May 11, 2021

Dear Mayor and Chapel Hill Town Council,

While literally at the MLK/Estes crossroads, the Town Council faces a critical decision on Aura that will shape the future of Chapel Hill. If the wrong turn is taken, Chapel Hill will end up with a clogged major cross connector that will go down in history as a regretted Council choice, and long remembered by the many affected users of Estes Drive as a poorly reasoned decision.

Estes Neighbors concerns with the elements of this proposed plan include:

- Aura fails to follow the still relevant Central West Plan - the specifics of our Comprehensive Plan - that calls for 100% instead of 10% townhomes.
- Expensive rentals ($3000/mo) do not meet town needs and are not a base for affordable housing.
- Aura will add 3000 additional vehicle trips a day to an already congested Estes Drive.
- Excessive parking (650 spaces) and vehicles discourage use of transit and reduce Chapel Hill's score for BRT Federal funding.
- The Estes full access entrance, only 800 ft from the MLK intersection, poses unacceptable pedestrian, cyclist, and vehicular public safety risks, including the high likelihood of dangerous T-bone accidents.
- Two percent commercial won't draw people, reduce trips, or contribute to the Town's placemaking aim.
- The requested zone switch from R1 to OI-3 will cause more flooding and environmental damage to the neighboring properties in the Booker and Bolin Creek watersheds.
- The Aura proposed zone - OI-3 - is intended for office and institutional zones. Using it here is defective and deceptive for the intended residential use.

There are six things critically wrong with this project that can be corrected:

1. Turn the unsafe full access Aura entrance on Estes Drive into a right in/right out driveway that will mitigate future bike, pedestrian, and vehicle accidents.
2. Restore missing setbacks to make room for actual shade trees, not tiny ornamentals, and the preservation and sense of scale for the neighborhood.
3. Make Aura "transit oriented" instead of "vehicle oriented" by reducing amount of parking spaces by at least one-half.
4. Return residential impervious limits (40%) to help mitigate flooding and stormwater damage to neighboring properties.
5. Create wealth-building housing ownership opportunities which makes it possible for residents to build equity by offering 175 townhomes as recommended by Central West Plan (and eliminate rentals).
6. Apply for appropriate residential zone, not deceptive OI - 3 that eliminates reasonable setbacks and sensible impervious surface limits.

We make two requests:

1. **We ask that the Council deny the permit until the Town can adopt a comprehensive traffic plan to keep Estes Drive mobile.** Trinsic is not the only developer who wants to develop land in the immediate area. There are a number of additional land owners near the MLK/Estes intersection with plans for development or redevelopment in the near future beginning with Whit Rummel on the

north side of Estes, as well as Sherman Richardson, Lucy Carol Davis, the Farrars, the James Peace estate, and the YMCA on the south side. Note that all of the properties along the south side of N. Estes recently were designated as a federal "Opportunity Zone" for purposes of spurring development.

A holistic approach to traffic planning will promote better outcomes in terms of roadway configurations (i.e., driveway locations, connections, traffic signals) and alignment of area density to Estes Drive roadway capacity. In contrast, the current fragmented, "first mover" approach will prevent some solutions and leave the Town in an untenable position vis-a-vis future applicants for future permits.

2. **We ask our Town Council to follow the Town's adopted Comprehensive Plan by following the Central West plan.** In 2013, the Town Council conducted the first small-area-planning process to address the first "focus area" identified for future growth in the town's 2020 Comprehensive Plan. The town spent over $500,000 on consultants and engaged hundreds of citizens and many staff for a year and a half. This long-range planning process, chaired by current Town Council members Michael Parker and Amy Ryan, yielded the Central West Small Area Plan for the area near the MLK/Estes Drive intersection. The town hired traffic consultants who determined how many more vehicles Estes Drive could handle and, thus, how much more residential and commercial development the area could support. This activity resulted in the current active, funded multi-million dollar project to add bike/ped paths along Estes and to add stacking lanes at the Estes/MLK intersection.

   A past Town Council went to extraordinary lengths to craft the Carolina North Development Agreement that would ensure a beautiful and functional UNC campus. The Central West Plan followed with a Steering Committee of representatives from UNC, the town, the School system and neighboring residents who crafted a thoughtful complement to the Carolina North plan. The Aura property was allocated 175 townhomes and a substantial amount of commercial to create a community benefit. Instead Aura takes 419 housing units, the lion's share of the whole Central West plan's allocation, and offers almost no commercial/retail space that would capture vehicle trips or bring in neighboring resident pedestrians.

   Planning and zoning are valuable tools intended to guide the town's development and growth to ensure a livable town that is sustainable, accessible, healthy and safe for all. **Not to follow the plan and vote for Aura is to reject outright the recommendations of a former Council, the citizens, and staff who spent thousands of hours developing the Central West Plan.**

Finally, delaying rezoning will give the town the opportunity it needs to complete and understand the town wide traffic model. While it is a positive sign that several weeks ago the Town Manager asked the transit staff to build future expected growth into the town wide traffic model that can simulate future conditions on Estes Drive, the Town transit planner acknowledged in a recent presentation that the model is not yet complete and that he and the Town consultant won't have an analysis of the model results for some time. Several neighborhood scientists, engineers, and statistical modelers reviewed the report from the latest traffic study and reached the following conclusions:

- The town wide traffic model remains markedly incomplete and requires substantial additional data in order to establish validity. Ten runs were completed in the current version of the model; ten thousand runs are a standard in scientific evaluations of such models. The runs should include a

wider range of data, more than a single value for event occurrences, and the effects of apparently small, random events on traffic flow.

