The built environment, Hamilton City Council policies and child driveway safety: a balancing act

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Executive summary

Driveway run-overs continue to bring tragedy to New Zealand families at a higher rate than any other Western nation. Meanwhile, little progress appears to have been made in regard to the recommendations of previous research. This project investigates whether recommendations in regard to one key factor in driveway run-overs, the built environment, are reflected in current local body policies and regulations. The research evaluates Hamilton City Council policies affecting the renovation and/or erection of domestic residences with a view to determining whether they are consistent with existing knowledge and best practice initiatives designed to minimise accidental injuries to children on driveways.

The project compares the findings of a review of the existing literature on child safety best practice for the built environment and urban design of driveways, with a review of Hamilton City Council policies and guidelines relating to the built environment of residential properties and adjacent roads (the Operative District Plan, Ten Year Plan, Urban Growth Strategy, Vista, and more), along with relevant central government policy. These findings are triangulated with data from interviews with four expert informants – one child safety expert and three Hamilton City Council employees involved in planning, policy and transport – who provide insights into the translation of policies into practice.

Key findings

- Children under five years of age are over-represented in fatalities and injuries on driveways, with an average of two incidents per month In New Zealand.
- The literature indicates that the built environment has significant effects on child safety. Reducing the length of driveways, preventing the driveway from being on the property boundary, introducing some form of separation between the driveway and dwelling/ outdoor areas, and decreasing the number of driveways that are shared between different properties demonstrably decrease the incidence of child driveway run-overs.
- Local governments can have a significant impact on child safety on driveways via the District Plan and other relevant bylaws and policies, such as those related to traffic calming and speed limits on roads adjacent to residential properties.
- Child safety on residential properties is not a significant priority for the Hamilton City Council when formulating policy. Other factors – 'living within our means', environmental sustainability, land rationing (hence housing intensification), housing affordability, and infrastructure capacity – take precedence.
- The Hamilton City Council's documents have nothing to say about child safety on driveways and child safety in any form receives only fleeting mention.
- While the District Plan has a set of minimum standards for the built environment (for example, the size of the outdoor living area and setback of the garage), the most critical decisions for child safety (such as the layout of the property and length of the driveway) are frequently left to property developers.

We accept that the Council must weigh many factors when formulating policies. Trade-offs are inevitable. Furthermore, councils have inherited a built environment legacy (the quarter acre

paradise) that presents multiple problems in responding safely to population pressure and the need for affordable housing. We also recognise the pressure emanating from communities with a social history that places a high priority – and has a high dependence – on motor vehicles. Therefore, child safety driveway strategies must be designed, and operate, within these constraints to find ways of making existing properties safer and ensure new developments are safe from the outset.

Recommendations

We unequivocally endorse the recommendations provided in the existing literature. In regard to the built environment we recommend:

- a continuation and extension of the practice of reduced speed limits and traffic calming measures in residential streets;
- warning signs and mirrors on residential properties where there are shared driveways;
- the development of a child safety role within the Council's planning unit;
- the inclusion of child safety as a high level objective in policy design;
- the development of a child safety culture within Council
- a commitment to actively discouraging residential property layouts that increase the risks of driveway runovers;
- a commitment, wherever possible, to prioritise child safety over economic and environmental factors;

Introduction

This research was inspired by a spate of driveway run-overs in 2013, which unfortunately continued throughout the duration of the project. These accidents almost exclusively involve children under the age of five and New Zealand experiences a higher rate of run-overs than any of our Western counterparts. A growing body of academic literature seeks to identify the causes of driveway run-overs, and is increasingly finding a relationship between the residential built environment, urban design guidelines and child safety on driveways. Furthermore, it is clear that local governments can have a significant effect on the residential built environment and urban design guidelines – and therefore child safety – through their District Plan and other related transport, urban growth and design documents.

A key contributing factor to our high incidence of driveway run-overs is the historical nature of the built environment in New Zealand – our quarter acre paradise. Recent demographic trends have put unprecedented pressure on our housing stock and quarter acre sections are no longer sustainable. Older residential developments had large sections with garages in the back corner and long driveways traversing the property. While these in themselves provide ample opportunity for driveway accidents, the more modern answers to housing pressures have often exacerbated the problem. Infill housing often incorporates shared driveways and privacy fencing, further adding to the risks and townhouse developments bring a slightly different set of risks. What therefore, can be done to mitigate the risks faced by young children in their own yards and driveways, and on the pavement just beyond their gateways?

This project seeks to begin where other research ends. That is, we aim to investigate whether recommendations in regard to a key factor in driveway run-overs, the built environment, are reflected in current local body policies and regulations. The research therefore evaluates Hamilton City Council policies affecting the renovation and/or erection of domestic residences with a view to determining whether they are consistent with existing knowledge and best practice initiatives designed to minimise accidental injuries to children on driveways, or whether other factors take precedence over child safety considerations. Accordingly, the project also explores the priorities given explicit expression in the District Plan and accompanying documents. While we accept that not all jurisdictions will have the same set of regulations as Hamilton, the differences are likely to be minimal, the more so since central government influences local policy through statutes and policies such as the *Resource Management Act* and the Ministry of Environment's *Urban Design Protocol.*

Methodology

The research process was divided into two distinct components. Firstly, we conducted a review of academic literature and relevant Hamilton City Council publications. The review contributed to three sections of the final research report. Initially, we needed to establish an understanding of the academic literature's view of what constituted child safety best practice for driveway run-overs and the built environment of residential properties. Several key questions were central to the review. What factors increase or decrease the rate of driveway run-overs? How should the dwelling, garage and living areas be situated relative to each other? How does population density and intensification affect the rate of driveway run-overs?

Additionally, it was important to gain an understanding of the Hamilton City Council's policies (incorporating the District Plan, bylaws and guidelines) in relation to child safety on driveways. This required consideration of policies on three core elements: urban design, the built environment and transport on adjacent roads. Hamilton City Council policies (and sections of larger documents such as the District Plan) were selected for analysis if their content was relevant to any of our three core elements. We were therefore able to evaluate the consistency of Hamilton City Council policies with the child safety best practice previously established.

We then reviewed the Hamilton City Council's policies to determine whether or not child safety on residential properties – and specifically on driveways – was a priority, or whether other factors such as environmental sustainability more heavily influenced policy design. This required an analysis of the statements and themes of these documents. It was relatively straightforward to identify the influence that child safety had on policy design by noting the regularity – or lack thereof – with which it appeared in the documents, and the degree of emphasis attached to any mention of child safety. Most documents incorporated a fleeting mention of safety, but it had little or no meaningful influence on the policy design. The documents often clearly emphasised the key factors that influenced their policy design and there was remarkable consistency across the various documents.

The second aspect of the research consisted of four semi-structured interviews with expert informants, one in child safety and three in urban planning. The aim was for these experts to provide commentary and insights on the key research questions and how they were – or were not – incorporated in planning, policy and practice. We asked, for example, if Hamilton City Council policies were consistent with child safety best practice or if child safety was a significant priority for the Council. We also canvassed what factors most significantly influence the design

of Hamilton City Council policy and what features of the built environment would have most influence in reducing the incidence of driveway run-overs.

The initial intention was to interview only two individuals. Eventually four interviews were conducted to more comprehensively cover the breadth of the Hamilton City Council's activities in relation to child safety, urban design, the built environment and transport. All our expert informants were happy to be identified and were: Julie Chambers, Starship Hospital Trauma Co-ordinator; and three Hamilton City Council employees: Elizabeth Hallsworth, Bylaws Manager; Robyn Denton, Transport Unit Manager and Luke O'Dwyer, Planning Manager.

