low impact urban design and development

concepts
policy
practice

Guidance on an integrated process

Designing, operating and maintaining low impact urban design and development devices

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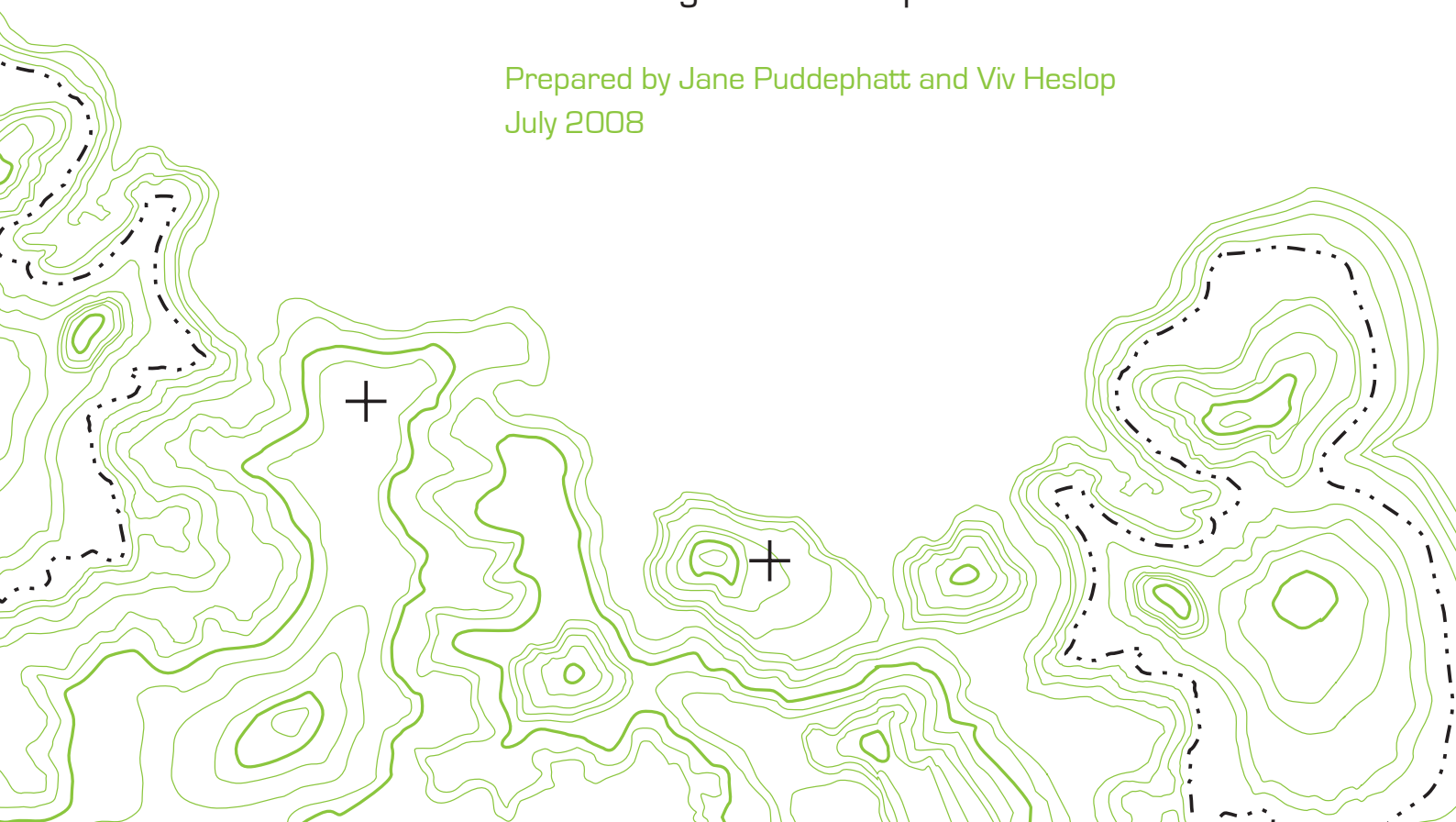

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Low Impact Urban Design and Development: An introduction

The Low Impact Urban Design and Development (LIUDD) research programme is a nationwide research and implementation programme underway in New Zealand. The six-year programme (2003 – 2009) is funded by the New Zealand Foundation of Research, Science and Technology, a government agency responsible for funding public good science research. Landcare Research Ltd, a crown research institute, is the lead provider, with the University of Auckland as a subcontractor. The purpose of the programme is to facilitate the uptake and implementation of low impact design policies and practices.