- In addition, there are no bike, pedestrian, and vehicle interactions modeled yet – a major issue with the proposed Estes full access driveway.

Estes Neighbors is a grass roots group organized in January to make people aware of the consequences of the Aura plan. Estes Neighbors advocate for development that will benefit existing residents, not just the developer, and ensure that Estes Drive remains mobile and safe. Estes Neighbors recently gathered more than 400 signatures petitioning the Town to follow the Central West Plan recommendations to match development densities to Estes Drive capacity.

Taking into consideration this information, along with the hard work of the Chapel Hill residents on the Central West Plan, we urge you to deny this permit.

Respectfully,
Estes Neighbors

And these signers

Beth and Joe Alexander, North Forest Hills

David Ambaras, Estes Hills

Jill Blackburn, Coker Hills

Eugene and Mary Kay Bozymski

Linda K. Brown, Summerfield Crossing

Betty and Tom Bouldin, Somerset – Huntington

Kathyrn Britton, Estes Hills

Scott and Lee Ann Buck, Somerset – Huntington

Kari Castleberry, Coker Hills

Harmony Chi, Coker Hills West

Silvia Clements, Coker Hills

Asta Crowe, former Estes Hills resident

Brian and Julie Daniels, Somerset – Huntington`

Nancy Early, Coker Hills

Steve Fleck, Mt Bolus

Nico and Camile Gourdet, Estes Hills

Amy Gladfelter, Mt Bolus

Dwight and Gail Gillespie,

Amy Gladfelter, Mt Bolus

Laurie Goldwasser, Coker Hills

Elizabeth Harris and Scott Burian, Coker Hill West

Daniel Head and Darek Sady, Coker Hills West

Tom Henkel, Mt Bolus

Clara Hess, Somerset – Huntington

Jan Hendrickson-Smith, Estes Hills

Samuel and Marsha Horowitz, Somerset – Huntington

Ian and Trish Kane, Coker Hills West

Michael Kline, Somerset – Huntington

Ave Lachiewicz, Coker Hills

Willemien Insinger, Hidden Hills

Debbie and Ted LaMay, Hidden Hills

Eduardo Lapetina, Estes Hills

Tao Li and Juanjuan Chang, Estes Hills

Ian Jackson and Erin Pearson, Coker Hills

Sherry T. and Rodney C. Jones, Ironwoods

Rita M. May, Mt Bolus

Molly McConnell, Glen Lenox

Kimberlee O'Neill, Oakes

Chris Parker, Lake Forest

Misaki Toda, Estes Hills

Sandy Turbeville and Glen H. Elder, Jr., Somerset – Huntington

Verla Insko, Estes Hills

Fred Lampe, Coker Hills

Carolyn and David Leith, Estes Hills

Julie McClintock, Coker Hills West

John Morris, Coker Hills West

Pamela and William Perreault, Coker Hills

Theresa Raphael-Grimm, Ian S. Grimm, Somerset- Huntington

James W. Ricci, Hidden Hills

Billie Royal, Coker Hills

Karta Slocum, Estes Hills

Virginia Saam, Ironwoods

Nick Strange, Estes Hills

Pallavi Sukhia, Hidden Hills

Emily Glaze Thomas, Estes Hills

Anne Vermilya, Cedar Hills

Carol Verner, Lake Ellen

Tracy Yan, Estes Hills

Marcia and Robert Vaughn, Somerset – Huntington

Yue and Betsey Wu, Coker Woods

Hangbo Zhang and Xingue Zhu, Coker Woods

Xinding Zhang and Xia Wei, Coker Woods

Hong Zhan and Hui Ding, Coker Woods

Amy Harvey

From: Jeanette Coffin
Sent: Friday, May 14, 2021 8:41 AM
To: Jon Mitchell
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Aura -- list of key conditions

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Jon Mitchell [mailto:capt.jdm@gmail.com]
Sent: Thursday, May 13, 2021 1:22 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Aura -- list of key conditions

Dear Mayor and Council,

Based on last night's meeting, I compiled a list of eight key conditions (below) that I either heard directly from you, or that I humbly suggest based on your comments. Please use your negotiating leverage aggressively to secure the conditions you believe in.

Thanks for all your efforts, including your thoughtful comments last night.

1. Affordable Housing. Many Councilmembers advocated for *on-site* for-sale units, more emphasis on 65% AMI (vs. 80%), and other affordable-housing-related conditions described in the OCHAC letter.

2. Traffic Solution for Somerset. Many Councilmembers recognized the need for a traffic light or circle at Somerset and asked how to move forward. The Mayor asked Mr. Neppalli to start putting this in motion. (To be clear, this is not an Aura approval condition but rather a separate effort the Town must undertake, unless the Town chooses to require Trinsic to contribute financially.) I understand that the process typically takes several years from idea to execution in the best case, meaning that if we start right now, a solution could potentially be in place a year or two after Aura opens.

3. Queueing Data. Ms. Gu pointed out that data regarding the *distribution of queueing outcomes* during the PM peak hour would be useful to better understand the traffic impacts. HNTB said on May 3rd that it already has this data and can provide it.