The data from the three lines of research (literature review, policy review and interview data) were then drawn together to facilitate the development of recommendations designed to provide enhanced protection for children from accidental run-overs in domestic driveways.

Literature review

Any evaluation of local government policies which influence the risk of children being run-over in driveways requires a prior understanding and appreciation of the factors pertinent to child safety best practice with respect to driveway run-overs, and in this project, this is especially relevant in regard to the built environment. This section therefore presents the findings and insights of the major New Zealand and international publications on this topic, covering six main risk factors. While the literature identifies additional risk factors, these six are demonstrably the most significant and are present across a wide range of different publications. The findings amongst the existing literature are summarised here by means of a range of recommendations which then act as a basis against which local government policies can be compared and contrasted, in section two of this report.

Driveway length

The international literature considers the relationship between driveway length and run-over incidents. Shepherd et al (2010) studied the physical characteristics of 88 properties where a driveway run-over had occurred, and compared these with 181 control properties. They found that the risk of injury increased two fold if the length of a driveway exceeded 12 metres. Similarly, Hsaio et al (2009) found that the typical driveway where a run-over incident occurred extended from the front of the section to a rear parking area or garage, often with multiple points of ingress from front or back lawns and the dwelling. Austin et al (2010) explored how policies

have changed since the 1970s in regards to property layouts, concluding that the objective of increasing affordability and intensification had resulted in the majority of homes being built with long driveways to access a rear, subdivided property, or a rear garage. However, Hunter et al (2009) note that newer properties tend to locate garages at the front of the property, therefore minimising the length of the driveway. This appears to be a result of the trend towards smaller sections and larger dwellings. The literature suggests that longer driveways may result in higher injury rates because motor vehicles reach higher speeds, will often have multiple access points, and because drivers are required to concentrate on reversing the vehicle more intently and for a longer period of time than on scanning for children. Relatively long driveways are most closely associated with the 'lollipop' property layout, where the driveway extends down the length of the property to a garage at the rear of the section.

Separating driveways from the dwelling and play areas

This issue is covered extensively in the literature; almost every paper considers the possible reduction in injury risk due to fencing off the driveway from dwellings and play areas, such as lawns or the back sections of a property. Safekids New Zealand (2011) argues that the fencing off of driveways would reduce the risk of injury by three times, compared to properties without fences. Similarly, Roberts et al (1995) found that a lack of fencing led to a 3.5 times increase in injury risk. This study investigated all driveway-related hospital admissions (fatalities and injuries) in the Auckland region from January 1992 to February 1994; there were 76 in total. However, it should be noted that while Roberts et al (1995) used a definition of a child as those under 15 years old, the data in most of the studies cited in this report are based on children aged 5 years and under. It is this age group that is most likely to be involved in driveway run-overs (Safekids New Zealand, 2011).

Murphy et al (2002) investigated the physical characteristics of 76 child driveway run-over incidents whose victims had been admitted to Auckland Hospital between 1998 and 2001. Not one of the sections on which the accident occurred included fencing to separate any person exiting the house or lawns from a motor vehicle on the driveway.

Finally, Baker et al (2011) and Cowley et al (2005) argue that fencing would, theoretically, significantly reduce the incidence of driveway run-overs. While they present no empirical data to support this assertion, they cite the numerous cases where children suddenly moved from a presumed safe location into the path of a motor vehicle, resulting in a collision. A fence would most often have prevented the child moving into the path of the vehicle and thereby eliminated

risk. This is a notable phenomenon. In Murphy et al's 2002 study, 19 of the 76 drivers reported that they had seen the child in a safe location immediately prior to the incident. This indicates that the child suddenly entered the path of the vehicle from a dwelling or part of the section that, with fencing, could have been physically separated from the driveway. The separate research of Hsaio et al (2009) and Baker et al (2011) supported this point. Hsaio et al (2009) stated that 20% of drivers regularly believed that children were in a safe location immediately prior to the run-over incident. The literature does not consider whether a fence built to separate children from driveways will cause the driver to focus more intensely on the reversing process and therefore further reduce the likelihood of scanning for children. We can expect, however, that this trade-off is compensated for by the significantly lower likelihood of a child accessing the driveway when a vehicle is using it.

The case of swimming pool safety is cited by Holland (2009) as an example of how fencing can be effective. The drowning rate in private swimming pools in New South Wales, Australia, has decreased 50% since fencing became mandatory. Clearly, there is the potential for risk to be significantly reduced when an individual is physically prevented from being exposed to a hazard. No study gave specific consideration to the relative effectiveness of the different types of fencing that could be erected on a property. Fencing options include: the entirety of the driveway be fenced; that child play areas on sections be fenced, and; that the doors of dwellings be fenced with, for example, a half-door.

Shared driveways

Research indicates that shared driveways increase the incidence of driveway run-overs. Shepherd et al (2010) find that shared driveways or additional parking sites on a driveway are associated with a threefold increase in risk. Similarly, Roberts et al's 1995 study of 53 cases and 159 controls concluded that shared driveways create approximately 3.2 times greater risk to children. These findings are reinforced by Hsaio et al's (2009) assessment of the physical characteristics of properties where run-overs had occurred, just over half of which shared a driveway with an additional property, though shared driveways are not currently the predominant environment. As Austin et al (2010) indicated however, the deliberate intensification of housing since the 1970s has resulted in shared driveways becoming commonplace, particularly in lower socio-economic areas where affordability is a key concern of planners.

Shared driveways can increase the incidence of run-overs for two main reasons. Firstly, a greater number of vehicles would use a driveway, and it is fair to assume that a greater number of children would also be present on the driveway as it is associated with, and a focal point for, multiple residences, such as those with battle-axe layouts. Battle-axe properties share a single vehicle access point from the road. The driveway later splits to form two separate vehicle manoeuvring areas, one for each residential section.

Figure 2: Battle-axe lots

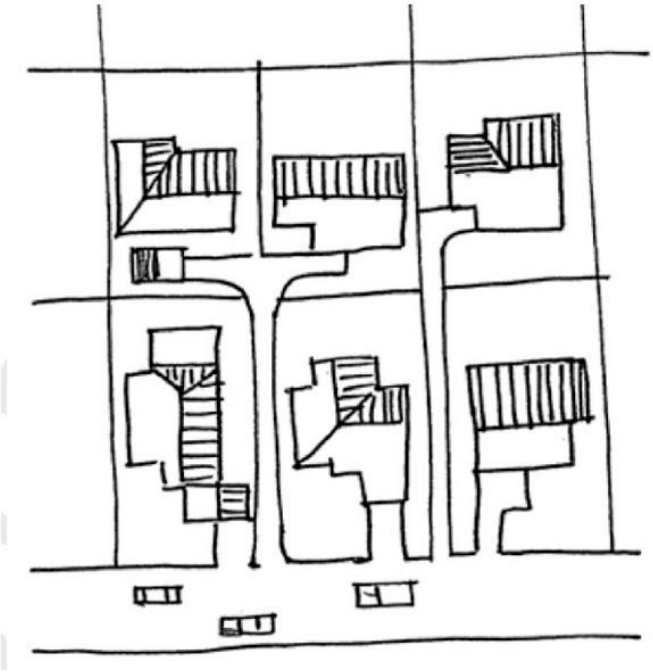

Figure 1: Battle-axe lots[3]

Driveways on property boundaries

The literature briefly notes the increased risk of run-overs attributable to driveways being positioned on the property boundaries. Shepherd et al (2010) find that driveways located on the boundary are associated with a threefold increase in risk, most likely because drivers must concentrate intently on avoiding a property fence and any vegetation. Additionally, some fences and vegetation extend past the property and obscure a driver's view of the footpath. These factors result in children on the driveway or footpath either not being visible at all, or not being seen because the driver is concentrating on other possible obstacles.