LIUDD is both a design approach and a range of structural techniques that can be applied to urban development and stormwater management. As a design approach, LIUDD provides an opportunity to identify and recognise natural features and integrate these into the design of development layouts in order to minimise environmental impacts or enhance natural features. The integration of natural processes in the design stage of a development can result in more attractive, multifunctional landscapes with greater value across a range of outcomes. And given that land development often results in modifications to the lands surface, LIUDD devices aim to utilise natural processes such as vegetation and soil media to provide stormwater management solutions and add value to urban environments through enhancing habitat, biodiversity, landscaping, amenity, recreational opportunities and cultural identity.

This report is focused on LIUDD devices, in particular issues associated with their operation and maintenance. Ensuring that devices are well maintained and operated correctly has been identified as being a potential barrier to the uptake of LIUDD. This report has been prepared in response to these concerns and aims to provide guidance to councils, consultants, developers and others on approaches that could be considered to address issues associated with long term ownership and ongoing responsibility for the operation and maintenance of LIUDD devices.

The operation and maintenance of LIUDD devices: An integrated approach

The key to achieving good design is the role that people and organisations play at different stages of the design and operation process for LIUDD devices. It is the integrated nature of design and alternative approaches to traditional stormwater asset design and performance monitoring required for LIUDD devices that is a significant challenge to ensuring their ongoing maintenance and performance. The technical skills required to inform the design and monitoring processes are available across a range of professions including engineers, planners, landscape designers, land developers, plumbers, builders, inspectors and maintenance contractors. However, delivering good design and ongoing performance of LIUDD devices relies on these professions working together together. This issue is common to devices managed by private owners on individual sites and devices managed by public agencies as a result of public works or transfer of assets from private developments. In addition, there are some considerations specific to the handover process for devices which are privately designed and constructed then handed over to public agencies for ongoing operation and maintenance.

The following is guidance on how to design maintenance smart systems. Developed around the checklist, the guidance aims to highlight key considerations around the issues of design, responsibility, mechanisms to ensure ongoing operation and maintenance and tools to support implementation.

Checklist for designing maintenance smart systems

Providing for the ease and efficiency of maintenance during the design of LIUDD devices is critical to facilitating their efficient and effective long term operation and maintenance. Clarity about who will become responsible for the maintenance of LIUDD devices and how this will be monitored, recorded and supported is also essential to inform the development of approaches to ensuring devices perform as intended.

Detailed below is a checklist of key considerations to help inform the design process for developing maintenance smart LIUDD devices and programmes to support and monitor their performance. Each of these points are then discussed in more detail.

A. Design process		
Design objective	What is the purpose of the device?	A.1
Device selection	Is the device appropriate for this purpose and in this location?	A.2
Integrated approach	Who should contribute to the design of the device?	A.3
Design for maintenance	What features will support ease of maintenance?	A.4
B. Responsibility for operation and maintenance		
Private or public ownership	Who will be responsible for the ongoing operation and maintenance of the device?	B.1
Contribution to design	Can the long term owners contribute to the design of the device?	B.2
Information management	How will information about the device and maintenance requirements be managed?	B.3
C. Mechanisms to ensure operation and maintenance		
Legislative requirements – design and installation	Building Act, Resource Management Act, Regional Plans, District Plans, bonds	C.1
Legislative requirements – operation and maintenance	By-laws, District Plans	C.2
Outsourcing responsibility	Third party maintenance	C.3
Warranty period	Ability to check performance before accepting ownership	C.4
Asset handover process	Handover from private to public ownership	C.5
D. Support for implementation		
Guidelines and checklists	For design, construction, maintenance and inspection	D.1
Templates – e.g. operation and maintenance plans	To support the development of clear instructions and provision of required information	D.2
Education and skills development	Build the capability of professions responsible for designing, constructing and maintaining devices	D.3
Certified contractors	Guidance for device owners	D.4

A. Design process

A good design process is informed by a clear understanding of what you are designing for, selecting an appropriate device for the context and purpose, involving those who will be responsible for ongoing maintenance and designing for ease and efficiency of maintenance.

