

THE DEVIL IS IN THE DETAIL: IS THE PLANNING PROCESS ENABLING STREAM LOSS?

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ABSTRACT

Auckland is experiencing unprecedented growth with development increasingly extending into greenfield areas. In order to establish the pattern of land use, transport networks and the availability of or need for key infrastructure, higher level planning documents (i.e. structure plans, precinct plans) are prepared to support plan variations. These high level documents ultimately inform land value, development potential and shape the way greenfield development are undertaken.

In preparing these plans, opportunities and constraints are identified, potential effects are addressed and key outcomes and objectives are documented to guide development. Developers assume that they provide a level of certainty and rely upon them as blue-prints for development.

However, in many situations, the level of detail regarding ecological features is incomplete or inadequate. Specifically in regards to stream networks, often only permanent reaches or main stems are identified, leaving a significant portion of the network unmapped. Roding layouts, development yield and open space are subsequently designed around the identified features with only a partial understanding of the ecological features. As a result, the ability of developers to meet the Auckland-wide objectives of the Auckland Unitary Plan (Operative in Part, AUP OP) is compromised and often only recognised within the resource consenting phase.

Despite most of these high level plan provisions stating that ground truthing is required, the supporting plans that identify some (but not all) of the streams within the area are relied upon. As a result, developers are caught short with 'surprise streams' that 'require' reclamation to enable the layout envisioned. These developers are then tagged with 'double dipping' when attempting onsite offset or mitigation works at resource consenting stage. This has obvious financial implications, both in terms of potential changes to the development yield or layout, as well as the costs associated with implementing stream enhancement required to mitigate or offset effects.

Further, regulators are left with plans that fail to identify a complete stream network and are working to planning provisions that effectively anticipate the loss of stream. While not directly prejudicing the consenting process, it is a contributing factor in final decision making and so the policy intent of the AUP OP is not necessarily met.

The AUP OP provides clear direction as to the need to retain and enhance streams, incorporate stream networks into stormwater management and implement water sensitive urban design approaches. Meeting these multiple objectives, while also enabling comprehensive development planning is challenging enough, without incomplete data.

Identification of a complete stream network extent allows for an informed approach to stormwater management and enables the retention of streams at the very earliest stages

of urban development design before significant resource and finance is invested into resource consent applications. A complete stream network provides certainty to developers, results in ecological and stormwater management benefits and enables a more streamlined approach to resource consenting.

This paper will illustrate the challenges being faced by developers, regulators and practitioners and will offer some insights as to ways more detail at the outset will actually make life that much easier for all involved.

KEYWORDS

Catchment planning; reclamation; structure planning; stream systems.

PRESENTER PROFILE

Josh Markham has eight years' experience as an ecologist working within the land development and regulatory sectors. He has first-hand experience working with developers who have completed due-diligence assessments to later find out that the information within plan change documents was incomplete. Josh also works as a technical streamworks specialist for Auckland Council assessing proposed greenfield developments against objectives, policies and rules of the Auckland Unitary Plan Operative in Part (AUP OP). He sees many developers struggling to obtain resource consents and recognises the need for ecological constraints to be fully identified and articulated at the earliest stage of planning to enable both development and environmental protection.

1 INTRODUCTION

Auckland is experiencing unprecedented growth with development increasingly extending into greenfield areas. In order to establish the pattern of land use higher level planning documents are prepared to support plan variations. These documents identify existing constraints and opportunities across the site and provide direction as to development intentions. Often the level of detail regarding ecological features is incomplete or inadequate. Specifically in regards to stream networks a significant portion of the network is unmapped, with only major tributaries shown.

The intent of this paper is to raise questions and engage the industry in a conversation about how to streamline some of the processes currently in place in respect of stormwater management and stream protection in greenfield developments. It is based on observations and experiences of the authors as practitioners who work as ecologists for developers and also as specialist advisors for Auckland Council. Our experience is predominantly Auckland based however the learnings from this region can be applied across the country.

