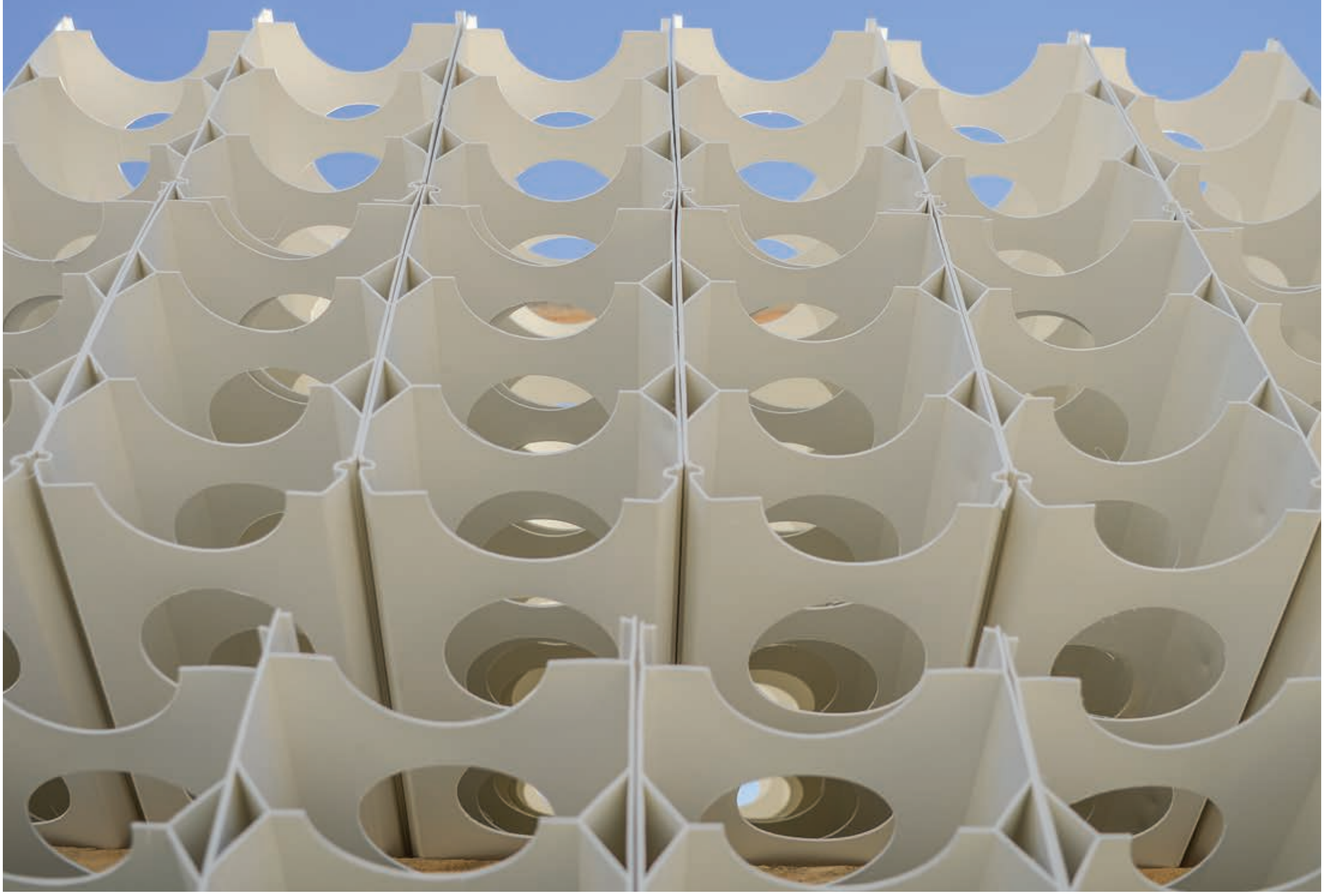

DINCEL STRUCTURAL WALLING

WATER CONSERVATION

EXECUTIVE SUMMARY

Only ~1.0% of the world's water supply is available as freshwater usage. Bored ground water, rain water by evaporation from oceans and melting snow captured by dams are the main sources of freshwater supplies for our needs. Apart from human needs, the quantity and quality of water is extremely important for the survival of trees to provide essential oxygen and the land to provide food. It is difficult and in most of cases impossible to collect significant amounts of rainwater in dams.