A.1 Design objective

The need to be clear about what you are designing for is important to informing the type of device and maintenance approach that is appropriate in a given context. LIUDD devices offer many opportunities to deliver multiple outcomes in addition to their stormwater functionality including water reuse, biodiversity, enhanced property values, quality design and quality of life (New York City Department of Design and Construction, 2005). Designing primarily for stormwater functionality will require a different approach to maintenance than designing for outcomes beyond just stormwater management. It is therefore important to have a clear design objective to inform the design of a device and identify who should contribute to this process and who will become responsible for its ongoing operation and maintenance.

A.2 Device selection

It is critical to select a LIUDD device or product that is fit for purpose, robust and effective for delivering the design objective. Problems with the operation and maintenance of a device can occur when it is inappropriate for a given location or has been undersized for its purpose. In these circumstances, a device may not deliver the level of performance expected and failure can be attributed to the practice, rather than poor design. It is essential to identify a LIUDD device that is both appropriate for a location, the design objective and ensure it is designed and constructed appropriately to meet the desired performance criteria.

A.3 Integrated approach

Ensuring those who will become responsible for the ongoing operation, maintenance and funding of LIUDD devices are involved in the design process is taking an integrated approach to design. This is critical to informing the development of a practical design that will enable ease of maintenance and develop ownership for ensuring the device performs as it was intended. Integrated design processes can also lead to opportunities for achieving multiple outcomes beyond pure infrastructure functionality.

For devices that will be privately owned, key participants will include developers and site owners who will need to be comfortable with the cost, functionality and aesthetics of a device and council staff who will support implementation and monitor compliance. For devices that will become publicly owned, there are a wide range of council staff and contractors who will add value to the design process and their level of input will depend on the type of device being considered. Design contribution could be sought from stormwater engineers who will want to ensure effective network performance, transportation engineers who want to ensure traffic safety and flow where devices may be adjacent to a street or transportation corridors, parks staff who have expertise in vegetation management and may become responsible for landscape maintenance, asset managers who are responsible for the long term management and planning for assets, contract maintenance staff who have significant practical experience and may become responsible for the maintenance of physical elements, urban planners and designers who want to ensure quality design and urban form and the community who may interact with the device.

Integrated design processes may take longer than conventional approaches due to their collaborative and iterative nature. Integrated design is however critical to identifying potential

issues and opportunities early in the design process and deliver outcomes that are easy and efficient to maintain and that meet the needs of multiple stakeholders.

A.4 Design for maintenance

Maintenance of devices must be considered early in the design process. This will assist in the identification of features that will facilitate the ease and efficiency of ongoing operation and maintenance of LIUDD devices. The main elements to consider in designing maintenance smart systems are (adapted from EPA Victoria, 2008):

- Access – All components of a LIUDD device must be easily accessible by maintenance staff.
- Vegetation – Selection of vegetation must be appropriate to local conditions, planting designs must provide safe environments and facilitate ease of maintenance and additional maintenance is often required during vegetation establishment.
- Mulch – Ensuring stormwater runoff doesn't wash mulch into drains and cause blockages can be addressed by good device design and selection of a mulch material that doesn't float.
- Sediment – Identify methods for removing and disposing of sediments from devices and designing areas for stockpiling and drying material to reduce the complexity and cost of maintenance.
- Mechanical components – Components should be simple and robust to ensure durability and ease of maintenance. A consistent approach to the diversity and nature of mechanical components across a management area will reduce the complexity and cost of ongoing maintenance.
- Vandalism & safety – Identifying appropriate locations for devices, selecting vegetation and materials that allow for surveillance and providing appropriate support structures such as tree guards can reduce the potential for vandalism and contribute to safe public spaces.
- Community – Engaging the community to raise awareness about the purpose and function of LIUDD devices and to gain an understanding of their expectations and willingness to contribute to the ongoing maintenance of LIUDD devices can lead to wider acceptance in changing practice.