This is a think piece and is not likely to solve all the problems, but perhaps introduce some ideas for us as practitioners to consider when working with our clients. Our intention is to highlight the importance of understanding ecological site constraints (and opportunities) at the very earliest stage of development in order to provide a higher level of certainty to both developers, regulators and asset owners.

2 THE AUCKLAND UNITARY PLAN

2.1 STREAM PROVISIONS

Development within the Auckland Region is managed through the provisions of the Auckland Unitary Plan (Operative in Part) (AUP OP). The AUP OP is Auckland Councils 'rule book' for giving effect to the purpose and principles of Part 2 of the Resource Management Act 1991 (RMA), to 'promote the sustainable management of natural and physical resources'.

The AUP OP is a complex planning document incorporating regional and district planning rules, as well as the regional policy statement and regional coastal plan provisions. It was notified in 2013 and made partly operative in 2016. The AUP OP specifically recognises the need for more housing and aims to provide for higher densities while also establishing a bottom line in terms of environmental protection.

Some of the environmental provisions of the AUP OP are more stringent compared to prior planning documents. For example, while the Auckland Council Regional Plan: Air, Land and Water provided for protection of permanent watercourses, the AUP OP extended that protection to intermittent watercourses (those that flow for only part of the year).

The RMA doesn't distinguish between the two, with river defined as (s2, RMA, 1991): *a continually or intermittently flowing body of fresh water; and includes a stream and modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal).*

While it has been long recognised that freshwater systems exist on a continuum (Vannote et al., 1980) it is only in recent times that the importance of intermittent streams is being recognised (see for example, Larned et al., 2010 and Leigh et al., 2015). Specifically within the Auckland region, Storey et al., (2011) identified that intermittent streams had biodiversity values that warranted protection similar to that given to permanent streams.

An assessment of the lengths of stream across the Auckland Region determined that intermittent streams contributed in the order of 4,500 km to the total stream length, compared to 16,650 km of permanent and 7,110 km ephemeral stream (Storey & Wadhwa, 2009). At approximately 16% of the estimated stream length, intermittent streams provide valuable ecological and hydrological conveyance functions.

Based on the growing body of evidence regarding the values of intermittent streams in the region (see for example Sukias & Nagels, 2006; Parkyn et al., 2006; Wilding & Parkyn, 2006 and McKergow et al., 2006), Auckland Council incorporated protection of intermittent streams AND permanent streams into the AUP OP. The implications of this were discussed in the section 32 report (Auckland Council, 2013) which provided the justification for the provisions included in the proposed plan. It recognized that while the inclusion of intermittent streams may result in a potential loss of developable land, the requirements for a water sensitive urban design (WSUD) and integrated stormwater management approach would not necessarily reduce development yield and value.

The resulting AUP OP provides a clear direction in respect of integrating stormwater and freshwater management. There is an emphasis on retaining and enhancing freshwater systems rather than allowing end of pipe stormwater solutions. Some of the key provisions include:

- Chapter E1 provides direction in regards to water quality and integrated management. Chapter E1 encourages the prioritisation of integrated water management specifically regarding stormwater management. It also recognises the overarching objectives of the National Policy Statement for Freshwater Management (NPS FM) and the need to maintain or improve water quality.
- Chapters E8, E9 and E10 (stormwater diversion, discharge, flow and quality) are specific to stormwater management and specify the need for retention, detention and treatment to protect natural waterways.
- Chapter E3 (lakes, rivers, streams and wetlands) addresses works in watercourse (s13, RMA 1991) and provides for permitted activities (i.e. culvert installation) as well as the more stringent controls around stream diversions and reclamation.
- Chapter B is the Regional Policy Statement and identifies the high level policies, directed towards protection of streams, for water quality and their retention and the need to integrate streams and aquatic systems into development designs.

