management Strategy which progresses the concept of integrated asset management well beyond other current 'integrated asset management' approaches. Auckland Transport [7] is presently taking the first steps in making changes to the operational systems and processes relating to the ALP. This is expected to take time, however the Project has nonetheless:

- Initiated changes to maintenance and operational practices in the ALP;
- Addressed issues with the long term sustainability of non-standard engineering solutions (e.g. green engineering, SUD, high amenity or high quality engineering); and
- Refocused asset management away from the assets and rebalanced this to include and uphold community and environmental values.

The project has also resulted in some salient lessons to date:

- Seeking non-standard performance or outcomes (such as from SUD) from conventional approaches (including contracts and specifications) is unrealistic;
- There is a distinct process gap between design, asset, and operational management – asset and operational managers frequently do not know what they need to know as critical information has not been passed on;
- Presently, asset management does not often explore multidisciplinary requirements or reconcile contradictory aspirations or requirements;
- Existing process negatives can be addressed through a revised framework. The framework does not preclude the use of existing tools and systems;
- Currently large gaps in processes exist, and it will take time and iteration to bed down the approach, however over time, the efficiencies within the system should prevail;
- Whilst the approach lends itself to non-standard, integrated design, and / or high amenity assets, initial feedback and development is indicating that the framework has much wider application.

The concept is likely to prove of particular relevance to stormwater management and the management of assets within SUD developments. The framework is however considered to have wider applicability; whether on a network, community, project, or asset basis. Whilst all of the building blocks will be needed to fully realise all of the benefits envisaged (and some iteration and evolution of the concepts are anticipated), implementation in stages is possible and could give rise to performance and outcome step changes in themselves. Nonetheless it would be beneficial to track progress and also to monitor tangible results and feedback from other sources so that change can be reported as assessed.

The development and roll out of the ALP framework has already established an appetite for a more holistic approach to asset management within those parts of Auckland Council and Auckland Transport encountered during the Project's development. This call has come from asset managers and design specialists from across a range of disciplines, and has led to the concept being explored on a wider basis by parts of both Auckland Transport and Auckland Council on other SUD projects and within the asset management operations more generally.

The CORe approach – or place based asset management has come of age and sits well with the concepts of sustainability and value for money drivers, and has applicability into other operational situations (e.g. highway operations or other parts of a territorial authority / council). It will require an incremental approach to implement and could well result in a significant culture change within an organisation / industry practice to successfully implement. However for those organisations that derive their operating imperatives from the community or stakeholders (who are not concerned with individual assets but rather their experiences and how they interact with a place or space) we encourage you to explore and adapt the CORe.

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NOTES

1. ARC, 2000.

2. New Zealand native freshwater fish are typically diadromous (i.e. have a marine stage in their life cycle). The Freshwater Fisheries Regulations (1983) require that the passage of fish not be impeded by structures such as culverts.

3. RAMM is the principal software tool for New Zealand road assets.

4. Often background documents such as a Scheme Assessment Report or Assessment of Environmental Effects are required to be complied with as part of an Outline Plan of Works or consent condition. Those documents include basic project assumptions (e.g. assumed level of catchment imperviousness, controls on traffic movement etc.), which if changed during operations or subsequent improvements, may impact on operational compliance.

5. Particularly the Environmental Constraints and Opportunities (ECO) Register which is a key part of the Managed Ascendancy Plan both of which lend themselves to spatial formats such as GIS.

6. All stakeholders should however determine their own involvement rather than this being assumed by a contract manager or asset owner. Conflicting requirements need to be resolved outright through that process.

7. In late 2010 the Councils within the Auckland Region were amalgamated to form a greater Auckland Council and several Council Controlled Organisations (CCOs). Auckland Transport is responsible for the transportation assets and operations across the region and has picked up the Albany Lakes project and this new asset management framework. The challenges seen within the previous NSCC are now exacerbated as parks and other interested parties are now within a completely separate operating entity.