4. Right In/Out and Somerset Connection. Ms. Anderson and Ms. Ryan pointed out that the full service driveway on Estes poses a safety risk, and that the solution may be to require Mr. Rummel to complete the connection from Aura to Somerset, while imposing a right-in/out restriction on Aura's Estes driveway. Of course, this solution would impose costs on Mr. Rummel (lost trees, lost developable land, driveway construction cost, increased traffic through his property), who may receive little if any benefit. Independent appraisers could perhaps estimate these costs relatively quickly, so that the Town could shift some of them to Trinsic if it wished.

5. Programming. Ms. Ryan observed that programming of the "central park" space will be important. In Southern Village, the Market Street Association (business district association) programs the central green, with support from private sponsors who gain advertising recognition, as well as from ticket sales. Whether Trinsic will feel financially motivated to do something similar seems like an open question. Will Aura residents complain about the noise? The Council might consider imposing a formal condition that Trinsic program the space at specific minimum intervals or make the space available for rent at market rates for similar event spaces.

6. Parking density around Central Park. Mr. Parker observed that the "central park" space is flanked by parking – including parallel parking on the immediate border and back-in parking across the driveway – and that removing some of this parking would allow for widening of the currently rather narrow green space.

7. Setbacks from Estes. Multiple Councilmembers advocated for larger setbacks from Estes and suggested Trinsic could perhaps build higher in the center of the property to compensate.

8. Stormwater and Impervious Surface. Multiple Councilmembers advocated for less impervious surface. Ms. Anderson asked for information about increasing the size of the underground water storage facility.

Respectfully,

Jon Mitchell

Amy Harvey

From: Jeanette Coffin
Sent: Friday, May 14, 2021 8:44 AM
To: Linda Brown
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Aura Disappoints

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Linda Brown [mailto:lkbrown9478392@gmail.com]
Sent: Wednesday, May 12, 2021 10:51 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Aura Disappoints

May 12, 2021

Dear Mayor and Council Members;

Aura is not affordable, provides almost nothing in the way of equity-building homeownership opportunities, and contributes little—if anything--to the town's economic wellbeing.

Each dollar in rent leaves the community and doesn't help the town or county's economy—no multiplier effect—while increasing the need for--and cost of--services

Aura fails to realistically address the affordable housing needs of Chapel Hill.

It fails to create housing stock of various types and price points that include truly affordable and housing ownership opportunities that make it possible for residents to build equity and generational wealth--which we all know is a major component to being able to move out of poverty.

Rentals, like Aura, fail to offer any housing security. Miss a payment and you are out on the street—and the high cost of Aura rentals will make it impossible for a tenant to make up a missed payment.

After renting for 30 years, what does a tenant have?

The town's own consultant stated that Chapel Hill does NOT need any more apartments. It needs housing for the 'missing middle.'

The so-called affordable units at Aura will rent for $1800 a month which is 75% of the monthly income of a person making $15/hr.

I do realize that some people may not want to be, or can't be homeowners but contrast Aura with what Raleigh is doing.

In an effort to create affordable housing and communities along its transit routes, Raleigh approved funding for almost 300 affordable housing units along future bus lines for people making 30% to 80% of its AMI-- which is considerably lower than Chapel Hill's AMI.

192 new units with rents ranging from $418 for a one-bedroom to $1,180 for a three-bedroom, and 90 units with rents ranging from $468 for a one-bedroom to $1,325 for a three-bedroom.

That is affordable—Aura is not.

I know that high land prices provide a financial incentive for developers to build as many units per acre as possible—which for--them means multi-family housing. Yet, density doesn't have to mean massive apartment buildings.

Aura could be a community of townhomes, duplexes, triplexes, and quads of roughly 15 – 30 homes per acre and still provide appropriate density and green space compatible with surrounding communities, while maintaining the town's character.

Please, go back to the drawing board. The town CAN do better. It did with Glen Lennox.

What Aura Could Look Like

https://line.17qq.com/articles/asstwwchx.html

--
LKBROWN9478392@GMAIL.COM

> Only after the last tree has been cut down, only after the last river has been poisoned, only after the last fish has been caught - only then will you find that money cannot be eaten. - Cree Indian proverb

Amy Harvey

From: Jeanette Coffin
Sent: Friday, May 14, 2021 8:44 AM
To: Wayan Vota
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Text of My Verbal Feedback on AURA Development

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

-----Original Message-----
From: Wayan Vota [mailto:wayan@wayan.com]
Sent: Wednesday, May 12, 2021 10:43 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Text of My Verbal Feedback on AURA Development

Thank you council members for listening to me tonight at that May 12th town council meeting. Below is the written version of my verbal comments tonight.

Dear Council Members,

I am Wayan Vota and I am a homeowner in Lake Forest. I've heard so many complaints about AURA in my Estes community. Signs along Estes, flyers in my mailbox, emails on my listserv.

These complaints are from a few people and sound like hypocrisy to me. People who moved here from somewhere - we all did at one point. People who drive vehicles, often multiple vehicles - like we all do. People who added to the town size with their kids - like I have. Even quite outspoken people who actually live in flood zones - unlike many of us.

These people now find the voice to complain about traffic. Complain about runoff. Demand we stop newcomers from moving here. I wonder how Native Americans would feel about that resistance to newcomers?

Honestly, their AURA complaints sounds like NIMBY to me. Not in my backyard. Not on my street. Not in my town. As if our streets and our town can be placed under glass, frozen in time, all progress stopped. As if these NIMBY are the majority. These NIMBYs can only say no. They cannot say yes. Therefore, these NIMBYs do not speak for me.

