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Redefining Tomorrow: Building Resilient and Sustainable Communities

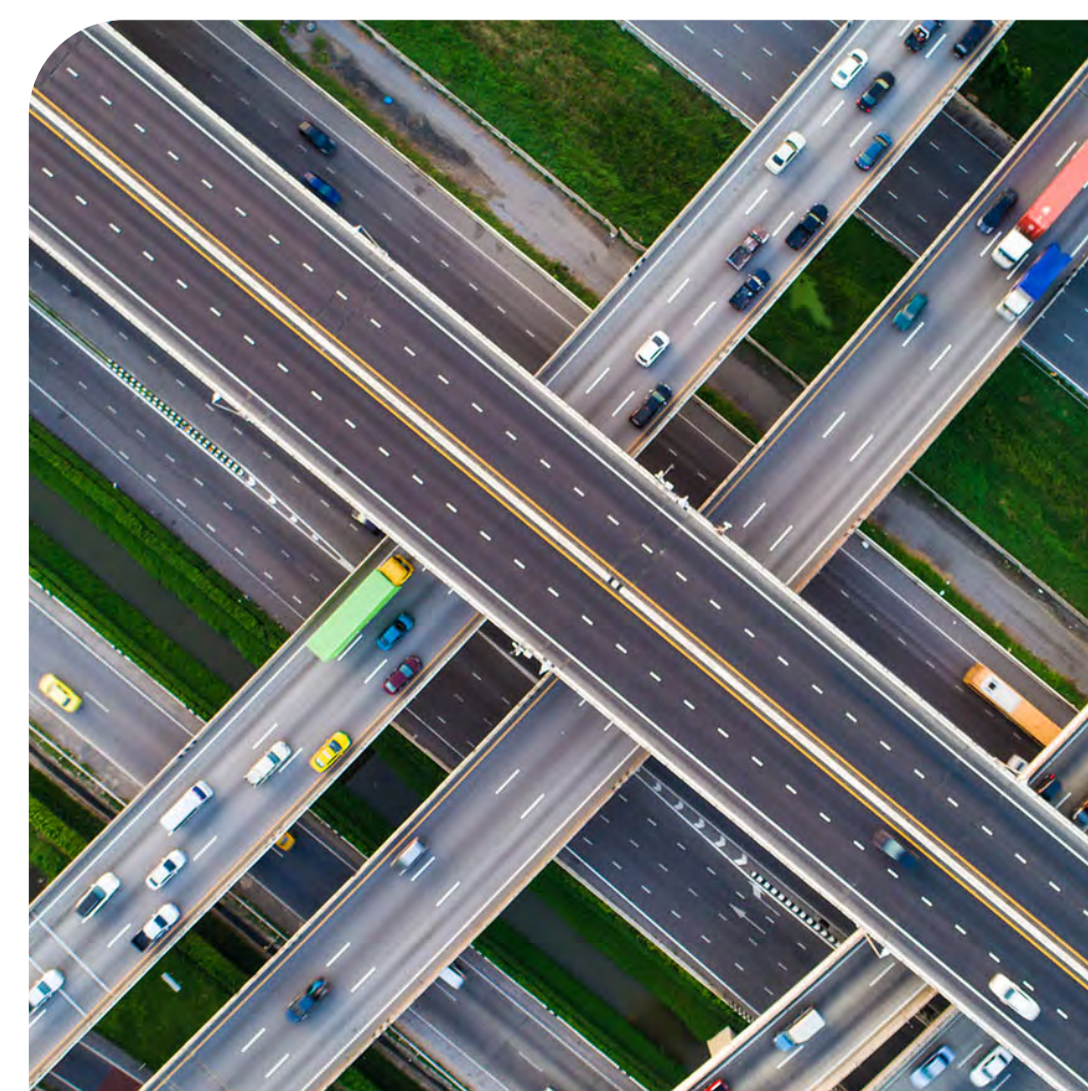
**Enabling Future-Ready Communities with
Tech-Infused Living Masterplans**

Google Cloud | **Deloitte.**

It's an **exciting time** for the world's cities.