Again, Austin et al (2010) cite changes to local and central government regulations that have encouraged the development of driveways on property boundaries. Firstly, many houses in the

[3] Austin et al, 2010, p. 7

post-war period were built and owned via a government mortgage that did not include amenities such as garages, carports and driveways. Therefore houses were not planned and built with consideration of a driveway and its placement on the property; when driveways and garages were later added, often in the 1980s when households had increased disposable income and cars became more affordable, they were attached to the edges of the property.

Secondly, New Zealand central and local authorities, in particular the Auckland regional authorities and the National Housing Commission, were influenced by overseas publications such as the Australian Joint Venture for More Affordable Housing's *Guidelines for Cost-Effective Residential Land Development*. This publication argued for reduced lot sizes to increase housing affordability and for the maximisation of the size of the dwelling (Austin et al, 2010). Consequently, driveways were planned on the property boundaries to minimise the space they used.

Dedicated child play areas

The literature notes that there is a clear correlation between the lack of a dedicated child play area on a property, and the incidence of driveway run-overs. In 64% of the 93 cases studied by Hsaio et al (2009), the driveway was the regular primary area of play and activity for the child. Additionally, Cowley et al (2005) and Baker et al (2011) note that in the absence of sufficient lawns for children to play on, the driveway, carport or vehicle turning area would become their primary area of play. We also note that areas constructed for vehicles offer a preferred surface for (usually older) children using wheeled toys such as bikes, scooters and skateboards. The influence of indeterminate play areas is supported by data showing that summer months are over-represented for injuries, and that accidents peaked in the late afternoon to early evening period. Children are most active in the summer months, and in the afternoon. The analysis of Murphy et al (2002) indicates that of the 76 cases studied, 39% occurred during summer, and 47% occurred between 4pm and 7pm. Conversely, spring months were under-represented, with only 10% of the incidents occurring in this season.

The decreasing rate of play areas on properties is explored in some depth by Austin et al (2010); they argue that since the 1970s, local authorities have actively encouraged the intensification of land with the objective of improving housing affordability, resulting in smaller sections and therefore smaller and fewer play areas for children. This has occurred most notably in low socio-economic areas, which provides some insight into the over-representation of Maori and Pasifika in the data. It is also noted that more recent residential developments,

such as terraced housing blocks, do not normally incorporate child play areas into their designs, nor are they required to by local authorities or central government. Urban intensification has resulted in a decrease in dedicated play areas. Roads and vehicle access areas become the default play areas, increasing the risk factor to children. There is little indication that local authorities thoroughly consider this issue from a child safety perspective when setting minimum standards for property development.

Secondly, the lines of child supervision and accountability may become blurred when multiple households use the same driveway. Active supervision is less possible when a driveway is shared because there is decreased awareness about when the vehicles of other households will be using the driveway. Additionally, Sullivan (2012) demonstrates that individuals possess surprisingly poor ocular accuracy, particularly in situations where objects are in motion and the individual has little time to scan. Put simply, humans are physically incapable of processing visual data at sufficient speed to encompass every detail of a given environment and we see only specific sections or points of a vista. Our brains 'fill the gaps" with what seems logical or expected. Clearly, children will not be expected on a driveway that has already scanned as empty, or where the child is not filling one of the specific points of vision. Add to this the increased driving focus of a driver who is reversing and the likelihood of seeing a child is significantly restricted. Furthermore, Sullivan notes that individuals may experience an optical illusion when scanning a vista, because moving objects – for example a child running onto a driveway while a vehicle is reversing – will not necessarily move relative to each other's sightlines. This results in neither party being alerted to the presence of the other.

The types of roads connected to driveways

Finally, the literature gives some consideration to the relationship between the type of road that a driveway exits onto, and the rate of driveway run-over incidents. Shepherd et al (2010) find that exiting onto smaller, local roads, such as suburban streets or cul-de-sacs, is associated with a fivefold increase in run-over risk compared to exiting onto busier, arterial roads. The authors state that this may be primarily due to drivers being overconfident or complacent when using driveways on local roads; drivers concentrate more when exiting onto busier roads because they aware of a greater number of hazards. Furthermore, greater numbers of children are more likely to congregate on quieter suburban roads than busier roads, thereby increasing the possibility of a collision. No other paper explores this issue so the data in this study are not yet supported, though it would seem worthy of further investigation.

Existing recommendations for the design of the residential built environment

The conclusions drawn in the academic literature are remarkably consistent across a wide range of studies and locations. These conclusions incorporate the property layout and built environment as key features of an ideal, best case scenario that would maximise child safety.

Firstly, the literature suggests that local governments should legislate (via the District Plan) to decrease driveways in new developments to less than 12 metres in length. Such a strategy would require an embargo on new developments of so-called 'lollipop' and 'battle-axe' properties, and result in a decrease in the population density. Such a suggestion is relatively impractical given the current emphasis on urban intensification and high density living. Further consideration of child safety is required in the planning of high density development, however.

A second recommendation evident in the literature is that local governments should legislate – via the District Plan and in partnership with relevant agencies – to ensure the separation of driveways from the dwelling and play areas. Since 2011, Housing New Zealand has invested $3-4 million annually in residential injury prevention, with approximately half a million dollars allocated to fencing driveways across their sizeable housing stock. The literature is unclear on what form this separation should take – for example, a fence along the length of the driveway or a half-fence on a dwelling door –, nor on how affordable this measure would be. It has been suggested that a subsidy or rates rebate should be considered. Additionally, the literature noted that it may not be practical for some existing properties to introduce a separation measure – should any legislation include these requirements – due to spatial constraints. Despite the inconclusive nature of the literature, it is clear that the general thrust of the recommendations is that local governments should actively research the feasibility of introducing a separation measure into, at least, future residential developments and existing properties where it is practicable.

Thirdly, local governments should ensure that future residential developments are designed to cater adequately for the play needs of children. This would require relatively sizeable, dedicated play areas immediately adjacent to dwellings and separated from vehicle access areas. This stipulation however, is likely to present significant problems for the development of townhouses and terraced housing in middle to high density urban areas.

Fourthly, local governments should legislate via the District Plan to ensure that future residential developments do not feature shared driveways or multiple parking spaces on driveways unless

they are adequately fenced. Ideally, driveways should service only one residential dwelling. This suggests the (unlikely) phasing out of so-called 'battle-axe' property layouts which are a legacy of previous regimes promoting the quarter acre paradise. Additionally, there would be complications if applied to townhouses which utilise one vehicle access area running down the length of the property. The shared driveway on a townhouse complex could perhaps be compensated for by implementing a range of different child safety measures, such as physically separating the vehicle access from dwellings.

Fifthly, local governments should legislate – in partnership with Housing New Zealand and other relevant agencies – to ensure that future residential developments do not place unfenced driveways on property boundaries. Additionally, there should be careful consideration about any requirements or guidelines relating to the height and placing of fences, and acceptable levels of vegetation, adjacent to existing driveways which run along the property boundary, as these risk factors invariably create distractions and blind spots for both drivers and pedestrians.