These NIMBYs do not speak for my neighbours, the silent majority. We want the people, we want the jobs, the commerce, the taxes, the culture that new people bring. We may seem to be silent - no signs, not flyers - no emails cluttering up your lives. But that is because we are busy living our lives, surviving the pandemic. Not retired and bored, picking random fights in a Quixotic effort to stop progress.

Hence, we want you, our elected representatives, to represent us. Represent us as an open, welcoming town of Chapel Hill community. A town that says yes to everyone. Owners, renters, walkers, cyclists, and yes, even drivers,

Thank you,
Wayan

--

Wayan Vota
Mobile/WhatsApp: +1 (919) 537-6654
Twitter/Skype: @wayan_vota

Amy Harvey

From: Jeanette Coffin
Sent: Friday, May 14, 2021 8:44 AM
To: msJuliemcclintock
Cc: Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Another speaker steps down

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

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Office Assistant
Town of Chapel Hill Manager's Office
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Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

-----Original Message-----
From: msJuliemcclintock [mailto:mcclintock.julie@gmail.com]
Sent: Wednesday, May 12, 2021 9:27 PM
To: Amy Harvey <aharvey@townofchapelhill.org>
Cc: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Another speaker steps down

Hi Amy

Jan Hendrickson-Smith will not speak tonight because she needs a full 3 minutes.

Julie

Sent from my iPhone

Amy Harvey

From: Jeanette Coffin
Sent: Friday, May 14, 2021 8:45 AM
To: Carr, Tim
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: YMCA Interest in Comprehensive Traffic Evaluation - Future Development South of Estes Drive

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Carr, Tim [mailto:Tim.Carr@YMCATriangle.org]
Sent: Wednesday, May 12, 2021 8:01 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Cc: Grooms, Kim <Kim.Grooms@YMCATriangle.org>; Judy Johnson <jjohnson@townofchapelhill.org>
Subject: YMCA Interest in Comprehensive Traffic Evaluation - Future Development South of Estes Drive

Mayor and Council,

On behalf of the YMCA of the Triangle Area and the Chapel Hill-Carrboro YMCA, and after participating in the review last week (03 MAY 21) of the Town-wide traffic study, we believe further study is needed. The animation provided during the presentation did not accurately represent current and certainly not future traffic impacts south of Estes Drive, including from the YMCA site.

The YMCA master plan will add a connection to Estes Drive as requested by the Town in our initial SUP process (2000). We believe this will ease some of the congestion at our current entrance and exit at

MLK. It also provides greater circulation across our site, and hopefully better access (vehicular and pedestrian) to our property from the communities to the east, as well as the Aura development.

It seems at this time the traffic overlay inaccurately represented realistic traffic counts south of Estes that in the Town plan for additional arteries, would move YMCA traffic onto Estes aligned with the new Aura driveway. We believe that this requires further study before the Aura project is approved to ensure improvements are adequate for future development of YMCA property and those undeveloped east of the Aura property around Somerset Drive.

The YMCA believes that a comprehensive traffic plan that will take into consideration all the property development particularly south of Estes, including the YMCA and full Aura buildout, is essential before the Town makes any further zoning changes within the Central West Plan.

Thank you for your attention to the issues identified by the community. We are encouraged by growth; just want to be confident that the Y supports the community and does not contribute negatively to a inaccurately developed traffic overlay.

Let me know how we can further assist with this effort.

All the best,
Tim Carr, CFM
Senior Vice President
Real Estate Development & Facility Management

YMCA OF THE TRIANGLE
ASSOCIATION RESOURCE CENTER
801 Corporate Center Drive, Suite 200, Raleigh, NC 27607
919-345-5596 | Tim.Carr@YMCATriangle.org
YMCATriangle.org | @YMCATriangle

The Y. For a Better Us.

Amy Harvey

From: Jeanette Coffin
Sent: Friday, May 14, 2021 8:46 AM
To: ken@joymaker.me
Cc: Colleen Willger; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: FW: Message from Website

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: info@townofchapelhill.org [mailto:info@townofchapelhill.org]
Sent: Wednesday, May 12, 2021 10:11 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Message from Website

A new entry to a form/survey has been submitted.

Form Name:	Contact Mayor and Council
Date & Time:	05/12/2021 10:11 PM
Response #:	443
Submitter ID:	13192
IP address:	2600:1700:3908:8200:79f1:9c1a:aee0:44dc

Time to complete: 8 min. , 10 sec.

Survey Details

Page 1

Submit the form below or email mayorandcouncil@townofchapelhill.org.

1. Name

Ken Brooks

2. Residency*

(○) I am a resident of Chapel Hill

3. Message

I joined the meeting this evening with interest in aura and I signed up to speak. I am deeply distressed that it is now 10:10 and the public has had no opportunity to speak. A public hearing at 10 PM is not a real public hearing, regardless of what the technicalities say, because it is infeasible for parts of the population to be awake. Does the Council prefer to keep the public out of this discussion? One begins to wonder.

A public hearing, on a topic known to be of passionate interest to some community members, should not have been scheduled AFTER the other presentation on the Longview Street development which is at an early phase not requiring public input.

Please, serve your public by putting a priority on making public hearings EARLY in the process of the Council meeting.

Thank you,
Ken Brooks
913 Grove St.