Municipalities are about to gain new capabilities, which will deliver the power to surmount traditional challenges, enable bold, dynamic possibilities, and foster greater sustainability.

All thanks to generative artificial intelligence (GenAI) and geospatial technology.





Sustainability, in the context of cities, requires that leaders take environmental, social, and economic factors into account when planning growth and development. While, simultaneously, ensuring that such development not only meets the needs of today's community, but those of future residents as well.

"If we're not designing long-term for the generation that follows, then it's not truly a sustainable development," says Dr Marco Macagnano, Digital Real Estate Leader, Deloitte Canada. "Additionally, if we're focusing primarily on environmental factors without understanding the impact on the social context or economic feasibility, then it all falls flat."

It's no wonder, then, that designing sustainably represents such a big ask. After all, municipalities must do their best to accurately forecast how they will evolve over time, then determine how to guide that evolution while taking multiple considerations into account. Too often, this has presented decision-makers with significant challenges.



From custodian of compliance to **enabler of possibility**



"There's no question that accurate forecasting capability is critical," adds Denise Pearl, Google Cloud's Global Sustainability ISV Lead. "Especially if municipalities are to move from simply reacting to and approving development proposals, to a more strategic and proactive partnership role." Yet building such capability has, historically, proved elusive.

Perhaps the most obvious reason why is that cities simply lack the resources. "Municipalities want to be more strategic, but they have to contend with multiple challenges that restrict their people and the time they have," notes Macagnano. "For instance, development planners are busy checking and re-checking drawings, or communicating with internal stakeholders. They just don't have the capacity to explore all the options necessary to reach best planning outcomes."

Naturally, this has a cascading impact, directly hindering knowledge management. After all, city leaders, planners and engineers must be able to document and learn from their decisions, in order to replicate successes, or pivot quickly when plans go awry.

Many municipalities struggle with monitoring and maintaining reliable data, and even understanding its impact on their ability to improve processes, particularly when internal departments are siloed. Without this capability, city departments simply can't keep pace with evolving markets.

This, in turn, means municipalities' ability to be forward thinking can suffer as well. Decision-makers want to be able to approve developments that are appropriate in their context, based on factors such as the vision for densification, balance of land uses, population growth projections, even trends around where people will work or how they'll commute.

However, the traditional role of a municipality to date has been that of a custodian of compliance, approving development applications based on what has been historically appropriate for a given site, rather than on a vision for how the city is expected to grow. Without the tools or insights, municipalities are reduced to waiting for developers to come to them first.

Ideally, the municipality could become a partner in development, able to say pre-emptively that, because we know demographics and population densities are evolving in a specific way, we can then identify where it makes sense to develop, and what it makes sense to build. In other words, the municipality would move from being a custodian of compliance to become, instead, an enabler of the possible.

It's a role that municipalities are best suited to fill. After all, developers don't always think about what happens outside the parameters of the sites they're developing. Meanwhile, the municipality has the potential to appreciate the big picture, compare development concepts, spot hidden value, and incentivize developers to build more or differently, knowing the end result will fit in better with the direction the city is moving. Now, with GenAI and geospatial data, municipalities finally have the capability to deliver on that ideal, and change the game.

GenAI puts municipalities in the driver's seat

By now, the concept of artificial intelligence is not new. Most organizations are already familiar with AI's advanced data analytics and reporting capabilities. "The real magic word here is the generative component," says Macagnano. "Now, AI can actually create." In other words, today's AI is not simply about data analysis, but about extrapolation.

"We're asking GenAI to come up with ideas we hadn't even considered, based on our desired outcomes." Macagnano explains. "We've never been able to do that before the generative component." When also combined with geospatial data, which uses Google Earth Engine's multi-petabyte catalog of observations about the planet, land uses, and climate changes to build a comprehensive picture of the impact of human activity on the Earth, municipalities suddenly have access to a very powerful tool.