Finally, local government regulations, together with relevant traffic and transport guidelines, policies and bylaws should ensure that vehicles exit onto roads at as slow a speed as practical. This may require warning signs on driveways, the continued implementation of 30 or 40 kilometres per hour speed areas in urban areas, and a general progressing in the development of a child safety culture and its implementation as a high level policy objective.

Child safety and Hamilton City Council policies

This section outlines Hamilton City Council's current and proposed policies relating to the two key aspects of the built environment that affect child safety in and around driveways: policies governing the construction and layout of residential properties and policies affecting the roading networks within which residential properties are constructed. This (theoretically) allows for a comparison of the City Council's driveway safety policies with the best practice recommendations identified in section one. It is fair to say that Council policies are notable for the absence of specific mention of driveway safety in general and child safety in particular, though there is a fleeting mention of pedestrian safety. While failure to *mention* such safety considerations will not automatically produce policies and guidelines that fail to facilitate child safety best practice, this review finds that very few of the best practice recommendations are met.

The documents reviewed are the 'Operative District Plan', the 'Proposed District Plan' (prior to submissions and hearings), the 'Access Hamilton' strategy (including the Transport Safety Action Plan), the '2012-22 10 Year Plan' the 'Urban Growth' Strategy, 'Vista', 'CityScope' and the Ministry of the Environment's 'Urban Design Protocol'. These documents were selected because they indicate Hamilton City Council's urban development policies and intentions, along with the required guidelines for new or renovated properties. The most relevant for this part of the research project is the District Plan, which came into operation in July 2012. The District Plan is the key document because it is the only Hamilton City Council document that is legally enforceable on private property. The various other documents mentioned above feed into and influence their relevant sections of the District Plan.

We can confidently state that the expert literature – outlined in section one – finds that there are a range of built environment measures that are highly likely to individually or collectively reduce incidence of driveway run-overs, regardless of any specific attribution issues that may exist. In other words, we know that certain measures, such as reducing driveway length, will decrease the risk of driveway run-over incidents, even if we are unable to specify exactly why it has this effect. For example, it may be attributed to increased vehicle speed, a longer period of concentration by the driver, more opportunity for child access, or greater appeal as a play area – or all of the above. Whatever the direct cause, we know that policies to limit the length of driveways will have positive effects on child safety. We therefore need to know how Hamilton City Council governs the length, placement and construction of driveways.

Operative District Plan

The Operative District Plan (the Plan) became operative on 28 July 2012. The Plan outlines specific rules relating to the residential built environment and adjacent roading network. Property owners and developers must adhere to these rules when building new dwellings or renovating existing sections and dwellings. Please note that the minimum standards for aspects of properties, such as outdoor living areas, differ according to the Zone in which the property is situated. This research primarily considers the standards of Residential Zones and High Density Areas. These differences are minor, and inconsequential to the findings of this research. We do not wish to complicate the research by considering all minor variations.

The Plan outlines the minimum section size of a residential property site. In areas zoned 'residential', the minimum site must be no smaller than 400m². By contrast, the minimum

property size in a designated High Density Residential Area is 350m². The average property size for new developments is regularly not significantly larger than these minimum amounts. This is a marked departure from property sizes of previous decades, which were on average 600-800m² (Hamilton Urban Growth Strategy, 2008). The Plan specifies that a maximum of 40% of a property in a residential zone can be covered by a dwelling. Up to 50% of a property in a high density residential zone can be covered by a dwelling. Both therefore appear to allow sufficient space for outdoor living, including a play area.

Secondly, the Plan outlines the minimum standards of the physical location of buildings on a property site. Any dwelling or building, irrespective of their zoning, must be set back at least three metres from a local road, and set back at least five metres if the property is immediately adjacent to an arterial road. If the garage door faces the street, garages and carports must be set back a minimum of eight metres from the road-facing property boundary if the section is immediately adjacent to an arterial road, but can be set adjacent to the berm if the property is on a local road. While there are some variations applied to specific parts of the city – those with 'special character', for example – the Plan has a general requirement that garages and other accessory buildings should be located to minimise their visual prominence in relation to the main dwelling when viewed from a public space (Rule 4.1A.5 [a, xi]).

The size of outdoor living areas on a property is also specified. Each residential unit is provided with an outdoor living area for their exclusive use, and it must be free from driveways and manoeuvring vehicles. In a residential zone, the dimensions must be a minimum of 60m² and be able to contain a circle with a diameter of at least six metres. This provision ensures that the outdoor living area has an acceptable length and width for recreational activities. In High Density Areas the dimensions must be a minimum of 40m² and be able to contain a circle with a minimum diameter of six metres. Apartment buildings in a residential zone require an area of 12m² per unit, which are able to contain a circle with a diameter of at least two and a half metres. It should be noted that balconies may be designed to meet these requirements. Consideration must then be given to the suitability of a balcony for a child's outdoor living needs; this may result in children playing on roads and vehicle access areas on the apartment complex because of a lack of alternative.

Townhouses in residential zones with four or more units are required to provide a communal outdoor living area for the exclusive use of all residents. This area must have a minimum dimension (ie length or width) of four metres, and be able to contain a circle with a diameter of

at least eight metres. Additional to these requirements, the communal area of a townhouse with four to ten units must have an area of no less than 60m² per unit; eleven to twenty units requires a communal area of no less than 40m² per unit, and; a complex with twenty-one units or more requires a communal area of no less than 25m² per unit. Townhouses in High Density Areas must provide a communal area of at least 12m² per unit, regardless of the number of units.

The Plan also specifies the minimum size of service areas on properties, which includes driveways and manoeuvring areas but not parking areas. A detached dwelling must have a minimum service area of 20m², with a minimum dimension of three metres. Apartments must have a minimum service area of 10m², with a minimum dimension of two and a half metres. Additionally, the Plan outlines the parking, loading and access requirements of properties. Two car parks are required per detached residential dwelling in all zones, with the exception of the central city and Recreation Environment Zones. Detached dwellings in residential zones must have a driveway crossing (from the road to the private section, crossing the footpath) with a minimum width of three metres and a maximum width of five and a half metres. Residential apartments or townhouses with one to four units require vehicle accesses to be a minimum of 2.8 metres wide; five and a half metres wide for five to ten units, and; six metres wide for more than ten units.

Roading also features in specifications for minimum sight distances and minimum vehicle access distances from intersections. On local roads with a 40kmh or 50kmh speed limit, the minimum sight distances are 30m and 40m respectively. The minimum sight distances on arterial roads for 40kmh and 50kmh are 70m and 90m respectively, though it should be noted that the Hamilton City Council has largely ensured that new, primary transport corridors – such as the Wairere Drive extension – do not have direct access to residential areas. The new developments should reduce the traffic volume passing through several main existing transport corridors, such as Peachgrove Road and Ohaupo Road. These roads are highly residential in parts. The minimum vehicle access distance from intersections for local roads where the intersecting road is a major arterial, minor arterial or local road is forty metres, twenty five metres and ten metres respectively

Finally, the Plan provides urban design guidelines to promote the, “enhancement and protection of distinctive areas within the City” (p. 955). This is a summation of the CityScope urban design guidelines. These consider the design of dwellings, property layouts and roading networks within subdivisions, residential areas, parking areas and open residential spaces. While

sometimes vague, the guidelines state that suburbs should be designed to be connected and easily permeable. For example, a suburb should not include an excessive number of cul-de-sacs and one-way streets because this reduces the ability for traffic to pass through. The Plan encourages design which considers the needs of multiple modes of transport – including cycling and pedestrian traffic – and which facilitates their safety.