The AUP OP provides for the protection of intermittent streams and envisages the incorporation of the wider stream network into an integrated approach to stormwater management as a key component of development.

2.2 MAKING LAND DEVELOPABLE

Much of the land around the Auckland area has been identified as 'future urban' under the AUP OP, meaning that it's currently functioning as rural land use, but following a plan variation it can be developed.

In areas where housing supply has been identified as an issue, the Housing Accords and Special Housing Areas Act 2013 (HASHAA) was implemented to free up land for development and attempt to resolve some of the affordability issues. HASHAA provided an optional route for developers to seek plan variations and resource consents under a fast tracked process. And while it has always been possible to push for a private plan change, HASHAA made it easier for specified areas.

When a plan change is prepared a high level effects assessment is undertaken which looks at the effects of the proposed land use change (from rural to urban for example). This is where town planning comes in, with considerations of transport networks, connections to wastewater networks, distribution of pedestrian networks, recreational areas, town centres, and allocation of housing density across the area. The plan change may apply over tens or hundreds of hectares and will look at the effects from a high level and specifically in regards to the land use change.

This clarification is essential. The effects assessment associated with a plan variation does not consider the effects of a culvert required to build the road in the location indicated on the master plan. It also doesn't identify the actual locations of stormwater devices, it may just refer to a WSUD approach, and indicate that a few wetlands might be required. It only considers the high level effects.

If the plan variation is accepted then there are typically some provisions associated with that piece of land that must be adhered to (or given consideration) going forward. For instance, there is often reference to basic stormwater provisions required for different landuse types or a requirement that riparian margins of streams should be planted. This may only apply to streams that are shown on a plan associated with the plan variation (or precinct plan) or may apply universally across a site.

In addition to plan changes, precinct plans have been developed which provided specific provisions for areas of proposed development. These plans included high level direction as to the anticipated density and layout of precincts. They may also include provisions regarding stormwater management expectations and enhancement of riparian margins.

For the context of this paper, we will refer to 'high level planning documents' (HLPD) to cover off structure plans, precinct plans, private plan changes or variations collectively. It is understood that they are not the same, however they are all high level planning documents which provide direction to development.

Within the HLPD an image will typically be prepared which shows the key features across the area which are incorporated into the urban design and overarching layout of the site. See Figures 1 and 2 for examples.