In fact, municipal decision-makers can now be proactive, no longer having to wait for developers to present land use options, and then figuring out if those options will work. Instead, municipalities themselves can use GenAI and geospatial information to quickly and efficiently determine what the cityscape will likely evolve to become, taking into account how many families are going to need to be housed, the financial feasibility, what the carbon footprint or emissions potential of various mixes of buildings and land uses will be, opportunities for electrification or solar panel placement, even flood or fire risk based on potential climate shifts.

Pre-emptive scenario planning, and the testing of various possibilities to fully understand the opportunities and risks related to development, becomes possible. This puts the municipality in a position to incentivize development, steering it in a way that benefits people, as well as the planet.

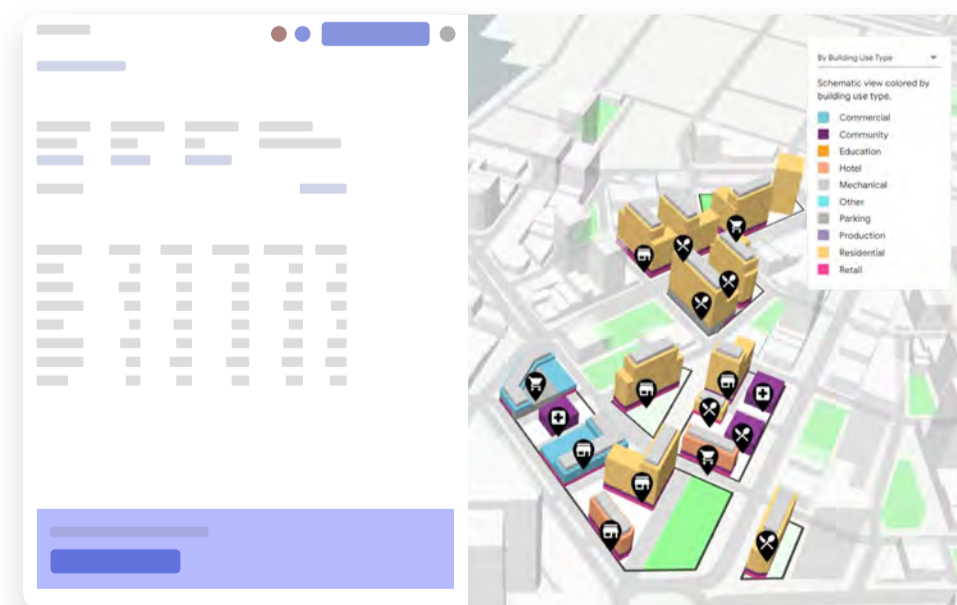
For example, a developer might want to build a condominium on a piece of land. Thanks to AI and geospatial data, municipal decision-makers will already know that this option could work, and what the impact will be on the environment and on city infrastructure. But they will also know that incorporating more retail or public spaces into that condo plan will catalyze other development and make the surrounding neighborhood more livable.

The municipality can then say to the developer, if you include that extra retail and public space, we will reward you with additional gross construction area, improving profits for the developer, as well as amenities for citizens. Significantly, this can now all be done in days, not months.