Our cities have been historically established at the end of water catchments before the oceans and rely on dams for water supply if there is adequate rainfall in the upstream catchments. Our cities do not currently have significant water recycling capability due to high cost, or capture and use rainfall which is available in urban settlements.

The capture, storage and use of rainfall available in our cities is the most logical solution to increase our water supply source, rather than letting it immediately drain into the oceans (Refer Figure 1).

The patented system incorporates a radically new approach to metropolitan water conservation, in which the construction itself is used for rain water storage. The latter is achieved by creating a box foundation structure which becomes a water storage tank. Placed under the basement which is usually below the public infrastructure level, say, a low or high rise housing development, the storage unit will provide water usage of up to 90% self sufficiency.

This achieves for each and every building to be sufficient for water storage such as landscaping, toilets, car-washing, general purpose cleaning, swimming pools and fire fighting. The usage can be extended to drinking, kitchen and shower usages if appropriate water treatment systems are adopted.

The system has the potential of reducing the need for the construction of additional dams, cost and maintenance of public stormwater infrastructure, the reliance on the town water supply, significant reduction in lifting the restriction on the developable land areas for flood mitigations.

PERMITTED USE OF DINCEL – WATER CONSERVATION

The following document is an introductory information of patented Dincel - WATER CONSERVATION system. The engineers of Dincel's customers for Dincel - Water Conservation System will be provided with Dincel - WATER ENGINEERING DESIGN MANUAL.

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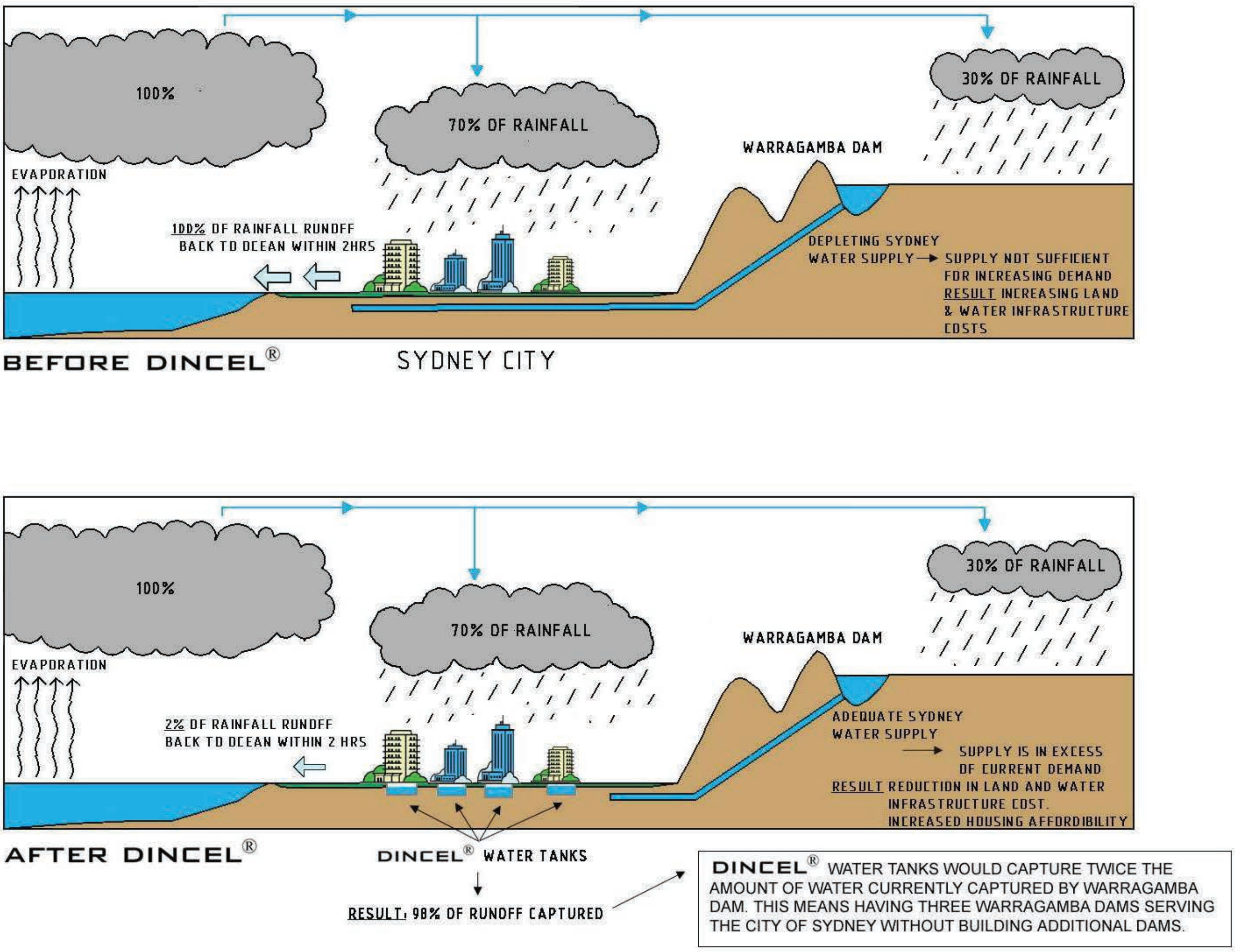