There is an emphasis on developing residential properties in accordance with the character and design of the existing suburb, if applicable. This particularly applies to the layout of the property, the setback from the road and the placement of the driveway and garage. High fences are not encouraged, on the grounds that openness facilitates crime prevention. The guidelines state that situating parking areas or garages at the rear of properties can utilise awkward or un-used spaces, as demonstrated in Figure 2 below. In particular, garages should be set back from the façade and be designed to not dominate the streetscape, "as they create bland, uninviting frontages with poor opportunities for surveillance and reduced pedestrian safety" (p. 968). This statement appears to contradict the zero metres setback provision for garages in the District Plan, though we note that it applies only in certain zones and reflects the Council's wish not to be, in its view, overly restrictive.

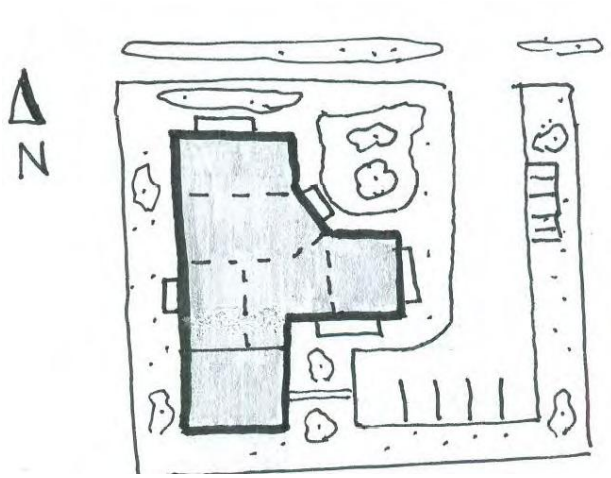

Figure 2: HCC's example of good placement of parking area.[4]

Open living spaces on multi-unit properties are required to be communal, accessible and useable, as outlined in Figure 3 below. A minimum of 60% of the area should be situated at

[4] "A good example of site layout and landscaping .There is soft landscaping facing the street, and the façade is set back from the road. Parking is at the rear of the property" (HCC, 2013, p.965).

ground level; for instance a deck could utilise up to 40% of a properties' outdoor living space. There is no requirement about the minimum covering of grass on an open outdoor living area.

Figure 3: HCC's example of good open spaces for multi-unit properties.[5]

It should be noted that *CityScope* has since been updated; *Vista* (2007) is the operative Hamilton City Council document for urban design guidelines. Vista has no meaningful differences with *CityScope* in relation to child safety. Tellingly, *Vista* intends to highlight, "key urban design principles considered fundamental to Hamilton's development as a dynamic, prosperous, memorable and sustainable city" (p. 4).

Urban Design Protocol

The Ministry of the Environment's *Urban Design Protocol* aims to facilitate sound urban design to meet population growth and the changing living, working and housing needs of future generations. It has six key, stated principles:

- context, where properties and suburbs are designed with consideration of the wider urban area and city;
- character, where the unique amenity of areas is identified and promoted;
- choice, where the wide range of housing needs is provided for;
- creativity, where the character and amenity of an area is enhanced;
- custodianship, where the environment is protected and sustained for future generations, and;
- collaboration, where planning, skills and experiences are shared.

[5] 'Communal space should be useable, accessible at ground level and overlooked by residents' (HCC, 2013, p.973)

Hamilton City Council is a signatory to the *Protocol*. This is reflected by strong consistency of the design guidelines (outlined above under the *Operative District Plan*) with the *Protocol*.

Ten Year Plan

The *Ten Year Plan* (Hamilton City Council, 2012b) outlines the Council's vision for Hamilton's development. Council spends $11 in every $1000 on city safety initiatives (1%). These services are provided, "to contribute to a safe community by minimising risks to public health and working with others to help keep our city safe" (p. 42). The services focus on dog registration and ensuring building compliance. No specific figures are provided the level of spending on each service provided. The Council aims to invest $9.6 million over the next ten years on cycling, walking and public transport initiatives, though, again, there is no mention as to where these funds will be specifically allocated.

The Council's transportation strategy aims to, "provide and manage a safe and efficient transport network for Hamilton which integrates freight, private vehicles, buses, walking and cycling" (p. 67). A specific measure is the number of injury crashes per 10,000 residents annually in Hamilton relative to other main urban centres. Hamilton is currently equal with the national average of 23 per 10,000 residents per year, and aims to maintain parity or have fewer injury crashes than other main urban centres. However, there is no meaningful consideration of the implications of the roading network on child safety. For instance, the Plan does not outline particular urban area initiatives to improve safety, such as an increase in the number of roundabouts, traffic islands, speed bumps or lower speed areas.

Access Hamilton

The *Access Hamilton* (Hamilton City Council, 2010a) document outlines the city's transport strategy. The objectives statement affirms that, "safety is a key consideration in all our decisions" (p. 2). Furthermore, it acknowledges the importance of built environment interventions – specifically based around traffic calming – to create safe communities. The document is silent, however, on the specific quantity and quality of interventions needed to improve safety, and on the priority that these interventions should be given relative to other Council responsibilities which are competing for funding. The document states its core objective is the convenience of individuals and families (particularly for using different modes of transport). Children and child safety are not meaningfully referred to in any part, however.

Key policy drivers

This section identifies the most significant influences on Hamilton City Council policies related to child safety on driveways. It therefore allows us explore the Hamilton City Council's priorities. In brief, the most significant influences are financial consolidation, environmental sustainability, land rationing and infrastructure capacity. Child safety on residential properties is noted fleetingly, but never in a meaningful capacity. Indeed, the concept of safety itself is used only irregularly and vaguely throughout the documents.

The Operative District Plan

The *Operative District Plan* (Hamilton City Council, 2012a) is a legally binding document which local authorities are required by law to develop to give effect to the Resource Management Act 1991 (the Act) at a local level. It therefore incorporates the objectives of the Act, with a primary emphasis on sustainable resource use and integrated management. The priority given to these two factors is indicated by the introduction section of the District Plan.

The document quotes from the Act, specifying sustainable development as:

> *…managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while-*
> *(a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
> *(b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
> *(c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment"* (p. 13)

The second key principle, integrated management, requires considering communities as a singular unit, and therefore making micro-level decisions that are consistent with the macro-level wellbeing of the whole.

While the Act does require the District Plan to manage resources in such a way as to facilitate a community's health and safety, no further specification or definition is provided in the Act, nor is any additional emphasis given beyond 'community safety'. In this respect, individual safety in general and child safety *per se* is not a high level objective in the Act. Indeed, other factors such as economic development and the protection of heritage sites are defined and emphasised to a much greater extent than safety in the Act.

Furthermore, the Act states that the District Plan should give particular regard to certain issues, such as the ethic of stewardship of resources, the effects of climate change, the maintenance and enhancement of amenity values and the finite characteristics of natural and physical resources. Ultimately, it is clear that the District Plan incorporates the Resource Management Act's key focuses on environmental sustainability and economic development. The District Plan establishes the Hamilton City Council's other key objectives in the introduction. These are additional to the objectives specified in the Resource Management Act, which the Council is required by law to implement.