4. If you would like us to contact you regarding this issue, please provide an email or telephone number.

ken@joymaker.me

Note: Mail sent to or received from the Town of Chapel Hill is subject to publication under the provisions of the North Carolina public records law.

Thank you,
Town of Chapel Hill, NC

Amy Harvey

From: Jeanette Coffin
Sent: Monday, May 17, 2021 9:03 AM
To: Megan Foureman
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Estes owner against Aura!

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
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Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Megan Foureman [mailto:meganfoureman@gmail.com]
Sent: Monday, May 17, 2021 8:36 AM
To: Pam Hemminger <phemminger@townofchapelhill.org>; Michael Parker <mparker@townofchapelhill.org>; Karen Stegman <kstegman@townofchapelhill.org>; Hongbin Gu <hgu@townofchapelhill.org>; Amy Ryan <aryan@townofchapelhill.org>; tai.tr.huynh@gmail.com; pshemminger@gmail.com; jcooperanderson@gmail.com; hongbin.gu@gmail.com; allenbuansi23@gmail.com; Maurice Jones <mjones@townofchapelhill.org>; Colleen Willger <cwillger@townofchapelhill.org>; Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Estes owner against Aura!

Hello. I am a homeowner on N. Estes Drive. I am writing to express my grave concern over the possibility of the Aura development.

I was very involved many years ago with the creation of the Central West plan. Since then, I have been patiently waiting and wondering why in the world the proposed improvements are taking so many extra years to materialize. And now, I am just aghast and saddened that our town is even giving the Aura idea a second

glance. Why is Chapel Hill even considering a development that clearly is not at all in alignment with the priorities that were so painstakingly set forth in the Central West plan?

To even consider Aura is a sellout. There will be other development proposals…there is development that will bring vitality AND be in line with Central West. Why did you commit to the CW plan and then deviate from it at your first chance? Why are you not representing the people of Chapel Hill as you have sworn to do? Why are you letting the interests of an out-of-state developer trump those of your neighbors who are begging for safety and for sensible development? Why did you waste so much of my time and our town's money back in 2013 when you told me that my opinion mattered and you committed to the Central West vision?

I do not ask these questions rhetorically. I truly want your answers. I await your responses. I am so disappointed in this town's leadership on this issue.

Megan Foureman

Amy Harvey

From: Jeanette Coffin
Sent: Monday, May 17, 2021 9:05 AM
To: betty boop
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Inclusionary housing

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: betty boop [mailto:lturner89@hotmail.com]
Sent: Saturday, May 15, 2021 3:58 AM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Inclusionary housing

My name is Lorna Turner, and I live in inclusionary housing in the Chandler Woods neighborhood. What I love about where I live is the feeling of safety and community. I feel that continuing to build inclusionary homeownership units like my home is important to the Town of Chapel Hill because without it I would never be able to afford to buy a home in Chapel Hill even though I have been working here for almost 30 years, and there are a lot of us with that same story. Please encourage the builders of the Aura project to work with Community Home Trust to ensure that affordable homeownership units like the one I own are a part of their plan. Thank you.

Amy Harvey

From: Jeanette Coffin
Sent: Tuesday, May 18, 2021 9:13 AM
To: jridkyb@gmail.com
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: FW: AURA
Attachments: Azaela Estate promised.pdf; Azaelea Estate Now 2.jpg; Azaelea Estate Now 3.jpg; Azalea Estate Photo Now 1.jpg

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Jill Blackburn [mailto:jridkyb@gmail.com]
Sent: Monday, May 17, 2021 5:45 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>; Manager <manager@townofchapelhill.org>
Cc: Julie Mcclintock <mcclintock.julie@gmail.com>
Subject: AURA

Dear Mayor, Town Council and Manager,

AURA, the proposed development on the corner of MLK and Estes Drive is in close proximity and/or borders on four established and children friendly neighborhoods.

We remain disappointed that Trinsic never took the time and effort to reach out to the surrounding neighborhoods, to gather our concerns or to learn about important issues that concern property owners.

Likewise, the out of state developer for Azaela Estate, also never choose to meet or share proposed plans with neighbors, especially neighbors who were very directly impacted by the project.

When Franklin Grove was proposed years ago, the developer Koven's came to several neighborhood meetings, spoke with property owners, shared concept plans and gathered useful information and insights from owners. Another shining example is Grubb Properties for Glen Lenox. The time spent was very advantageous in finding a path forward, a path that made it possible for owners, renters and developer to come together and form agreement.

During the lengthy and delayed project development of Azaela Estates, neighbors faced years of on-going disturbances, including the blasting and drilling of rock, homes shaking, some homes were damaged. Construction activity continued for a lengthy time during the work week and on weekends starting early in the AM.

Additionally, please take a look at the photos attached which include the drawings prepared by the developer and the actual photos of Azaela Estates taken last Thursday. A very sharp contrast of what was promised to our town and the surrounding neighborhoods and what property owners view daily.

With the proposed development of AURA, I think we do have the right to be fearful that what the developer is proposing will not come close to what we will all see on a daily basis, especially since the proposal as it stands now, does not even provide for tall mature green canopy or the needed road setbacks from Estes Drive and even MLK.

In contrast, look at the generous setbacks for the Shadowood and Timber Hollow Apartments. They have a lovely dense buffer which lessens road noise and adds aesthetic appeal.

Neighbors deeply care about these issues and we look to you as our Town Manager and elected officials to do all you can to protect established neighborhoods and the quality of life in our community.