FIGURE 1 – THE SOLUTION TO WATER MANAGEMENT AND CONSERVATION

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INTRODUCTION

If the solution is to store adequate rainfall runoff throughout the year for each development site, then the solution needs to incorporate large flood management as well.

Increased roofing and hardstand areas due to increasing urban development cause a loss of pervious land and vegetation. This significantly affects the magnitude of flooding in urban areas, commonly resulting in 'flash' flooding. Current stormwater infrastructure is currently inadequate to manage these types of floods. This issue requires the need for stormwater management to minimise the nuisance, possible flood damage to infrastructure and most significantly, loss of life.

As a result many cities, including Sydney, in the last 10 – 15 years have started to implement new stormwater management policies. These policies incorporate stormwater on-site detention (OSD) storage areas in either above ground basins or below ground tank forms. The purpose is for each development site to hold its contribution of stormwater until the storm has eased and existing public infrastructure can safely and effectively manage the stored quantity of water.

OSD policies provide a solution to protect the community, creeks & rivers from increasing stormwater flooding provided each detention system is adequately designed by a qualified engineer and properly and regularly maintained. These problems are currently causing inadequate OSD operation in the city of Sydney. The other negatives of this system include loss of native flora & fauna, restrictions on development planning and naturally a significant cost to design, construct & maintain the OSD system.

This system may be considered effective despite all its negatives as one part of the solution for urban flood management. However, it does not provide a solution to water conservation needs.

OSD systems do not store water for future use after the storm therefore all temporarily stored water is released into the oceans through the existing public stormwater infrastructure immediately after the storm has passed.

The most effective Water Management System can only be achieved by providing adequate water storage for both flooding and conservation purposes simultaneously.

The Dincel Construction System incorporates stormwater management and water conservation solutions simultaneously. The space to provide water storage required is incorporated into the building foundation system. This combination provides a significant volume for water storage. The void under the building development is the most logical position without affecting other planning issues to accommodate a significant volume of water storage.

The combined system offers the following benefits.

- An effective solution for flood management.
- Capture and re-use adequate rainfall for the purposes of:
    - Toilet flushing, landscaping irrigation, general purpose cleaning for driveways, building façade and hard surfaces, car washing, industrial water usage for the industry with minimal use of water filtration/screening system.
    - If water is further treated: washing clothes, dish washing and showers.
    - If biological and chemical contaminant treatment used: drinking purposes.
- The other benefits:
    - Significantly more efficient development land usage and development planning resulting in improvements in the protection of native flora & fauna, more space for landscaping hence better amenities for the building's occupants. This will also lift the restrictions of water planning on the efficiency of cross ventilation and solar design of the buildings.
    - Elimination of current OSD construction costs.
    - Reduction to strain on urban stormwater drainage, upgrading and maintenance costs.
    - Decreased reliance on the town water supply, hence significant reduction in the need for large public infrastructure costs, such as building dams, water supply, pipes, etc.
    - Significant reduction in the water management administration, upgrading and maintenance costs.
    - Significant reduction in restrictions on new developable land due to water scarcity. The increased supply of land reducing land cost, hence direct impact on the housing affordability.