B. Responsibility for ongoing operation and maintenance

The long term performance of LIUDD devices can be compromised as a result of unclear responsibility for operation and maintenance and limited knowledge of the presence of an on-site device (NZWERF, 2004). Allocation of responsibility for maintenance should be appropriately matched to the scale and complexity of tasks required to ensure long term performance of a LIUDD device (Puget Sound Action Team, 2007).

B.1 Private or public ownership

It is important to identify who will become ultimately responsible for the ongoing operation and maintenance of a LIUDD device at an early stage of the design process. The key consideration is whether this is likely to be a private site owner or a public agency.

Identification of who will become responsible for the operation and maintenance of a LIUDD device will provide an opportunity for the long term owner to contribute to the design and raise any concerns and comments at stage when they can be easily addressed. It will also help to determine how information about the device is collected and stored to ensure it is obvious and accessible for future reference.

B.2 Contribution to design

For individual sites where devices are in private ownership, opportunities to contribute to the design process will depend on the stage of development that a person becomes the site owner and their level of understanding about LIUDD. Opportunities for influencing design primarily exist where the site owner is managing the installation of the LIUDD device themselves and is informed about device functionality and design flexibility.

Where LIUDD devices are in public ownership there is likely to be a number of parties who will contribute to different elements of their operation and maintenance of (e.g. landscaping, weed control, mechanical maintenance, waste disposal). It can therefore be relatively predictable to determine who will become responsible for the operation and maintenance of LIUDD devices in public agencies. This provides a significant opportunity to pursue an integrated approach to design and address the long term needs of those who will be responsible for the ongoing operation and maintenance of a LIUDD device.

B.3 Information management

A key mechanism for recording and highlighting the operation and maintenance requirements for privately owned LIUDD devices on individual sites is through council records, such as the Property Information Register (PIR), Land Information Memorandum (LIM) and council property files (North Shore City Council Infrastructure Design Standards – Issue 9 (2006), Auckland City Council On-Site Stormwater Management Manual (2002), NZWERF (2004). The King County Department of Natural Resources and Parks places a covenant on properties where LIUDD devices are installed which includes a sketch of the device, the maintenance requirements and grants permission to the county to inspect devices (King County Department of Natural Resources and Parks, 2005).

For LIUDD devices designed and constructed by public agencies, the most effective method for the collection and storage of information about the technical design and maintenance requirements is to utilise existing organisational systems for information and asset management. For LIUDD devices designed and constructed by private developers and handed to public agencies for long term ownership, there is a need to ensure a thorough asset handover process occurs. This is to ensure public agencies obtain all the information they need, in an accurate

and relevant format, to undertake their operation and maintenance responsibilities. There may also be a need to establish a 'handover' process for LIUDD devices designed and constructed by public agencies when different departments are responsible for asset design and asset maintenance within the single agency. Tools to support handover processes are discussed in a later section of this report [section D].

C. Mechanisms to ensure operation and maintenance

There are a range of council planning, regulatory and partnership approaches that can be used to encourage or ensure that owners of LIUIDD devices on single lot private developments or within public agencies to fulfil their responsibilities for operation and maintenance. These range from voluntary regimes such as educating site owners about their devices and maintenance responsibilities through to mandatory requirements imposed by planning frameworks (NZWERF, 2004).

Voluntary approaches can help build the capacity of individuals and organisations to undertake their responsibilities and be useful for testing compliance monitoring and owner support requirements (Association of Bayside Municipalities, 2004). A mandated approach is more likely to result in wider implementation of maintenance requirements, however regulatory agencies will need to consider how this could be applied within their policy framework and how compliance monitoring could be resourced and integrated into their organisation.

Key legislation that provides for tools and processes that can be used to require the installation of LIUDD devices, establish design criteria and outline the process for ensuring their ongoing operation and maintenance this in New Zealand includes the Building Act (2004), the Local Government Act (2002) and the Resource Management Act (1991). Each of these Acts allows for different levels of intervention (e.g. design criteria, approval processes, site access for inspection) based on their purpose of the legislation. Selecting the appropriate legislative direction and identifying the appropriate tools and processes to achieve operation and maintenance objectives must be determined by each regulatory authority and based on their specific needs.

Detailed below is an overview of the types of approaches that can be taken to ensure the ongoing operation and maintenance of LIUDD devices and examples of where they have been applied.