Jill Blackburn
President
Coker Hills Neighborhood Association

View at Building Entry

View at Southeast Corner

Chapel Hill Retirement Residence

Chapel Hill, North Carolina

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3150 Kettle Court SE, Salem, Oregon 97301
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View Looking West on Estes Drive

View Looking East on Estes Drive

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Building at South Side

Building at North Side

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Building at East Side

Building at West Side

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Southeast Aerial

Northeast Aerial

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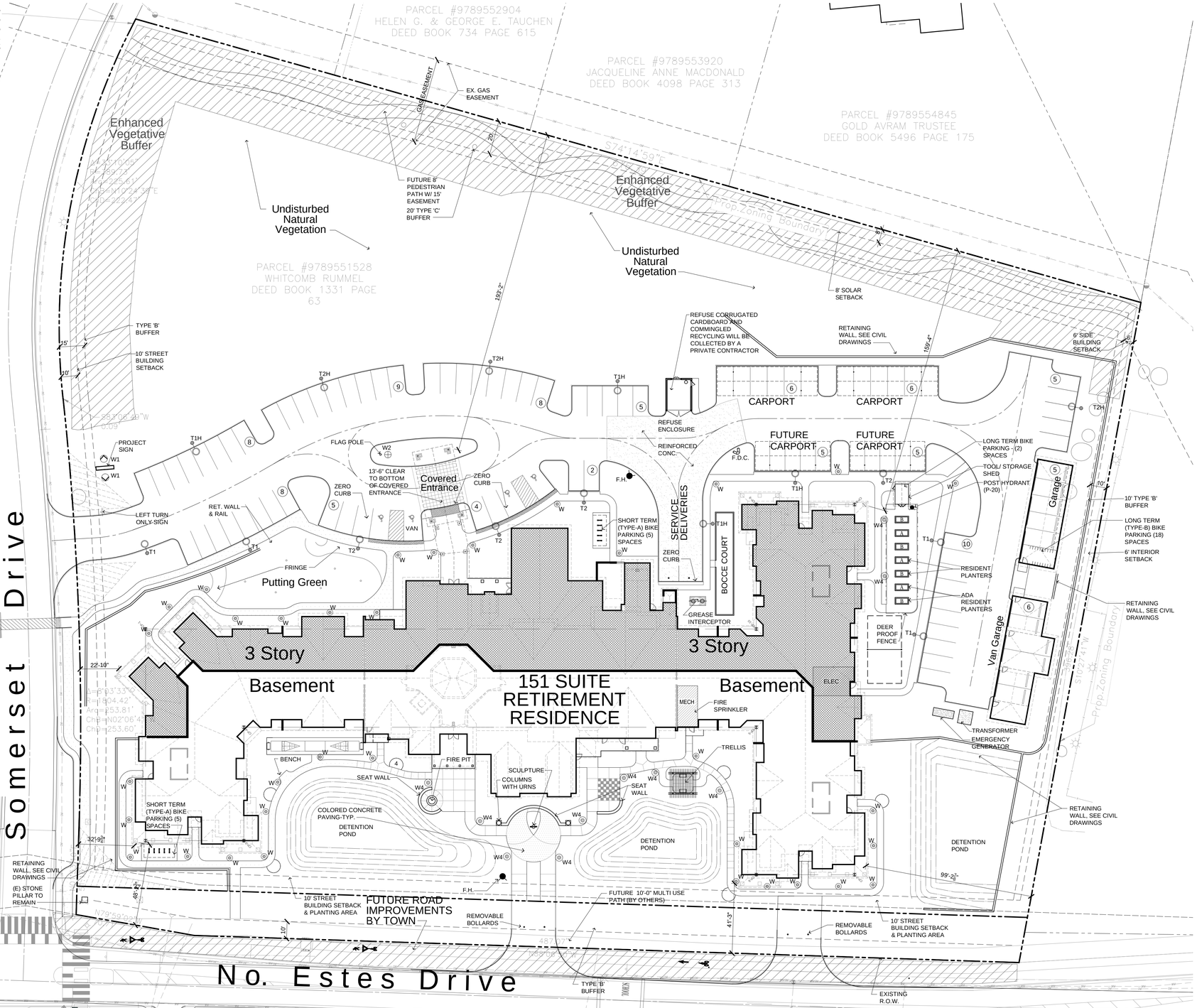

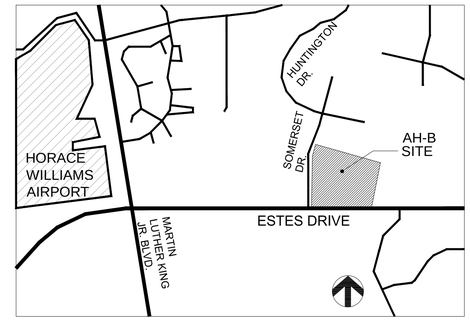

PROPOSED AH-B SEGMENT TO AIRPORT HAZARD OVERLAY DISTANCE ORDINANCE 3.6.1.