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UPPER PARRAMATTA RIVER

CATCHMENT TRUST

DINCEL RAINWATER TANK FOOTINGS4.DOC
Ref: 9020105-6

23 February 2007

Director
Dincel Construction System Pty Ltd
Level 3, 7K Parkes Street
PARRAMATTA NSW 2150

Attention: Mr Burak Dincel

Dear Burak

Re: Water Engineering Design Manual for Rainwater / On-site Stormwater Detention Tank
Your ref: letter dated 13 July 2005 and Manual and email dated 14 February 2007.

I refer to our earlier correspondence regarding the Water Engineering Design Manual, Revision 3 dated July 2005, for what is now the Dincel Construction System. I understand that the supporting information you provided then remains current.

The proposed system appears to be an innovative solution to the twin challenges of re-using stormwater for non-potable supply and catering for the development's On-site Stormwater Detention (OSD) requirements. By integrating the storage into the foundation support structure, the Dincel Construction System process maximises the footprint of the tank while incorporating the site's future water management directly into the building construction rather than making it a separate addition.

Your manual indicates that the process could be used for residential, commercial or industrial premises. As you have noted, the water used by two latter development types is very much dependent on the specific development. More consistent internal water usage patterns can be found with residential buildings and this may make the system more applicable to residential developments.

Congratulations on this initiative and I wish you luck in marketing the process. Examples like this, where sustainability and OSD become an integral part of the building, are the way of the future and will create a path for others to follow.

If you require further information, please contact the Trust's Operations Engineer, Mr John Carse, at this office on ☎ 9895 7320.

Yours sincerely

per

Stephen Lees
EXECUTIVE OFFICER

Encl.
Cc:

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THE CONSTRUCTION OF DINCEL TANK FOR WATER MANAGEMENT

The key to maximum benefit starts with an efficient and modular building design.

Currently, the New South Wales Government requires efficient cross ventilation and solar design to improve and encourage apartment living. The reason for this encouragement is to reduce the cost of infrastructure for new development lands and the scarcity of water supply.

Efficient natural cross ventilation and solar design improves indoor air quality which provides healthier living. In a working environment this results in increased productivity and health of the occupants. Cross ventilation also reduces the need for air conditioning, which reduces power consumption. Efficient solar design reduces energy consumption, costs and direct impact on the air quality and at the same time improves quality of living and working environment as well.

The above issues cannot be dismissed and are essential elements for our quality of life on this planet.

Efficient building planning and design to cater for the above issues generally yields a modular building design. The acoustic and fire rated party walls between sole occupancy units becomes structural load bearing elements in the case of the **Dincel**-Wall. The maximum structural cost benefit can be achieved if party walls align with the car parking arrangement in the case of residential developments incorporating basement car parking. This allows the cost of superstructure to decrease substantially.

The superstructure of a building needs to be carried by its foundation system that is suitable for its particular ground conditions.

The system provides a foundation structure and generates a void space under buildings of any desired depth simultaneously (Refer Figure 2). This space can than be used for water and/or even for dry storage combination. The system creates a box type foundation system which is a sophisticated version of the common raft slab-foundation system. The worse the ground conditions are the better the results of the box foundation becomes. This type of foundation system is commonly used in parts of the world where difficult ground conditions are encountered. The common stiff raft foundation systems achieved either in the form of waffle or thick concrete plates. The waffle system is achieved with close centred ribs connected to the floor slab. The limitation of this system is the construction of ribs which is currently achieved by providing polystyrene blocks as formwork and normally used for small size and scale building foundations.

Thick concrete plates of 0.5m to 5.0m thick are used as foundation systems for larger buildings. The drying concrete stresses of thick plates conventionally controlled by the post-tensioned cables at varying levels. The presence of massive quantities of concrete and stressing cables adds considerable cost to these foundation systems.

The disadvantage for both waffle and mass foundation systems is the lack of formworking system to build the ribs between the top of bottom slabs of the box to provide the equivalent stiffness of the foundation system. **Dincel** offers a relatively cheap and quick formworking system for the ribs of the box foundation system by reduction in concrete usage, elimination and stressing cables and creating voids and in turn these can be used for water storage purposes.

Dincel creates a box foundation as well as a water storage tank simultaneously resulting with a solution to the water supply shortage. The benefits of this water supply solution far exceed the construction cost difference of box foundation from an alternative conventional foundation system. The fact is that for soft, uniform ground conditions the box foundations itself without considering the water shortage solution benefits would even be cheaper than the alternative foundation solutions.