Within the Plan, there is a particular awareness of Hamilton City's limited land resources. Hamilton's urban growth rate, given existing property sizes, is not sufficient to meet the projected population increase. Furthermore, the Plan notes that urban growth also has the potential to degrade landscape values and natural features. There is therefore a significant emphasis on land rationing and carefully managing land use. This has resulted in increased intensification, a higher rate of infill development and smaller property sizes. Individual sections of the District Plan include the underlying rationales in support of the various policy settings. Of most relevance to this research are the sections relating to child safety on residential properties, the built environment and transport.

Section 3.5 on *Urban Trees* places some emphasis on maintaining and developing Hamilton as a green city. The removal of trees, it argues, detracts from an area's heritage, special character and amenity values. The Council believes that a green image is important to Hamiltonians. The Plan therefore seeks to protect trees and encourage their planting, especially on larger developments. This policy may be inconsistent with child safety, as the academic literature review established that trees and vegetation can create distractions for drivers and diminish sight lines. However, if managed with safety as a key consideration, tree planting and maintenance can undoubtedly contribute to improved residential amenities.

Section 4.1 on *Future Urban Areas* sets out guidelines for the development of the Rototuna, Rotokauri and Peacocke areas. The Council aims for these developments to be economic and sustainable, but, in particular, intends to protect the amenity standards of established communities in these areas by ensuring that existing rural activities, such as cycling and trekking, are viable post-development. Good urban design is stated to be very important to maintaining a balance between development of these areas and retaining existing amenity standards. While there is no elaboration on what constitutes good urban design, it can be fairly

assumed that this would be consistent with the guidelines in the Hamilton City Council's *CityScop*e and *Vista* documents.

The section on *Transport and Accessibility* (4.2) notes that residential amenity values – primarily relatively quiet and tranquil neighbourhoods – are a priority for Council. High speeds in heavily urban areas has reduced the amenity value for residents, resulting in Council implementing a number of "Lower Speed Areas" of 40kph, most notably in the Dinsdale area and around schools. These speed limits may decrease to 30kph in time. The stated rationale for the speed limit decrease in residential areas is primarily an attempt to decrease noise levels in the neighbourhood, and is not motivated by a desire to improve safety. The decrease in the speed limit outside schools, however, was implemented to improve student safety.

Section 4.2.2 on *Vehicle Access* states that high-traffic corridors should be separated from residential areas to facilitate pedestrian safety. This is surprising given the strongly residential character of several high-traffic corridors in Hamilton, such as Peachgrove Road. It should be noted, however, that Councils inherit past planning and development decisions and Peachgrove Road is a prime example of this. More recent high-traffic roading developments, such as the Wairere Drive extension, do not pass through residential areas, nor do they have direct vehicle access from residential sections. Section 4.2.2 also notes that the built environment of the roading network can have a significant impact on traffic behaviour and pedestrian safety such that "on local roads, road design and traffic management measures can improve the efficiency and effectiveness of the road system" (p. 78).

Subdivision and the Development of Land is covered in Section 4.4, which states that subdivisions may have economic and environmental implications, and can compromise cultural and natural features. Furthermore, the Council wishes subdivision to occur in such a way as to accommodate a wide range of activities, promote amenity values – such as consistency with the surrounding area and maintenance of a suburb's special character – and maintains opportunities for future utilisation of the land. While these statements are relatively broad and sometimes ambiguous, they reflect Hamilton City council's desire to avoid being too prescriptive and/or restrictive. They are also significant in so much as there is a deafening silence in regard to child safety. There is very little mention of safety in broad terms, and no mention of child safety in any form. It is therefore fair to conclude that it is not a meaningful element in the design of the Council's subdivision policy.

Section 5.1 on *Residential Areas* outlines the Council's responsibility to provide a range of housing to meet the range of demands in the housing market. Declining household sizes are creating a demand for smaller homes, and there is greater demand for low-maintenance properties. Flexibility in building types and housing density is therefore encouraged. These are provided as part of the rationale for increased intensification, either in the form of in-fill or greenfield developments, though the Council states that it will attempt to protect residential amenity values. Any development is required to conform to the existing character of an area, its housing needs, environment and heritage values, and be able to integrate with the City's existing infrastructure capacity. For example, new developments in Hamilton East must adhere to the existing streetscape in regard to the setback from the road and the height of the buildings. Properties built prior to 1939 will be retained to support heritage in the City. Sites of environmental and cultural significance will also be preserved and retained.

Environmental issues are also a priority for the Hamilton City Council in the planning of residential areas. The Plan advocates for the retention of significant vegetation and trees in residential areas to support existing habitats and prevent a disruption to local ecosystems. Crime prevention also influences the policy design, as the Plan discourages the erection of high fences to improve neighbourhood surveillance. Transport convenience is a further priority for the Council as it is given clear emphasis in the District Plan. Suburbs close to tertiary education, the central city and suburban commercial areas should increase in housing density to encourage walking, cycling and public transport use, and decrease traffic flows and its accompanying pollution.

Section 7.1 on *Built Heritage* prioritises heritage for the Council. A substantial number of heritage sites have been lost in recent developments in Hamilton, it argues, and more are at risk. Heritage is important because it contributes to a sense of place, provides links to the past, improves business image and facilitates tourism. We can therefore determine that the Council is unlikely to allow these heritage sites to be redeveloped and become more compliant with child safety best practice. For example, the location and length of a driveway has a statistically significant impact on child safety, but these built environment aspects are difficult to alter on a heritage site.

Design Guidelines (Section 10.1) aims to promote the, "enhancement and protection of distinctive areas within the City" (p. 955). Aesthetic appeal and neighbourhood consistency are key urban design priorities for the Council, as properties are required to conform to the existing

streetscape and incorporate soft planting and landscaping. In particular, garages should be set back from the façade and not dominate the landscape, “as they create bland, uninviting frontages with poor opportunities for surveillance and reduced pedestrian safety” (p. 968).

Thus again, crime prevention features in the Council’s urban design policy, along with a perceived higher risk of harm to passing pedestrians, though the literature indicates that this is not likely. Furthermore, the encouragement to conform to the existing character of an area diminishes the likelihood that new developments will conform to child safety best practice. For example, a new development in a suburb with long driveways and garages at the rear will be required to conform to this relatively unsafe design. The guidelines do encourage a degree of diversity, but it is unlikely that this would extend to any significant deviation in the property layout.

The efficient utilisation of space on a property appears to take precedence over child safety. The guidelines note that it can be beneficial to situate parking areas or garages to occupy awkward spaces that may otherwise be left under-utilised. Finally, outdoor living areas on properties are required to be communal, accessible and useable. This effectively encourages easy access between the dwelling, outdoor living area and vehicle access areas, and discourages any separation between the outdoor living area and vehicle access areas to facilitate child safety.

The Urban Design Protocol

The Ministry of the Environment’s 2005 *Urban Design Protocol* provides seven key priorities which influence its design guidelines. These are: context, character, choice, connections, creativity, custodianship and collaboration. The design guidelines therefore emphasise environmental sustainability, heritage, and intensification for transport convenience. Additionally, the Protocol states that it is influenced by Safer Communities Action Plan to Reduce Community Violence and Sexual Violence. Thus crime prevention urban design measures are also present in the Protocol. The Protocol influenced the Council’s development of the District Plan and urban design *CityScope* and *Vista* documents. The Hamilton City Council and Environment Waikato are both voluntary signatories to the intentions and objectives of the *Urban Design Protocol*. Like other documents under review here, the *Protocol* does not refer specifically to safety, child safety, safety on residential properties, or driveway safety in any form. While this may be a function of setting policy at the macro level, and a reminder of the complex terrain that

such documents must encompass, we question the prioritising of *character* and *choice,* for example, over the safety of the city's most vulnerable inhabitants.