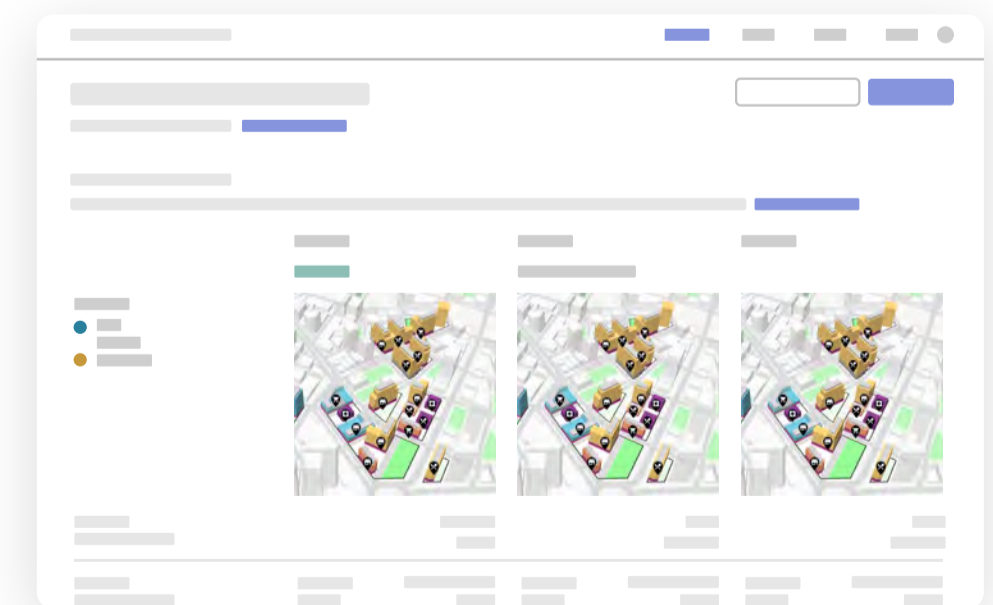
GenAI: The Great Enabler



Accelerate site assessment



Test and optimize possibilities



Incentivize desired development



80-90%

of project value is created
during pre-development *

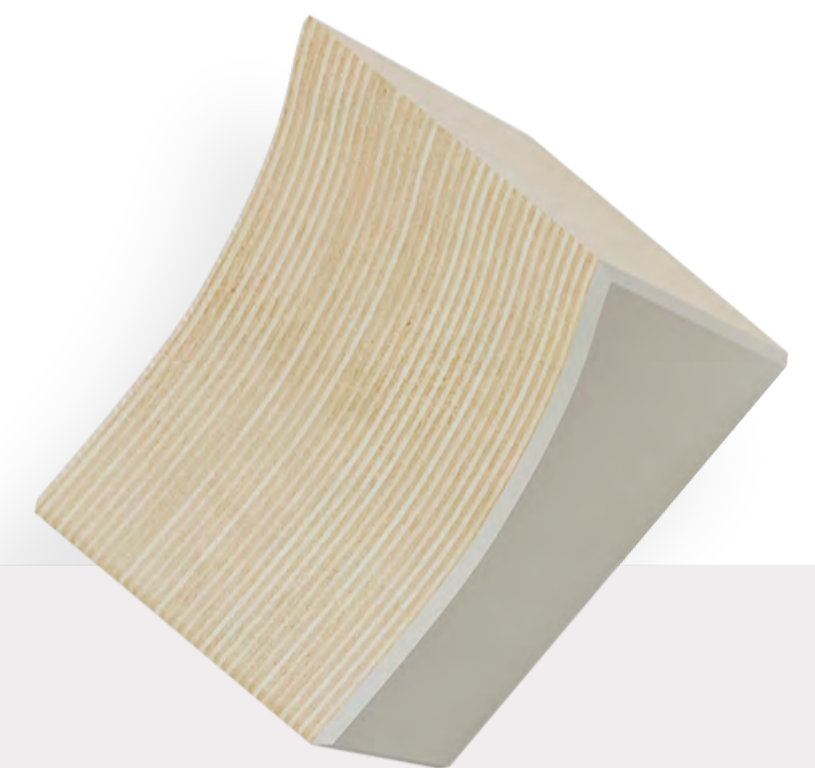
Welcome to the world of “what if”

Accelerated decision-making, and enhanced collaboration, may be the most obvious GenAI-related benefits. After all, once a municipality has used GenAI to build a detailed, and immediately accessible, understanding of how the cityscape can and should evolve, then providing a yes or no on development proposals will no longer need to wait for lengthy engineering studies – decision-makers will already have a clear picture of what the land and infrastructure will support, and what regulatory compliance looks like. The potential exists to cut years off of projects, which helps ensure that development ideas are representative of what the market needs today, as well as tomorrow.