C.1 Legislative requirements – design and installation

District Plans can require the installation of LIUDD devices and establish criteria for assessment through permitted activity provisions and rules. The building or resource consent process can be utilised to approve design specifications, address unintended impacts of construction (e.g. damage to the drainage system) and clearly identify who will be responsible for the on-going operation and maintenance of the device. The final approval process for project completion or compliance inspections can be used to ensure the device is installed as designed, that the regulatory authority has accurate technical details for the device and a device specific operation and maintenance plan for their records, confirm who will be responsible for the ongoing maintenance of the device and addresses any adverse impacts caused by device installation (e.g. damage to the public drainage system).

- North Shore City Council Proposed Plan Change 22 (North Shore City Council, 2007) will make the installation of LIUDD devices mandatory across large parts of North Shore City. The District Plan provides the legal basis for requiring LIUDD devices and will

specify design parameters for devices. The building approval process will include planning checks to ensure the proposed device meets planning requirements. Inspections to assess the correct installation of devices will be undertaken alongside the building 'code of compliance' process and will require the submission of device specific design details and an operation and maintenance plan for council records.

- The Auckland City Council On-Site Stormwater Management Manual (2002) sets design standards for on-site stormwater management devices, identifies the site owner as the party responsible for operation and maintenance of the device and requires a device-specific operation and maintenance plan be submitted with the Building Consent application. The Auckland City Council Manual for Development Contribution Rebate Programme for Rainwater Tanks (Stormwater) (2006) takes a similar approach for rainwater tanks, however resource consents, as well as building consents, are identified as mechanisms to manage the design and implementation process for rain tanks.

- The Environment Bay of Plenty On-Site Effluent Treatment Regional Plan (2006) has direct relevance to the approaches that could be taken for addressing the operation and maintenance of LIUDD devices on private sites. A permitted activity rule in the Effluent Treatment Regional Plan (2006) identifies the site owner as responsible for maintenance activities of the on-site effluent treatment system, requires regular servicing and maintenance of the system and that records of maintenance activities and a certificate of performance be lodged with the council. Failure to provide information to the council or maintenance records that demonstrate below average performance are identified through the compliance monitoring process and followed up by the council.

- The concept of incorporating a clause within consents, permits or contracts to address the potential for damage to public drainage networks resulting from individual site construction activities was suggested in discussions with staff from Melbourne Water. Construction work on individual lots has the potential to damage publicly owned LIUDD devices (e.g. swales, rain gardens) within road reserves through the discharge of sediment and concrete. The inclusion of a condition in consents or permits to protect the public drainage network and remedy any damage resulting from private development is one approach that places responsibility on the private developer to maintain the integrity and functionality of public drainage assets.

- The deferral of LIUDD device installation or commissioning and payment of a 'bond' by the subdivision developer is another approach that could be used to address the potential for damage to publicly owned and operated LIUDD devices, resulting from private site construction activities. Where LIUDD devices are required on private subdivisions for hand over to public agencies, councils could defer the installation of the devices (or the completion of them) and require a financial payment from the subdivision developer. Final installation of the LIUDD device would then be undertaken by the public agency using the financial payment provided by the private developer for project completion.

C.2 Legislative requirements – operation and maintenance

Stormwater by-laws provide a mechanism to manage the ongoing maintenance requirements and compliance monitoring for LIUDD devices on private sites. Requirements can include requiring individual site owners to undertake maintenance activities for LIUDD devices on their property and seek external certification of the device and to provide records that confirm maintenance and inspection activities have been undertaken to the regulatory authority. While District Plans can also provide for these functions, by-laws have been used in a number of locations to manage the ongoing operation and maintenance of LIUDD

devices as by-laws can be applied to both existing and new devices. Changes in District Plan rules may only apply to new installations following Plan notification, which may leave a proportion of existing LIUDD devices that will still require a mechanism to manage ongoing operation and maintenance.

- North Shore City Council is currently reviewing their stormwater by-law to support District Plan Change 22 which requires the implementation of LIUDD devices on private sites. The proposed changes to the stormwater by-law establishes a 'self certification' system that requires owners of LIUDD devices on private properties to maintain devices, have devices inspected and certified periodically, at the owners cost, and to provide records of inspections and certification to North Shore City Council (North Shore City Council, 2008).