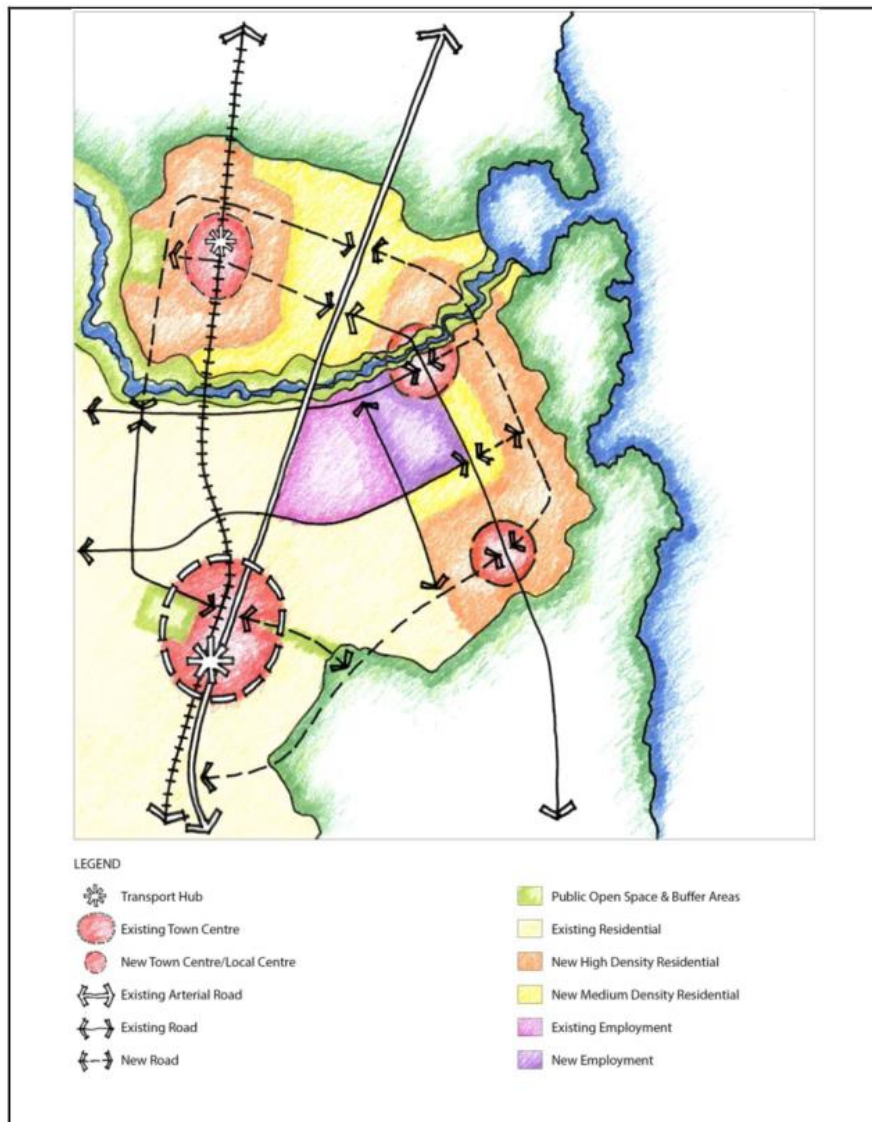


Figure 1: Example of a structure plan (source: Auckland Future Urban Land Supply Strategy, July 2017)