PROJECT STATISTICS:

PROJECT AREA:

TOTAL AREA 6.437 Acres Net	280,439 SQ. FT.	
Total Building Coverage:	47,464 SQ FT	16.9%

Area Calculations:

Retirement Building:	44,379 SQ. FT.	15.8%
Out Buildings:	3,085 SQ. FT.	1.1%
Drives:	39,857 SQ. FT.	14.2%
Walks & Patios:	18,112 SQ. FT.	6.4%
Landscaped Openspace:	175,006 SQ. FT.	62.5%

Pervious / Impervious Area

Impervious Area:	37.5%	Pervious Area:	62.5%

PARKING:

Retirement Project:
- 60 Open Spaces
- 33 Covered Spaces
- 4 Accessible Spaces
- 97 Total Spaces

BIKE PARKING

- 10 Short Term Spaces
- 20 Long Term Spaces
- 30 Total Spaces

SITE PLAN

Site Plan

DATE: Jan. 18, 2017
SCALE: 1" = 30'-0"

0 15 30 60 90

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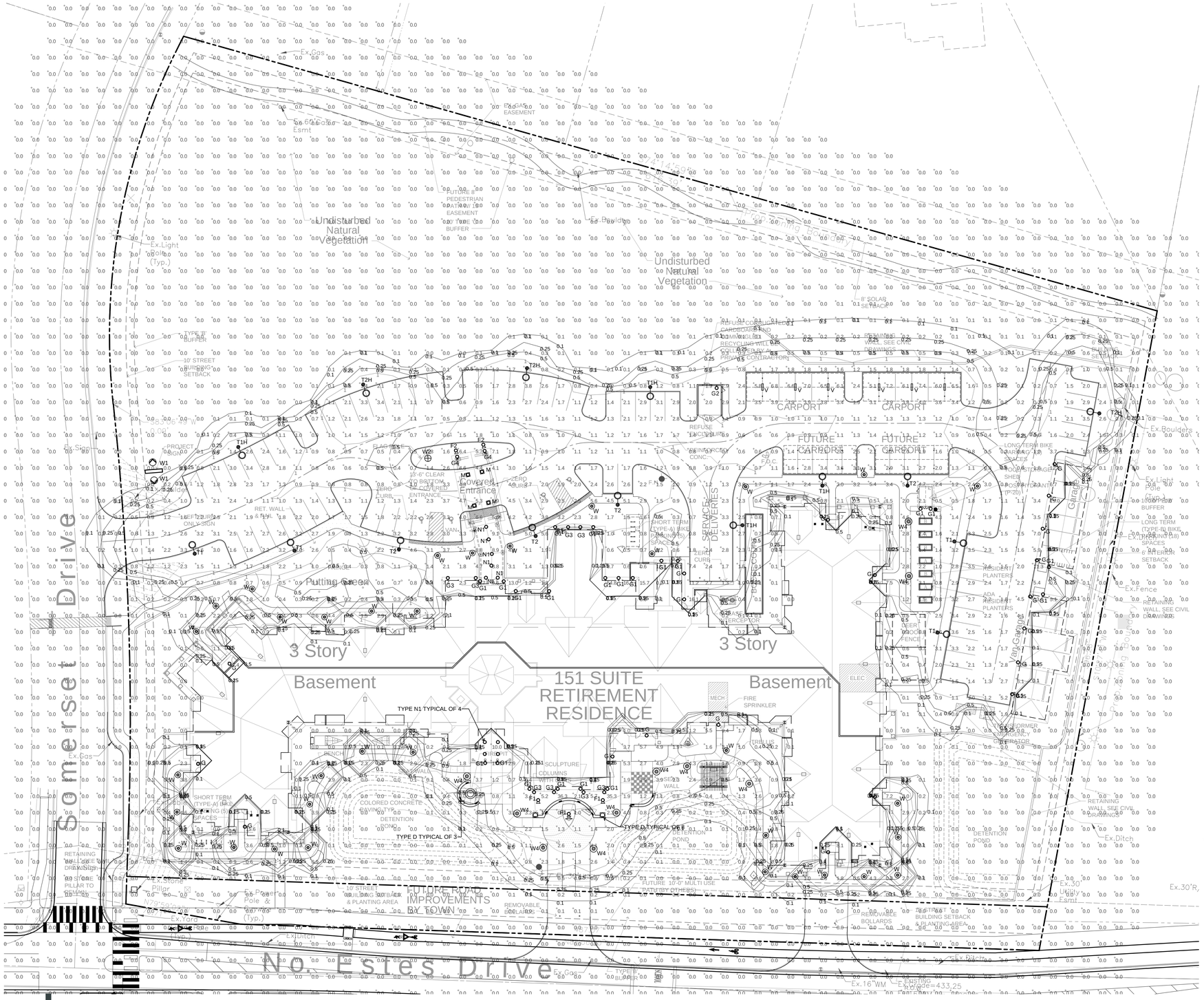