- Auckland City Council also have by-law provisions that require owners of LIUDD devices on private properties to maintain and service devices at specified intervals and provide records of servicing to the council (NZWERF, 2004).

C.3 Outsourcing responsibility

An even more rigorous approach to ensuring the ongoing operation and maintenance of LIUDD devices is to contract this activity to a third party, at the expense of the device owner. The third party undertakes all maintenance activities and liaises directly with the regulatory authority to provide records of maintenance activities (NZWERF, 2004).

C.4 Warranty period

Where LIUDD devices have been designed and installed by private developers for hand over to public agencies for ongoing operation and maintenance, a warranty period is valuable to ensuring that devices have been constructed as agreed and that they are functioning as intended. This enables any problems with the device to be identified early and at a stage when the party responsible for implementation can be held accountable for any necessary modifications or repairs. This helps to avoid public agencies bearing the cost of repair or replacement works.

- Housing New Zealand Corporation have been required by Auckland City Council to maintain rain gardens in the road reserve at Talbot Park, Auckland, for a period of two years following construction. After this period, the responsibility for long term operation and maintenance of the rain gardens will be transferred to Auckland City Council.

- The City of Portland (City of Portland, 2008) requires a warranty period for a minimum of two years for LIUDD devices being taken over by public facilities. The warranty is required through a public works permit and routine inspections throughout the period enable the City to track performance. If inspections identify problems with the device, the City can extend the warranty period to ensure it is operating as intended when they take over ownership of the device.

C.5 Asset handover process

Before taking on ownership of LIUDD devices and the responsibility for the long term maintenance, the proposed owner should undertake an asset handover inspection. This could include both a site inspection and an assessment of hand over documentation. This provides an opportunity for the proposed owner to gain an understanding of how the system operates, identifies key components of the design and ensure that all the information required to fulfil the maintenance obligations (e.g. technical design drawings, operation and maintenance plans) are provided (Victoria EPA, 2008).

D. Support for implementation

Critical to ensuring the ongoing operation and maintenance of LIUDD devices by private and public owners, is the need to support those responsible for undertaking these activities with tools, resources and educational material. There is a need for a clear process that communicates what is expected of developers and device owners, how it will be reviewed and approved and how information will be passed on.

Raising awareness about the value of LIUDD devices, the importance of undertaking operation and maintenance activities and how to do this is a key to gaining support for these practices and encouraging people to fulfil their responsibilities. Providing tools to support operation and maintenance activities will help to enable good practice and improve the quality of information regulatory authorities receive and require to be confident that appropriate actions are being taken to support the performance of the public stormwater network. A number of useful approaches and tools and references have been identified as part of this project and described below.

D.1 Guidelines and checklists

Guidelines and checklists are useful sources of information that inform readers about specific aspects of the design, asset handover and maintenance process.

- North Shore City Council Infrastructure Design Standards – Issue 9 (April 2006) provide a detailed description of the information required in an operation and maintenance plan for stormwater quality and detention devices.
- North Shore City Council Long Bay Practice Notes series – provide information to inform developers about the requirement for on-site stormwater management and specific details about practices and LIUDD devices.
- The Auckland Regional Council TP10, a design guideline for stormwater treatment devices, provides inspection forms and checklists for a number of LIUDD devices.
- The New Zealand Water Environment Research Foundation developed the 'On-site Stormwater Management Guideline' (2004) to provide practical guidance on the design a number of common LIUDD devices. The guideline states assumptions relevant to design methodologies and discusses key considerations for operation and maintenance and geographical variabilities.
- The Water Sensitive Urban Design Technical Design Guidelines for South East Queensland (Healthy Waterways, 2006) outlines device maintenance requirements and provides checklists for design, construction, maintenance and asset transfer.
- The Victoria EPA publication 'Maintaining water sensitive design elements' (2008) clearly and simply outlines key considerations for the operation and maintenance of LIUDD devices. The publication was incredibly valuable to informing this project and includes maintenance checklists and an indication of the typical annual maintenance costs for individual devices.
- The City of Portland Stormwater Management Manual (Draft 2008) provides guidance on maintenance and inspection considerations for LIUDD devices (e.g. ponding water, pests, sediment removal and disposal, vegetation management).