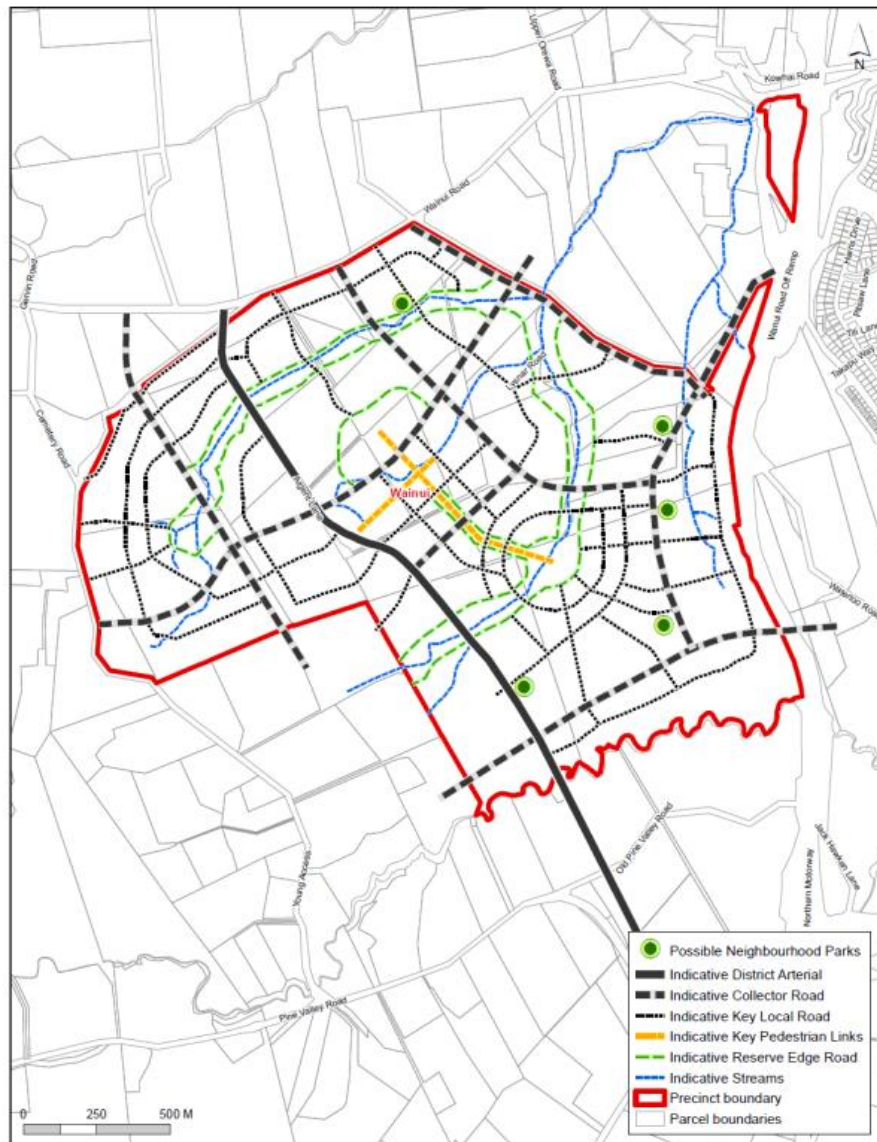


Figure 2: Example of a precinct plan (source: Auckland Council Unitary Plan, Chapter I544)

Following the finalisation of the landuse change or precinct planning documentation, developers anticipate an easy run through the consenting process. The activity they want to undertake (residential housing development) has been anticipated in this area and at a high level, effects have been assessed. Key features of the site have been identified and where appropriate, incorporated into the site layout.

3 SO WHAT'S THE PROBLEM?

There is often a figure associated with the HLPD which shows the density provisions and general layout that has been approved (For example, Figures 1, 2 and 3). In some instances this may identify watercourses (e.g. Figure 3). It's assumed that these figures are reliable. Someone looking at this information couldn't be faulted for thinking that this is the full extent of watercourse in the area. It would be odd for a plan to be prepared that only shows some wouldn't it?



Figure 3: Example of watercourses shown on a precinct plan (Auckland Council, Chapter I, 6.33 Hingaia 3)

This person (developer, planner or engineer) may be comfortable that their site (indicated by a star) doesn't have any streams. They may be purchasing the land and fail to do a complete due diligence assessment or alternatively they may already own the land, have been present through the plan variation process and trust the information presented.

They might see a bit of wet ground at their site but could assume it's an overland flow path, or that it's 'nothing' if it hasn't otherwise been identified in the HLPD. They may be there in summer only when there is no evidence of a stream being present at all, particularly in areas where landuse impacts have modified the channel morphology.

And so they design their site based on the information at hand. The urban designers work to maximise yield across the site and the stormwater engineers develop a stormwater management approach based on discharging to the identified stream over the road. They may even be discharging to the coast and so the stormwater management requirements are quite different.

And then the developer finds out there is quite a bit of stream that wasn't identified in the HLPD (Figure 4). In order to enable the development that the urban designers envisage, all of the stream will need to be reclaimed. Reclamation is a non-complying activity and they had anticipated starting works at the beginning of earthworks season. So now the developer owns land, is on a timeframe and the stream isn't documented in the HLPD. A few questions spring to mind.