CityScope and Vista

CityScope (Hamilton City Council, 2005) and *Vista* (Hamilton City Council, 2007) are also influenced by the *Urban Design Protocol*. *CityScope* has five key principles: people, place, process, promotion and projects. These are again broad and ill-defined principles, though 'people' offers some hope that child safety might be explicitly addressed. It is not. "Vista" has clearer objectives in the form of six design elements: design quality, sense of place, access, public space, lifestyle and sustainable environments. Additionally, it states that Hamilton's, "goal is to build a city that is renowned internationally for its unique design, stunning architecture, exciting public spaces and all around functionality" (p. 14). Design expectations include that a property is consistent with its surroundings, and inspires or causes delight to those who view and engage with it. There is a fleeting mention of the need to design the built environment of the roading network to create traffic calming and therefore facilitate pedestrian safety, but no consideration is given to child safety on residential properties.

The 10-Year Plan (2012-22)

The *10-Year Plan* (Hamilton City Council, 2012b) is the key document stating the Council's plans for the city's development, and the accompanying rationale. Fiscal conservatism and "living within our means" are the main objectives of the *10 Year Plan*. Nearly all of the Council's units have had their budgets decreased, or are being asked to find efficiencies. Each section of the Plan has a detailed breakdown of how expenses are set to be reduced. Notably, the specific measures the Council established to monitor their performance incorporate no consideration of child safety. For instance, the Council's measure for the performance of their public safety unit is based on the percentage of dog complaints responded to within a certain time period, and maintaining their Building Consent Authority accreditation!

Hamilton Urban Growth Strategy

The *Urban Growth Strategy* (Hamilton City Council, 2010c) details how the Council intends to develop Hamilton. The Strategy's tagline is, "a compact and sustainable city", clearly emphasising the priority attached to intensification, housing affordability, land rationing and environmental factors. The Council's development strategy is, for the most part, based around

Structure Plans for the Rototuna, Rotokauri and Peacocke areas; these are currently predominantly rural areas within the City's boundaries that can be developed. Infill development will complement these greenfield developments.

The stated rationale for the Strategy's emphasis on intensification and environmental protection is the City's limited supply of land. It is argued that property sizes are too large at 600-800m² per section, and must decrease to approximately 400-600m² per section. Relatively large property sizes increase the cost of housing and decrease its affordability. Additionally, given the present property size and limited land capacity Hamilton has, the City will be unable to develop to accommodate the expected 85,000 new residents and 36,000 new houses by 2041. Additionally, there is an emphasis on protecting the environment as, "more compact living will allow us to proactively limit sprawl and manage our city's urban footprint" (p. 8).

Access Hamilton

Access Hamilton (Hamilton City Council, 2010c) outlines the City's transport strategy. The document strongly acknowledges the importance of the built environment in traffic calming to provide liveable, safe communities. Additionally, it states that, "safety is a key consideration in all our decisions as transport partners" (p. 2). The Strategy therefore places some emphasis on safety, but does not specify what this entails. Indeed, child safety in residential areas or on residential properties is not referenced in the document suggesting that once again, it is not a priority.

Expert informant interviews

Julie Chambers, Starship Hospital Trauma Co-ordinator

In Julie's experience with child safety literature, academic journals on architecture and building are significantly silent on the issue of child safety on residential properties. The vast majority of the research and literature on the causes of driveway run-overs originates from medical academics, many of whom were motivated to conduct the research because they had regularly seen the results of such incidents first-hand.

Academic research on child safety was not, however, consistent across different countries. The location of researchers writing about driveway run-overs indicated that the issue was more

severe in some nations, or cities, than others. For instance, very little research originated from Britain or Continental Europe, implying that driveway run-overs are infrequent in these locations. There is a much more substantial body of literature from New Zealand, Australia and some areas of the United States.

Julie believes that these geographical inconsistencies are a result of differences in lifestyles and the built environment of properties. Some nations, such as Britain or Singapore, have more intensive housing developments and motor vehicles are less dominant than in New Zealand, for instance. Indeed, New Zealanders expect to own motor vehicles (usually 2 per household), and further expect that their cities will actively facilitate motor vehicle use and convenience.

Julie re-emphasised the findings of her 2010 research with Michael Shepherd and Dr Trish Austin. The main risk factors are: driveway length; the type of road that a vehicle exits onto; the positioning of the driveway on a property boundary, and; the erection of some form of fencing or separation between vehicle access areas and the dwelling. She does note, however, that the literature is inconclusive on the effectiveness of fencing.

We note that implementing the recommendations from the existing research presents a number of practical problems. The design of existing urban areas is relatively fixed, and Council's face significant issues regarding demographic pressures and spatial constraints. These factors make some recommendations impractical, either due to land supply issues, unaffordability or the lack of buy-in from individuals.

Julie therefore believes that recommendations should operate within the existing constraints to make areas as safe as possible. For instance, mirrors and warnings could be erected on driveways and in local streets to provide drivers with as many warnings as possible to slow down. She believes that vehicle speed may perhaps be the most important factor in the rate of driveway run-overs. Furthermore, child safety should be incorporated as a high-level objective in policy design to ensure that policies are more consistent with best practice initiatives.

Finally, Julie stated that she has not sufficiently engaged with the Hamilton City Council to have an informed opinion about their attitude towards child safety, nor does she have a perspective on whether it is a significant priority. She was, however, unimpressed with a report by Jason Wright – a Hamilton City Council engineer – which implied that policy should be designed with an acceptable tolerance of child deaths in mind; this figure was arbitrary and miscalculated,

Julie believes. There is no reason to believe that this report is consistent with the Hamilton City Council's official position on policy design, however.

Luke O'Dwyer, Planning Manager, Hamilton City Council

Luke stated that the District Plan is primarily influenced by the need to meet the requirements of the Resource Management Act 1991. Its priorities are therefore closely aligned with those of the RMA. Environmental sustainability and responsible resource use are the main priorities.

The Council's own key objectives in the District Plan reflect the Hamilton's circumstances. Urban areas will be developed to meet the projected demographic trends given the limited land supply. Intensification – in existing areas and in future developments – is therefore required. Intensification is not occurring to alleviate pressure on rising house prices, as is the case in Auckland. Reflecting on the level of priority given to child safety by the Council, Luke stated that, "child safety is a factor, but not the most important factor. That may disappoint some people." Luke accepted that Council can make a contribution to child safety, but that, "parents are responsible for child safety… there is always an element of personal responsibility."

Council does not seek to implement strict standards for properties because it does not wish to be overly restrictive on developers. In his opinion, stricter standards would increase compliance costs and probably be an inconvenience to many seeking building consents. He believes that many Hamiltonians would prefer the status quo to more overtly stringent standards.

The Resource Management Act sets out a process that property developers can follow if they are in breach of the District Plan's minimum standards; planners are able to grant building consent after balancing the merits of the development. That is, it evaluates whether its benefits outweigh the cost of the developer's inability to meet certain minimum standards.

Luke was asked to comment on the properties in Figures 4 and 5 (below) regarding the compliance of the circled properties with the Operative District Plan's specified minimum standards for outdoor living areas. The properties are townhouse developments on Peachgrove Road and Knighton Road, Hamilton.

Luke stated that, while the properties may not be compliant with the Operative District Plan regarding the size of their outdoor living areas, "the fact they have already been approved indicates that, on balance, they were projects that complied with Council's planning provisions and the RMA [Resource Management Act]."