However, it's the promise of accelerated visualization that represents an even more significant benefit in the long term. GenAI gives municipalities the power to ask different questions, receive alternate recommendations, and model out bold new scenarios quickly, all with lower effort and labor cost. “Multiple datasets can be combined in new ways and augmented with GenAI, driving better decision-making at both a project and portfolio level,” notes Pearl. This puts cities firmly in the “what if” business.

GenAI can give developers, and even the average citizen, a “what if” capability as well. Consider how complex today's city building codes are. For a developer concerned with compliance, tax liabilities, or environmental impacts, a lot of dots have to be connected whenever a new project is in the works. Even a homeowner looking to install a pool or a heat pump will likely find the relevant city codes daunting – if they can even find the right codes to begin with.

Now imagine if that developer or average citizen could interact directly with a dedicated municipal AI. They could ask questions and submit plans, and quickly receive answers and recommendations related to compliance, building considerations, or environmental impacts. In a sense, the city's AI would become an interpreter, enhancing transparency and enabling more informed decision-making.



“ We’re asking GenAI to **come up with ideas we hadn’t even considered** based on desired outcomes. ”

Master planning as a **continual process**

"What if" applies to master planning as well. Consider how much time and effort it takes for a city to design a master plan today, with multiple data points to be integrated and stakeholders to be accommodated. By the time a municipal master plan is complete and printed, the market has, quite likely, already moved on. Contemporary master plans are often obsolete the day they come out.

What municipalities need is what Macagnano calls a "living master plan," capable of reacting and adjusting according to the latest population trends, market needs, and environmental factors. Such a master plan would be able to evolve as rapidly as the market it's intended to serve, and be instantly accessible, while offering greater transparency and visibility to all stakeholders. With GenAI and geospatial data, the concept of a living master plan can be realized.

"Forget about master plans as being products, that have to be refreshed every five to ten years," says Macagnano. "Instead, think about your master plan as being a never-ending process, continually shifting and changing based on evolving market data and feedback."

With GenAI propagating updates to the master plan as needed, no one will ever have to say "back to the drawing board." The living master plan is, itself, the drawing board. Always available, and always up to date.


Keeping up with the times (and the market, and the opportunities)



Traditional master plans are fixed in time and unable to adapt to change



The living master plan enables continual adaptation and optimization



GenAI gives municipalities the power to ask different questions, receive alternate recommendations, and model out bold new scenarios quickly, **all with low effort and labor cost.**

Quick pivots become the norm

In fact, one western Canadian city has already taken advantage of this level of flexibility, using GenAI to analyze an irregularly shaped piece of land that had been earmarked for commercial and retail redevelopment. The city needed to quickly understand what development the site could accommodate, and be able to validate competing proposals from developers. Deloitte and Google Cloud came together and collaborated to build a GenAI model for the city that revealed ideal outcomes for the site, along with a catalog of options and cross-comparative analysis, that allowed decision-makers to quickly pivot their approach based on what they wanted to prioritize. As a result, the city better understood the inherent value, and potential, of the land they owned.

GenAI scenario modeling in action



Understand the site's potential

Parcel 3	
Parcel Area	50.4K sq m
Max Height	120m
Front Yard Setback	2m
Rear Yard Setback	2m

Explore ideal outcomes

Primary Use Types	
Each primary use type can have a set GFA or FAR.	
	Residential - For Sale
	Residential - for Rent

Validate competing proposals



Confirm optimal way forward

GenAI offers similar advantages to municipal organizations beyond city governments. For example, Deloitte and Google Cloud recently worked with a college in a major Canadian city, which had several facilities spread across multiple locations. The college was juggling a number of challenges, among them, assessing how much, and what type, of physical space would be required in the future; implementing sustainability initiatives across their facilities; and evaluating strategic acquisitions. In this case, Deloitte and Google Cloud worked together to create a living master plan for the college, powered by GenAI. The college gained a database that was able to react to new market data, and recommend changes and adjustments to the master plan in real time.