D.2 Operation and maintenance plan template

Templates provide a useful guide on what information is required to operate a device and ensure maintenance can be undertaken. Templates also offer clarity on the criteria used by regulatory authorities to assess applications to install LIUDD devices and provide a consistent format that can assist regulatory authorities in undertaking an efficient assessment of operation and maintenance plans.

- Auckland City Council On-Site Stormwater Management Manual (2002) – outlines operation, maintenance and monitoring requirements for on-site stormwater devices and provides standard forms as a template for developing operation and maintenance plans.
- North Shore City Council are developing owners manual templates for a range of on-site LIUDD devices including rainwater tanks, detention tanks and rain gardens to support Plan Change 22 and changes to the North Shore City stormwater-bylaw.

D.3 Education and skills development

Approaches to improve the awareness and capability of designers, builders, device owners, maintenance contractors and regulators is critical to ensuring people understand their LIUDD device maintenance responsibilities and have the skills required to undertake these.

- Environment Bay of Plenty has developed a suite of simple tools and techniques to ensure the maintenance of on-site systems for wastewater treatment. These could equally be applied for LIUDD devices on private sites. Approaches include training for maintenance contractors about council requirements, providing carbon copied inspection checklists for contractors to use and submit directly to the council and issuing reminder letters to device owners when maintenance is due.
- A number of organisations, including the Auckland Regional Council and the New Zealand Water and Environmental Training Academy (NZWETA), provide technical training courses on LIUDD devices for designers and practitioners. Courses include discussion on the need to design for ease and efficiency of maintenance and emphasise the importance of a well considered process in designing LIUDD devices. There is an opportunity to extend practical training beyond designers to address the needs of those responsible for undertaking the operation and around maintenance of LIUDD devices (e.g. private site owners, council staff and contractors, industry professionals). It is understood this is being considered by some industry associations and training providers.

D.4 Certified contractors

Environment Bay of Plenty provides a list of council certified maintenance contractors to help device owners in selecting an appropriate service provider to assist them with maintenance activities.

Final thoughts

The way LIUDD devices are designed and constructed directly affects how easily and efficiently they can be maintained (Victoria EPA, 2008) and monitored. The key to designing maintenance smart systems is to ensure an integrated approach to design, clarity about the responsibility and requirements for ongoing operation and maintenance, development of mechanisms to facilitate maintenance activities and tools to support implementation. This is common for both devices managed by private owners on individual sites and devices managed by public agencies as a result of public works or transfer of assets from private developments.

The checklist and discussion of key considerations in designing for the efficient and effective operation and maintenance of LIUDD devices presented in this report is intended to provide an insight into how challenges around ensuring the ongoing operation and maintenance of LIUDD devices can be overcome. The emphasis is on good design and planning for maintenance.

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Appendix A
Project brief and methodology

Project brief

The purpose of this project is to investigate the range of approaches taken by public agencies to manage the operation and maintenance of Low Impact Urban Design and Development (LIUDD) devices to ensure the service levels (e.g. water quality and water quantity) of the public stormwater network are not compromised.

The focus of this project is on LIUDD devices installed on:

- single lot private developments
- public land where they are implemented by private developers and handed over to public agencies for operation (such as road reserves)
- public land through public works programmes (such as road and pipe upgrades).

The type of LIUDD devices considered as part of this project include rain tanks, rain gardens, tree pits, green roofs, swales, stormwater retention ponds, wetlands and permeable pavement.

The aim of the project is provide an overview of the options available to address concerns regarding the ongoing operation and maintenance of LIUDD devices.

Project methodology

The project was undertaken in two stages. The initial stage focussed on researching the range of approaches that are being used in New Zealand, Australia and the United States to manage the operation and maintenance of LIUDD devices. This involved contacting organisations and individuals to discuss their experiences and approaches taken in their areas of work. Internet research was also undertaken to investigate suggested resources and identify further information that could inform the project.

The second stage of the project involved the review and synthesis of information collected in stage one. The purpose of this stage is to provide an overview of key considerations in planning, designing, implementing and managing LIUDD devices to ensure they continue to function as they were intended. Information was analysed and is presented in a way that provides an overview of approaches that could be considered to address concerns about the long term ownership and ongoing responsibility for the operation and maintenance of LIUDD devices. The project does not include a detailed analysis of individual approaches.

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