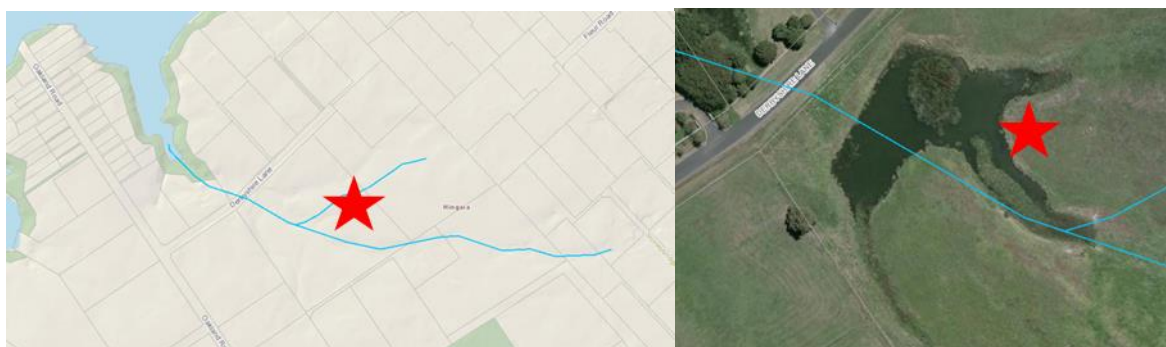


Figure 4: Rivers layer (left) and aerial imagery (right) from Auckland Council GeoMaps for the site identified in Figure 3 above.

1. Does the stream exist?

Yes it does. Irrespective of the plan variation process and identification of site features within the high level planning documents, the stream still exists and the RMA (and regional plans) restricts activities in the bed of streams. These activities can include anything from culverts to diversions or reclamations.

These activities haven't been considered at the plan variation stage, in fact they may have been specifically excluded. For example, in Flat Bush Stage 3, the commissioners identified that considering riparian planting proximate on subdivision could not also be considered as mitigation for works in streams as this would be 'double-counting mitigation' (Approved Plan Variation 8 and Qualifying Developments 1 & 2).

2. Can it be modified or reclaimed?

Yes it can. But there's a 'but'. The objectives and policies of the AUP OP are quite clear that significant adverse effects on streams should be avoided. These objectives and policies have been developed in light of the need for increased housing. Certain activities are still allowed and there are standards that allow for these for example, culverts that meet certain criteria. However, something like reclamation is a non-complying activity and it's likely that resource consent will be required, which brings with it a raft of other requirements.

3. Can I get a consent?

Yes...but. Seeking a streamworks consent is typically not 'simple'. Where there are significant adverse effects (most often associated with reclamation), mitigation or offset is required. This can be provided on site (if some stream remains following development) or offsite (if no stream remaining on site).

If there are provisions within the plan variation that requires stream margins to be planted then planting of streams on site may not contribute to mitigation or offset calculations. That is, the planting is required under the plan provisions and so cannot be demonstrated to be additional to what would otherwise be required. Additionality is a key concept in biodiversity offsetting (NZ Government, 2014) and is specifically included in the AUP OP (Appendix 8, Biodiversity Offsetting).

A good example is the Flat Bush Precinct, which covers approximately 1730ha of land and includes ten sub-precincts (refer AUP Chapter I, I412 Flat Bush Precinct). Each of the sub-precincts have varying level of subdivision controls. Sub-precinct J (Conservation and Stormwater Management) covers an area of steep gullies and waterways that warrant environmental enhancement. Policy I412.3.3(1) requires riparian planting of native species along streams within the sub-precinct. As was outlined above, the riparian planting is proximate to subdivision and so should not be used to contribute to offsetting effects on streams.

This means that to get a consent, offset on stream somewhere else is required. Finding a site with sufficient stream is very difficult and involves time, negotiation with landowners and financial commitments.

This doesn't just affect the land owner or developer. It affects the regulators who are stuck between a rock and a hard place, effectively being the bearer of bad news that there are 'surprise streams' perhaps not identified until after lodgement. The streamworks specialists are trying to implement the rules, objectives and policies of the AUP OP which have been effectively missed at the plan change stage. In order for the

policies to be met (specifically E3.2(4)), offset needs to be identified prior to consent being granted.

It also affects future asset owners, who want to implement the integrated management component of the stormwater management approach recommended within the AUP OP. In line with their guidance documents, they are seeking water sensitive urban design, stream retention and enhancement and management of overland flow paths (i.e. keep 100 year flows out of pipes).