Dincel consists of a permanent stay-in place formwork made from a special polymer encapsulating conventional concrete. The polymer-concrete container (tank) collects the rainfall for re-use.

The following example consists of a multi-storey unit development accommodating water storage tanks under the entire basement of the building which normally accommodates carparking. The rainwater on the development site is collected by the tank located under the carparking. A pump system located in the water tank can then supply water to occupants at each floor level for laundry, toilets, and for landscaping, irrigation and fire fighting purposes. If treated, it is even suitable for drinking purposes. The tank will be connected to the town water supply which can top up the water levels of the tank if required during low rainfall periods. This will result in an incredible saving (over 40%) on reliance on the town water supply. For the above described uses each building becomes largely self sufficient, substantially reducing water bills and virtually eliminating them if the captured water is treated & used for drinking/bathing. This concept can be applied to both single and multi-storey buildings. In small buildings, solar power can be used to operate the pump.

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EXAMPLE: WATER STORAGE AND USAGE

The following calculations can be a good example of the potential of the system as a world wide solution to the water shortage;

The continuous water supply and demand model was created in order to determine the percentage of mains water reduction that can be achieved with the foundation tank. Daily rainfall and usage data is used within the model in order to achieve maximum accuracy for the foundation tank. The percentage of mains water reduction will become the basis in determining the foundation tank size.

Baulkham Hills Council Baulkham Hills Council
Development control plan No.6 allows 175 persons/hectare (0.0175persons/m2) densities for developments. The development site is generally allowed to be utilised in the following manner.

Development site area = 5000m2 (minimum site for apartment buildings in Baulkham Hills Shire Council)

Allowable Building Base Area = 5000m2 x 50% = 2500m2 (tank footprint)

- 50% development with roofed area; 100% of rainwater capture is possible.
- 50% development to be a landscaped area including grassed, planted and hardstand areas, conservatively, 90% of rainwater capture of this site area is possible.
- Therefore a minimum 95% of rainwater to the development site is to be captured.

Rainwater storage (Supply):

95% of 801.4mm/year= 761mm/year x 5000 = 3800m3/year

Water Use Demand:

Option A – Foundation tank System for Landscaping, Laundry & Toilets

The NSW Government's new development sustainability index BASIX requires a minimum of 40% water usage reduction for all new detached residential dwellings. When BASIX is expanded into residential apartment developments a figure of 40% will not be possible using conventional methods of rainwater harvesting due to the difference in population densities between detached dwellings & apartment developments and a lower figure will be adopted.

However with the **Dincel** water tank solution we can achieve more than a 40% reduction in water usage.

The Australian Bureau of Statistics has calculated average household water use in the Sydney metropolitan area to be approximately 250kL per year. Sydney Water suggests that this water usage can be accounted for as follows:

Outdoor/Landscaping	40%	100kL/year	91 l/p/day
Laundry	16%	40kL/year	36 l/p/day
Toilets	16%	40kL/year	36 l/p/day
Hot Water	27%	67.5kL/year	61l/p/day
Drinking	1%	2.5kL/year	2 l/p/day

The **Dincel** water storage solution in this example (Option A) provides adequate water storage for all water uses bar hot water & drinking. A reduction has been made in the outdoor/landscaping use due to the decreased amount of landscaping per person in apartment developments (approximately one third of detached residential houses).

Our total water demand becomes 163 l/p/day for outdoor/landscaping, laundry & toilets which is approximately 72% of total water usage. Therefore the water harvesting solution Option A will reduce mains water by over 73% based on this example.

The total yearly water requirement becomes:

0.0175p/m2 x 163 l/p/day x 365d x 5000m2 =5206 m3/year

Our software model developed for this example shows the continuous supply and use of the water within the tank and that a maximum depth of 0.27m is achieved with the maximum water reduction percentage and tank size. The maximum depth of water calculated will be stored in the tank during the year. A balance of 0m3 over the course of the year will be achieved by draining exact roof and surface areas into the tank in order to maintain the required maximum water depth of 0.27m.

Option B – Roof Tank System for Drinking & Hot Water

Additionally, a tank can be created immediately under the roof of the building using the Dincel Construction System in combination with Option A above. Overflow from this tank would be directed to the foundation tank described in Option A.

The purpose for this tank would be to capture roof water, which contains significantly less contaminates than surface runoff from landscaping. With minor treatment this water can be used for the remaining purposes of drinking water & hot water.