Figure 4: Townhouses on Peachgrove Road, Hamilton[6]

Half of the Hamilton City Council's Planning Unit are accredited with the New Zealand Planning Institute. This indicates that there is a relatively high level of quality planners at Council. Accredited planners are required to remain current with relevant academic planning literature; it does not necessarily follow that they will remain up-to-date with child safety literature.

Figure 5: Townhouses on Knighton Road, Hamilton[7]

[6] Google maps

Finally, Luke stated that he was relatively content that the Council's existing policies on child safety on driveways were consistent with best practice initiatives. In particular, he claimed that Council staff had thoroughly considered the academic literature when replying to Safekids New Zealand's submission to the Council's District Plan.

Robyn Denton, Transport Unit Manager, Hamilton City Council

Robyn stated that, in her experience, the Hamilton City Council places considerable emphasis on vehicle and pedestrian safety on the roading network it is responsible for, relative to other local authorities. The Council is an active participant in, and contributor to, regional and national transport safety groups, and in the development of national policy.

She appreciated the ability for the built environment to make a difference to child safety; it is the primary reason that the Council has, more recently, placed a further emphasis on improving the built environment's safety features in many urban areas. Robyn stated that this policy has resulted in considerably more roundabouts, traffic splitters and pedestrian islands in urban areas to facilitate traffic calming and improve the separation between vehicles and pedestrians. Robyn agreed with Julie that drivers require messages and signals – often via the roading design – to remind them to travel slowly and consider the safety of others using different modes of transport.

The Hamilton City Council runs child safety campaigns. The campaigns are mainly focused on safely walking to school, and has less emphasis on safety on residential properties. Finally, Robyn believes that the most effective child safety initiatives for residential properties and driveways would address built environment factors, vehicle design issues and incorporate public safety campaigns. "I believe that a multi-prong approach is the most effective – we need people to understand why they should try and get a car with a reversing camera, or walk a little bit further to use a pedestrian island. Education of the general public, and decision makers is really important, as they in turn create the demand for change… or make the change with their own personal choices." She does note that Hamilton City Council is a 'technology taker' and therefore in no position to determine which type of vehicle technology is used on the Hamilton roading network.

[7] Google maps

Elizabeth Hallsworth; Bylaws Manager, Hamilton City Council

Elizabeth primarily provided information about the extent and limits of the Hamilton City Council's influences. In summary, the District Plan is the only Hamilton City Council-produced document which is legally enforceable on private property. Council bylaws are legally enforceable in public areas within the Council's jurisdiction, i.e. within Hamilton City's boundaries. Conversely, Council policies are not legally enforceable and are primarily best practice guidelines, for instance a policy regarding personal safety in central Hamilton. Please note that this research has used the term 'policy' more broadly than the Council would; in our research the term 'policy' includes the District Plan and bylaws.

Elizabeth stated that the Lower Speed Areas initiative – where the speed limit has been reduced to 40kph in urban areas – is mainly a response to noise and amenity issues, and was not motivated by safety concerns. The Lower Speed Areas initiaitive around schools, however, was implemented to improve child safety. Elizabeth reflected on Council's recent experiences with Lower Speed Areas, particularly regarding the speed limit decrease in the suburb of Dinsdale. She stated that this demonstrates that Council operates within a democratic framework. While Council staff will provide objective, technical advice, it is the responsibility of Councillors to balance the competing interests.

Conclusion

This research sought to establish whether the Hamilton City Council's residential built environment and urban design policies are consistent with the existing knowledge and best practice strategies to improve child safety on driveways. Additionally, we considered the Council's explicit priorities in designing policy and the implications this has for child safety on residential properties.

The literature indicates that the built environment has a significant impact on child safety. Reducing the length of driveways, preventing the driveway from being on the property boundary, introducing some form of separation between the driveway and dwelling/outdoor areas, having dedicated play areas for children, and decreasing the number of driveways that are shared between different properties will decrease the incidence of child driveway run-overs. The City Council has the authority to influence all of these design aspects, mainly via the District Plan.

The research has found that the Council's policies do not explicitly consider child safety, but are not invariably inconsistent with child safety best practice on driveways. The laissez-faire nature of Council's policies in regard to features of the built environment has safety implications for residential properties, such that there can be no assurances that child safety best practice will be adhered to. The Hamilton City Council's District Plan has a set of minimum standards relating to the built environment for residential properties – such as the size of the outdoor living area and the setback of the garage. In practice, the most critical decisions for child safety, such as the layout of the property or length of the driveway are made by the property developers. This reflects the Hamilton City Council's wish not to be excessively restrictive on property developers. Developments can receive approval, pursuant to the Resource Management Act, even if they are in breach of certain minimum standards, provided that planners assess that the overall benefits of the project compensate for the inability to meet those standards.

Child safety on residential properties is not a significant priority for the Hamilton City Council when designing policy. Indeed, the Council's documents are silent in regard to child safety on driveways. Additionally, child safety in any form receives only fleeting mention. The documents do not mention, elaborate on or itemise any specific child safety initiatives for residential properties. Other factors – such as 'living within our means', the amenity values of urban areas, environmental sustainability, land rationing and therefore intensification, housing affordability, and infrastructure capacity – are prioritised. These priorities reflect two particular pressures on Council. Firstly, it reflects Hamilton's current situation of relatively high debt, combined with a limited land supply which must be developed to meet the City's expected population growth over the next three decades. Secondly, it reflects the Council's statutory obligations to implement the Resource Management Act, which has a primary emphasis on environmental sustainability. The Council is undoubtedly balancing many competing interests, but does operate within a democratic framework. Regardless, it is clear that significantly more action could be taken by Council to improve child safety initiatives.

We also note that Housing New Zealand has a key partnership role with any local government in addressing this issue, since they manage large numbers of state houses. Their housing stock incorporates duplex and multiple unit dwellings, along with battle-axe sections, all of which present higher risks. We applaud recent initiatives to separate driveways from play areas and dwellings on social housing properties, but note that not all such properties will lend themselves to this solution. We also note that many private sector dwellings need similar remediation.

Recommendations

Many of existing recommendations would be difficult or impractical to implement *carte blanche*. This is a result of past urban design policies promoting large sections and long driveways, the current trend towards housing intensification and the predominance of the motor vehicle in the New Zealand lifestyle. Residential properties and urban areas have historically been routinely designed with motor vehicle convenience as a key priority. While change can be observed in terms of increased focus on public transport and cycling at the macro-level, priorities in urban design at the micro-level continue to favour economic and environmental concerns over human safety. In so far as safety features at all within Council services and planning, dog control and accreditation for building consents are key performance indicators.

Child safety in general and driveway strategies in particular, must be designed and operate within the existing constraints and historical realities if we are to make existing areas safer. In this context, lower speed areas in residential streets, warning signs and mirrors on residential properties with shared driveways and the development of a child safety culture – reinforced by the inclusion of child safety as a high level objective in policy design – could all be effective safety strategies. Perhaps most important of all, is the adoption of a policy requiring explicit consideration of human – especially child – safety in urban design. We therefore recommend:

- a continuation and extension of the practice of reduced speed limits and traffic calming measures in residential streets;
- warning signs and mirrors on residential properties where there are shared driveways;
- the development of a child safety role within the Council's planning unit;
- the inclusion of child safety as a high level objective in policy design;
- the development of a child safety culture within Council
- a commitment to actively discouraging residential property layouts that increase the risks of driveway runovers;
- a commitment, wherever possible, to prioritise child safety over economic and environmental factors.

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