So now what?

3.1 BACK TO THE DRAWING BOARD?

Depending on what stage of the project these streams are identified, it may be possible to redesign the site layout to avoid some or all of the streams. This is likely to involve a significant amount of rework to road alignments, stormwater management approach, yield and urban design. It may also introduce additional consultation requirements with parks or asset managers as to long term ownership of the streams and their margins. Redesign is almost certain to add financial costs and time delays to the process and so is not typically a preferred approach. But the alternative is trying to find streams somewhere else to offset effects associated with stream loss.

Retaining streams doesn't have to mean loss of yield, time delays and cost implications. Gathering a sufficient level of detail prior to preparing HLPD can be costly up front and require access across numerous land owners, but the ability to plan based on real constraints is invaluable. Knowing where streams are before drawing up the conceptual site designs means that the real cost of the long-term development of the area can be quantified early. Using GIS can be a good starting point. The river layer is fairly reliable but it's not the only layer of use.

The overland flowpath layer modelled by Auckland Council gives an indication of where streams are likely to be found (Figure 5). The thin blue line is likely to be representative of intermittent streams, while the thick blue line is permanent. The lines are not 100% accurate but should be sufficient to raise alarm bells.



Figure 5: Overland flow path layer in a Future Urban Zone (Auckland Council GeoMaps).

At this stage, it's important to engage a suitably qualified and experienced freshwater ecologist who can assist with classifying streams. Despite there being definitions in the AUP OP, land use impacts can significantly impact the ability to classify streams and so a level of conservatism may be required. It's also vitally important that these assessments are undertaken at the right time of year (July to October) to ensure classifications can be relied upon.

Photographs 1 and 2 below both show intermittent streams. The photo on the left is an intermittent stream in native bush cover and so the definition can be fairly easily applied year round. However the image on the right is an intermittent stream through pasture. In summer, this stream will effectively disappear making it impossible to identify as stock walk through the channel removing evidence of its existence.



Photograph 1 and 2: Intermittent streams in Auckland region with very different characteristics (left: native forest catchment, right: rural stream with stock impact).

Back to Figure 5 above, if each of those blue lines is indicative of a stream channel it would be near on impossible to avoid all streams, while also meeting urban design and transport network requirements. If these stream networks were classified and mapped in detail prior to the high level planning documents being prepared, then it would be possible to quantify the extent of stream likely to be impacted through the development.

It does provide for a more integrated stormwater approach, which incorporates the freshwater environment into the site design. There is a move away from piping stormwater networks, rather relying on the conveyance abilities of natural systems as these are more resilient. WSUD seeks to protect and enhance natural freshwater systems, sustainably manage water resources, and mimic natural processes to achieve enhanced outcomes for ecosystems and our communities (Lewis et al. 2015).

Further, stream corridors can provide opportunities for amenity areas, pedestrian and cycle links and the opportunity to incorporate environmental enhancement into the development objectives.

How can this be achieved if there is insufficient knowledge about the stream networks present?

3.2 EXAMPLES IN PRACTICE

A due diligence assessment of a site in west Auckland revealed that retention of the stream through the site would result in a 50% reduction in yield. The developer's early intention had been to pipe the stream. The financial implications of needing to find suitable offset meant that the purchase did not proceed. While disappointed that the purchase fell through, the prospective purchaser was much happier knowing the site constraints before committing to a purchase price.

Recent work in south Auckland has involved ecologists and urban designers on site together, classifying streams and identifying the constraints prior to a purchase price being confirmed. The intention is to keep the streams, create amenity areas and avoid any major consenting hold ups (for streamworks). This is being undertaken prior to signing any paperwork so that the real cost of development can be quantified. Further, specific stream protection provisions for this site can be incorporated into the upcoming plan variation process.