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As this option becomes more appealing the higher the building becomes, a reduced footprint of 800m2 (possible 20% high rise tower roofing area) is used. Based on the water usage rates above volume required is:

0.0175p/m2 x 64 l/p/day x 365d x 5000m2 =2047 m3/year

Note: check with local government high rise tower density allowance.

At a water usage reduction of 40% (from BASIX above) the required yearly catchment volume becomes 819m3.

If both solutions (foundation = below roof tank) are provided our total water use reduction is over 90%, **more than twice the BASIX target of 40%.**

Flood Management:

The purpose of the **Dincel** tank/foundation system is to capture adequate rainwater for each required purpose. For this reason the storage tank is to be placed at the footing levels which are generally below the level of public stormwater infrastructure. For this reason discharge of rainwater into the public stormwater system via gravity is neither possible nor intended.

The flood storage required for effective flood management is provided as void space above the max water storage depth (0.27m – from Option A). Our example uses a maximum flood average reoccurrence interval (ARI) of once in five hundred years and maximum storm duration of 72 hours (3 days).

The volume generated from the site from our extreme flood is approximately 1900m3 which has a depth in our tank of 0.84m. Therefore the total tank depth required to satisfy both water use and flood management requirements is:

0.27m + 0.84m = 1.11m

This depth can easily be accommodated into the **Dincel** tank/foundation system.

Conclusion

The development site of the above example having 2500m3 water storage capacity is adequate for all possible flooding events and available per annum water storage is more than adequate for the nominated 40% water use reduction.

THE PLANNED IMPLEMENTATIONS BY AUTHORITIES FOR SYDNEY'S WATER PROBLEMS

The current solutions by authorities to water efficiency consist of:

- Increased water charges to the end user.
- Water use restrictions.
- Implementations of expensive waterless toilets.
- Expensive and costly maintenance of toilet systems, shower heads, and taps.
- Possible future restrictions of private swimming pools.
- Provisions of portable or permanent rainwater collection tank normally attached to the building structure.

Most of the Sydney Councils now require additional storage to assist water conservation. In the case of Baulkham Hills Shire, a 5m^3 capacity rainwater collection tank is planned to be required for each new development in the Shire. A typical Sydney landscaping area requires 4 L/m^2 water for each summer's day. The 5m^3 water storage would therefore be adequate only for one day's watering needs for a 1250m^2 landscaping area. Therefore this provision without even considering issues other than landscaping for the remaining days of the year would be grossly inadequate, especially when it is compared to the above example.

The abovementioned measures by the authorities cannot address our emerging water problem. The following is a good example of expressing the magnitude of the problem.

The Sydney Morning Herald dated 4th August 2003 has covered this emerging concern. The paper reported that the current water usage of Sydney City is 630 gigalitres per year; very soon this quantity needs to be reduced by 100 gigalitres to save an ecological disaster in the Hawkesbury River. The newspaper also reported that the major usage of water is the irrigation of grassed and landscaped areas for individual housing on a quarter of acre block. If we are on the verge of returning 100 gigalitres back to the Hawkesbury River, every rural land turned into urban land development could become a reason for large environmental problems in the future.

Our future holds very challenging environmental tasks if urban consolidation policies are not enforced and new solutions for water sources/usage are not implemented.

The following patented water conservation storage system illustrates how significant the quantity of water can be stored and used.

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WATER MANAGEMENT AND CONSERVATION - SYNOPSIS

The Local Authorities/Department of Urban Planning may consider where suitable, increase in density and building heights depending on the degree of water conservation solution(s). An implementation of Performance Based Urban Planning with the inclusion of Dincel Construction System offers the following benefits to the community at large (Refer Figure 3 – Housing Affordability Flow Chart).

- Assists government's efforts for urban consolidation.
- Reduces the need for environmental taxing.
- Our reliance on the town water supply.
- Reduction in significant infrastructure construction and maintenance costs to Local Authorities, state/federal governments and the tax payer for urban water supply.
- Reduces flooding inconvenience hence flood mitigation costs. The reduction in infrastructure and maintenance cost to State and local governments for urban flood related issues.
- The cost of stormwater on-site detention systems as flood management devices to the developer and Local Councils.
- Significant reduction in loss of native flora & fauna.
- Significant reduction in lifting the restrictions on developable land areas.
  - › Reduction in land cost & increase in housing affordability.
  - › Increase in landscaping areas resulting in better amenities for the use of occupants.
  - › Better building planning with greater flexibility for cross-ventilation, solar access and indoor air quality.
- Modular buildings, resulting in cheaper building structure, significantly less number of lifts (vertical transportation), lesser dependency on heating – cooling equipment.
- The constant availability of water increases the chances for better fire control and management even for bush fire prone areas.