Similarly, Deloitte and Google Cloud are working together to help a regional police service prepare for the future, using GenAI and geospatial tools to build a picture of what the jurisdiction will look like several years hence. Interestingly, that picture will be created in three dimensions, a critical capability the police service has never had before.

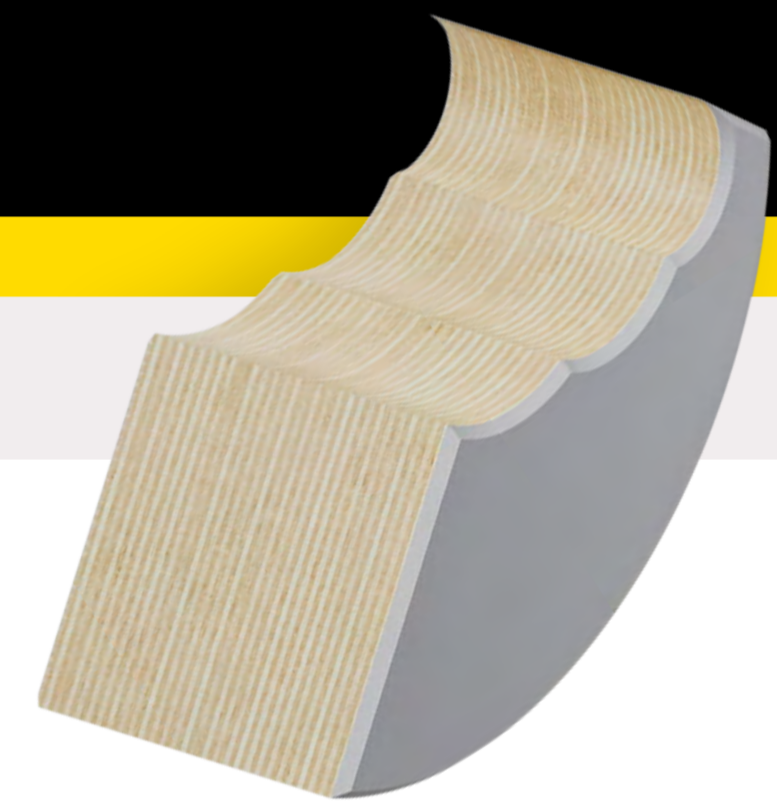
After all, when police respond to a call in a high-rise building, the matter of how long it takes officers to get up to the relevant floor has to be factored into response times. Since it can take several years to construct new police facilities, knowing where to focus attention and build new facilities now is vital if the police service is to be most effective going forward. As with the college, police decision-makers will have a living master plan, able to adjust and evolve its recommendations as crime, demographic, and even climate risk data changes over time.

“ There's no question that **accurate forecasting capability is critical**, if municipalities are to move to a more strategic and proactive partnership role. ”





“ If we're not designing long-term for the generation that follows, then it's not truly a sustainable development. ”



Where do we **grow** from here?

Clearly, the verdict is in: GenAI is proving to be an indispensable tool as municipalities and related organizations look to prepare, sustainably, for the future. For decision-makers contemplating next steps, it's time to embrace the change, and become fully familiar with what GenAI and geospatial technologies can do. Look at GenAI as an evolution, rather than an experiment, and be open to building proofs of concept. The more familiar one's stakeholders can get with GenAI, the easier it can be to encourage adoption.

Similarly, and especially when working to secure buy-in from other stakeholders, one should look at GenAI as an accelerator, not a replacer of roles. One of AI's strengths is the ability to serve up data and analysis that city workers would otherwise have to spend time chasing. This frees those workers to take on more strategic and proactive roles.

Finally, put long-term objectives in place. Decision-makers should think about where they want to be several years from now, and how they intend for GenAI to help them get there. This will keep the process from becoming overwhelming, and ensure expected outcomes are more easily understood.

With so much potential waiting to be unlocked, GenAI is ready to help municipalities plan and build sustainably.

It's time to jump in.

Today's landscape demands a **whole new set of rules.**

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