For one stage of a larger development area, a developer sought advice about the placement of temporary culverts on a stream identified in the HLPD to be retained. Upon reviewing the aerials and subsequent site visits, it was determined that an additional 1.7 km of stream was not mapped on the HLPD and needed to be reclaimed to enable the development to proceed as envisaged. This added time delays and significant unanticipated costs to the project.

Some landowners, who have offered up their streams as offsets, have had high expectations in terms of financial commitments. One prospective offset site attached a price tag of several hundred thousand dollars for the right to use the stream, before any enhancement costs were introduced. Another landowner has requested that rather than 7-wire fencing (at approximately \$17 per lineal metre), they would prefer post and rail fencing (in the order of \$45 per lineal metre). When a developer needs a consent and they need the offset site, the ability to negotiate is severely hamstrung.

While it might seem much easier to undertake detailed assessments on smaller sites, it is not impossible to do the same on larger sites. In both scenarios, without knowing about these constraints or opportunities there can be direct or indirect cost implications, time delays or rethinking to try to get developments over the line.

4 RECOMMENDATIONS

From our experience, most developers don't set out to destroy the environment and they work to the advice of their consultants. How can we front foot this to improve outcomes for everyone to meet as many objectives as possible?

Our recommendations are as follows.

- Spend more time upfront to identify ecological opportunities and constraints of a site. This applies to small sites right the way up to future urban zones over hundreds of hectares.
- Identify the ENTIRE stream network on the site. This includes the overland flow and ephemeral reaches as these can be valuable components of a stormwater management approach.

- Ensure that stream classifications are undertaken using suitability qualified and experienced practitioners.
- Wherever possible, undertake stream classifications at the right time of the year (July to October) which is when intermittent streams will be present. If time delays mean this is impossible, be conservative and work to a worst case scenario.
- Work as hard as you can to avoid stream loss. Some stream loss is inevitable but minimising this should be a key priority.
- In early conceptual planning, consider what the maximum stream loss across the site may be at the end of the development. For the most part, it should be possible to identify that there will be x number of road crossings equating to x m of culverting.
- Where avoidance just isn't practicable, determine how much reclamation is likely to be required across the site.
- Consider the financial implications at this point – what does stream retention mean for maximum yield across the site? Is it possible to increase density in some areas to account for a loss in yield if a stream is kept? What are the costs of going offsite to undertaken offset enhancement work?
- Look at the stormwater management approach in light of streams being kept. Is it necessary to divert some streams (better than reclamation) or are there going to be issues to retain flows and manage flood effects.
- What is the development going to do to baseflows of these streams? What stormwater management provisions can be incorporated to ensure that ecological flows are retained? What is the likelihood of indirect reclamation and how can this be accounted for in the site design?
- How can the stream corridors provide a shape to the development in the form of road alignments, pedestrian and cycleways, recreational areas and amenity value?

5 CONCLUSIONS

The level of detail regarding ecological features in high level planning documents is incomplete or inadequate. Specifically in regards to stream networks, often only permanent reaches or main stems are identified, leaving a significant portion of the network unmapped.

We recommend front-footing as much as possible. Identification of a complete stream network extent allows for an informed approach to stormwater management and enables the retention of streams at the very earliest stages of urban development design before significant resource and finance is invested into resource consent applications. A complete stream network provides certainty to developers, results in ecological and stormwater management benefits and enables a more streamlined approach to resource consenting.

ACKNOWLEDGEMENTS

We'd like to acknowledge our clients who have 'seen the light' and can appreciate the realities of working around streams. We also appreciate the opportunities afforded to us working on both sides of the 'fence', for developers and regulators.

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Auckland Council AUP OP Chapter I, I544 Wainui Precinct.

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Auckland Council AUP OP Chapter E3 Lakes, rivers, streams and wetlands

Auckland Council AUP OP Chapter E8 Stormwater - Discharge and diversion

Auckland Council AUP OP E9 Stormwater quality - High contaminant generating car parks and high use roads

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