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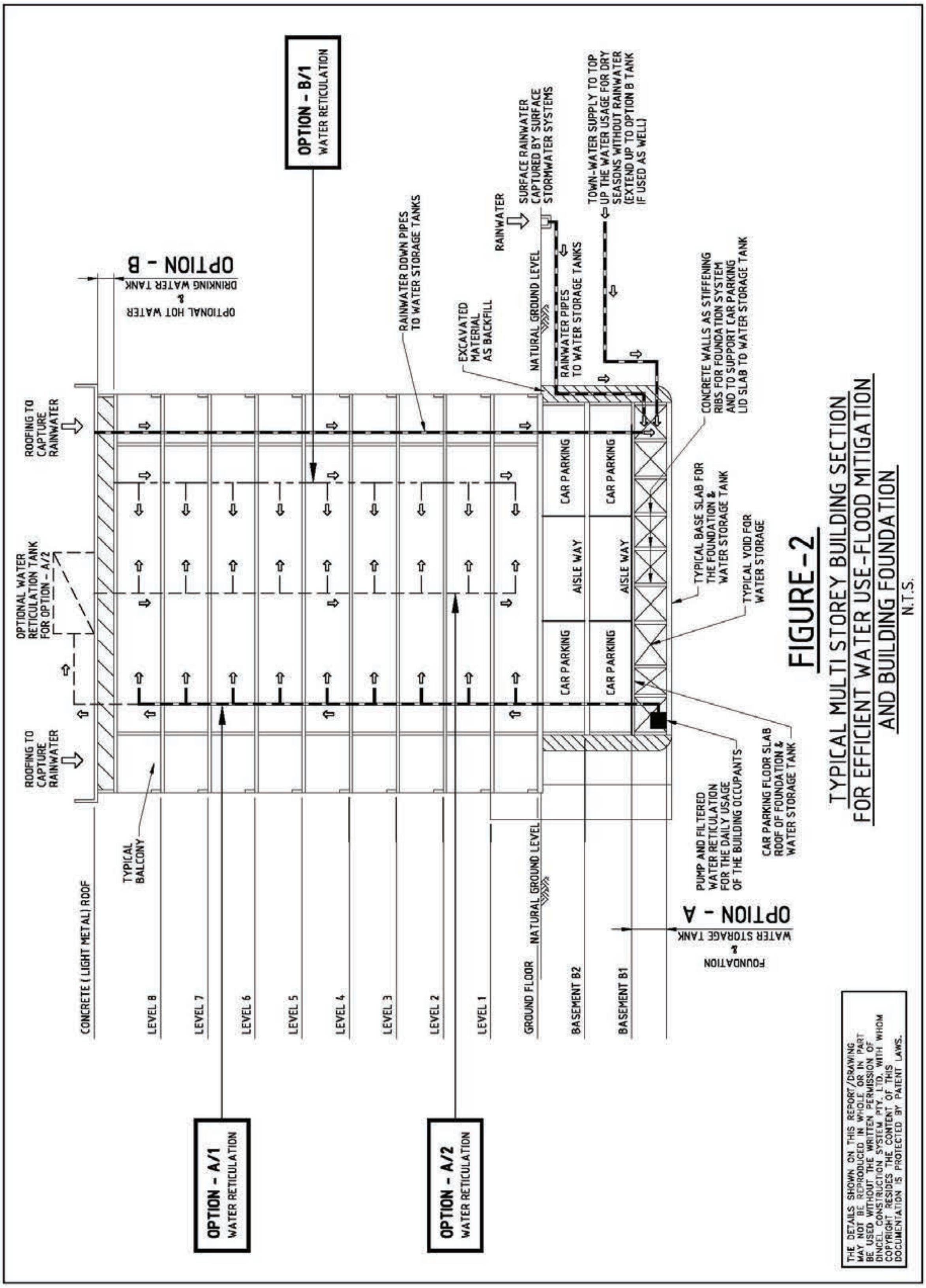

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