



GRI PATHWAYS STUDY - SUMMARY SHEET

PURPOSE

The "Rainwater Infrastructure Building Typologies Pathways Study" (**GRI Pathways Study**) was undertaken to better understand what **GRI tool combinations** are most suitable to meet the Rain City Strategy (RCS) performance **targets** (e.g. retain 24 mm/day, 48 mm/day) for various representative **building-site typologies** on private property. A range of site conditions were incorporated. The study also sought to better understand:

- ❖ the capital **costs** of these GRI tool combinations,
- ❖ the **co-benefits** (e.g. urban heat mitigation, groundwater recharge, twelve others), and
- ❖ the **barriers** and **solutions** to implementation.

RESULTS

This work produced a preferred set of GRI tool combinations ('**compliance pathways**') for each building-site typology. Accompanying **commentary** and **recommendations** inform the ongoing development of rainwater management policies for the City.

CHAPTERS AND CONTENT

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TASK 3: Rainwater Management Tools (e.g., green roof, bioretention, tree trench, detention tank, non-potable water reuse, treatment device, other)	ES Page 7	Page 75
TASK 4: GRI Design Methodology (current state, jurisdictional scan, current and recommended GRI design methodology, design tool)	ES Page 8	Page 89
TASK 5: Performance Modelling and Solution Sets ("Pathways") (variables, development and policy considerations, approach (includes 73,000 scenarios), results)	ES Page 17	Page 165
TASK 6: Costing (GRI unit capital costs, total capital costs for each typology's compliance pathway, total cost as percent of overall building construction cost)	ES Page 23	Page 228
TASK 7: Co-Benefits (metrics (economic, environmental, community, resiliency), scoring, weighting)	ES Page 25	Page 306
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RELATION TO CURRENT RAINWATER MANAGEMENT POLICY ON PRIVATE PROPERTY

RCS performance targets have been superseded by other rainwater management requirements on private property (see Vancouver Building By-law). GRI Pathways Study findings remain an informative resource for those pursuing retention-based approaches.

EXAMPLES OF SUMMARY TABLES

Table ES 2 – Summary of Modelling Variables

Retention Compliance Standard	Site Conditions		Development and Policy Conditions	
	Pre-Development Condition	Soil Infiltration Rate	Infiltration Area Available	Non-Potable Reuse
<ul style="list-style-type: none"> • 24 mm • 48 mm 	<ul style="list-style-type: none"> • No pre-development (Natural conditions, 0% impervious) • Less than post-development (50% of typology impervious) • Equivalent to post-development (100% of typology impervious) 	<ul style="list-style-type: none"> • High (50 mm/hr) • Medium (20 mm/hr) • Low (5 mm/hr) None (0 mm/hr) 	<p>Foundation Setback</p> <ul style="list-style-type: none"> • Typical (5 m) • Reduced (3 m) • No setback (0 m) <p>Parkade Setback</p> <ul style="list-style-type: none"> • Parkade minimum - occupies only the building footprint • Parkade maximum - occupies portion of parcel equal to total impervious area (i.e., 90-100% of parcel) 	<ul style="list-style-type: none"> • Typical non-potable demands (flushing + irrigation) • Expanded non-potable demands (including clothes washing and cooling makeup)

Table ES 7 – Pathway Solution Set Summary Table

Pathway Category:	1	2	3	4	5
Retention Standard:	24 mm		48 mm		n/a (Tier 3)
Soil Conditions:	No infiltration	Low infiltration (5 mm/hr)			n/a
Setback/Parkade:	n/a	Typical (Full)	Reduced		n/a
Small Lot Residential Low Massing Stories: 2 GFA: 225 m ²	<i>No viable pathway</i>	<ul style="list-style-type: none"> • Bioretention 	<ul style="list-style-type: none"> • Bioretention 	<ul style="list-style-type: none"> • Bioretention 	<ul style="list-style-type: none"> • Detention & Treatment device
Small Lot Residential High Massing Stories: 2 GFA: 375 m ²	<i>No viable pathway</i>	<ul style="list-style-type: none"> • Green roof • Bioretention • Permeable pavement 	<ul style="list-style-type: none"> • Bioretention 	<ul style="list-style-type: none"> • Green roof • Subsurface infiltration 	<ul style="list-style-type: none"> • Detention & Treatment device
Low-Rise Residential & Mixed-Use Stories: 3 GFA: 3,000 m ²	<i>No viable pathway</i>	<ul style="list-style-type: none"> • Green roof • Bioretention 	<ul style="list-style-type: none"> • Bioretention 	<ul style="list-style-type: none"> • Bioretention • Permeable pavement 	<ul style="list-style-type: none"> • Detention & Treatment device
Mid-Rise Residential & Mixed-Use Stories: 6 GFA: 11,700 m ²	<ul style="list-style-type: none"> • Green roof • Rainwater harvesting 	<ul style="list-style-type: none"> • Green roof • Rainwater harvesting • Bioretention 	<ul style="list-style-type: none"> • Bioretention • Permeable pavement 	<ul style="list-style-type: none"> • Green roof • Subsurface infiltration 	<ul style="list-style-type: none"> • Detention & Treatment device
High-Rise Residential & Mixed-Use Stories: 20 GFA: 16,800 m ²	<ul style="list-style-type: none"> • Rainwater harvesting 	<ul style="list-style-type: none"> • Green roof • Bioretention 	<ul style="list-style-type: none"> • Bioretention 	<ul style="list-style-type: none"> • Bioretention • Permeable pavement 	<ul style="list-style-type: none"> • Detention & Treatment device
Low/Mid-Rise Non-Residential Stories: 3 GFA: 3,000 m ²	<i>No viable pathway</i>	<i>n/a (parkade occupies entire site)</i>	<ul style="list-style-type: none"> • Bioretention • Permeable pavement 	<ul style="list-style-type: none"> • Green roof • Bioretention • Permeable pavement 	<ul style="list-style-type: none"> • Detention & Treatment device
High-Rise Non-Residential Stories: 14 GFA: 61,600 m ²	<ul style="list-style-type: none"> • Green roof • Rainwater harvesting 	<i>n/a (parkade occupies entire site)</i>	<ul style="list-style-type: none"> • Bioretention • Permeable pavement 	<ul style="list-style-type: none"> • Green roof • Bioretention • Permeable pavement 	<ul style="list-style-type: none"> • Detention & Treatment device

GFA = Gross Floor Area