LUMINAIRE SCHEDULE

Symbol	Label	Mounting Height	Catalog Number	Description	Lamp	Lumens	LLF	Watts
▲	D	1'-6" A.F.G.	LITHONIA WSL1F	RECESSED STEP LIGHT. DIE CASTING ALUMINUM HOUSING WITH LOUVERED DOOR.	ONE 13-WATT FLUORESCENT	900	0.75	22.41
▷○	F1	6" A.F.G.	E-CONOLIGHT E-GL3L01N2K	7.8"L. X 3"DIA. X 5-13/16"H. KNUCKLE MOUNT ACCENT LIGHT FLOOD REFLECTOR TEMPERED GLASS LENS	LED 7 WATT 600 LUMENS	600	0.95	7
▷○	F2	6" A.F.G.	E-CONOLIGHT E-GL1S03N2K	7.8"L. X 3"DIA. X 5-13/16"H. KNUCKLE MOUNT ACCENT LIGHT SPOT REFLECTOR TEMPERED GLASS LENS	LED 38 WATT 2000 LUMENS	2000	0.95	38
▷○	F3	6" A.F.G.	E-CONOLIGHT E-GL1F03N2K	7.8"L. X 3"DIA. X 5-13/16"H. KNUCKLE MOUNT ACCENT LIGHT FLOOD REFLECTOR TEMPERED GLASS LENS	LED 38 WATT 2000 LUMENS	2000	0.95	38
○	G	8' A.F.G.	E-CONOLIGHT E-WP6L03NZ	CAST BLACK PAINTED FINNED METAL HOUSING, 120 LED ARRAY, FORMED WHITE PAINTED METAL REFLECTOR WITH 1.0625 X 1.8125" APERTURE, CLEAR CONVEX GLASS LENS	LED 36 WATT 3,350 LUMENS 4,000 K	3350	0.95	36
○	G1	8' A.F.G.	E-CONOLIGHT E-S12L014U	WALL MOUNTED LED FIXTURE	LED 16 WATT 950 LUMENS 4,000 K	950	0.95	16
○	G2	5' A.F.G.	E-CONOLIGHT E-WW1L21NMP	WALL MOUNTED LED FIXTURE	LED 22 WATT 1228 LUMENS 4,000 K	1,228	0.95	22
○	G3	8' A.F.G.	E-CONOLIGHT E-S22L034U Up/Down Wall Sconce	Up/Down Wall LED Sconce	LED 30 WATT 1,850 LUMENS 4,000 K	1,850	0.95	30
○	G4	14' A.F.G.	E-CONOLIGHT E-DG1L13USK	ENTRY CANOPY WALL SCONCE WITH	LED 15 WATT 1,260 LUMENS 4,000 K	1,260	0.95	15
▣	M	14' A.F.G.	E-CONOLIGHT E-RC2L04CW	16" RECESSED CANOPY LIGHT	LED 42 WATT 4,100 LUMENS 4,000 K	4,100	0.95	42
○	N1	9' A.F.G.	HALO SLD612940WH	6" SURFACE MOUNT DOWNLIGHT, WHITE PAINTED TRIM.	LED 15 WATT 1,000 LUMENS 4,000 K	1,000	0.95	15
○	T1	13'-6" A.F.G. (12' POLE WITH 1'-6" POLE BASE)	Lithonia Lighting DSX0 LED 40C 530 40K T4M MVOLT HS	DSX0 LED WITH (2) 20 LED LIGHT ENGINES, TYPE T4M OPTIC, 4000K, @ 530mA WITH HOUSE SIDE SHIELD	LED	7,700	0.95	68
○	T2	13'-6" A.F.G. (12' POLE WITH 1'-6" POLE BASE)	Lithonia Lighting DSX0 LED 40C 530 40K T4M MVOLT	DSX0 LED WITH (2) 20 LED LIGHT ENGINES, TYPE T4M OPTIC, 4000K, @ 530mA	LED	7,700	0.95	68
○	T3	13'-6" A.F.G. (12' POLE WITH 1'-6" POLE BASE)	Lithonia Lighting DSX0 LED 40C 530 40K T3M MVOLT HS	DSX0 LED WITH (2) 20 LED LIGHT ENGINES, TYPE T3M OPTIC, 4000K, @ 530mA WITH HOUSE SIDE SHIELD	LED	7,700	0.95	68
○	T4	13'-6" A.F.G. (12' POLE WITH 1'-6" POLE BASE)	Lithonia Lighting DSX0 LED 40C 530 40K T3M MVOLT	DSX0 LED WITH (2) 20 LED LIGHT ENGINES, TYPE T3M OPTIC, 4000K, @ 530mA	LED	7,700	0.95	68
◎	W	2'-6" A.F.G.	VISTA 1447-B-CR-13	WALKWAY - FLOURESCENT LANDSCAPE LIGHT	ONE 13-WATT CPF - FLOURESCENT	1200	0.95	18
⌃	W1	6" A.F.G.	E-CONOLIGHT E-CF3L03N2Z	LED FLOODLIGHT	LED 30 WATT 3,000 LUMENS 4,000 K	3,000	0.95	30
⊕	W2	6" A.F.G.	E-CONOLIGHT E-HL5S06N2Z	LED SPOT LIGHT WITH 20° BEAM.	LED 72 WATT 6,150 LUMENS 4,000 K	6,150	0.90	72
◎	W4	9' A.F.G. (8' POLE FIXTURE HEIGHT 1')	LIGHTWAY TRZP-21-U-1T42-4-W2	21"DIA. X 16-3/8"H. POST TOP FIXTURE WHITE REFLECTOR HOOD CLEAR TEMPERED GLASS JAR LENS	ONE 42-WATT FLOURESCENT	3200	0.75	43.86
▭	V	CEILING	LITHONIA DMW 2 32	4FT WET LOCATION ENCLOSURE WITH (2) T8 LAMPS, 50% DR HIGH IMPACT ACRYLIC LENS.	TWO 32-WATT LINEAR FLUORESCENT T8, 735	2800	0.8	56.7

Site Lighting Photometric Plan

DATE: 01/18/2017
SCALE: 1" = 30'-0"

0 15 30 60 90

SITE LIGHTING PHOTOMETRIC PLAN

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Chapel Hill, NC

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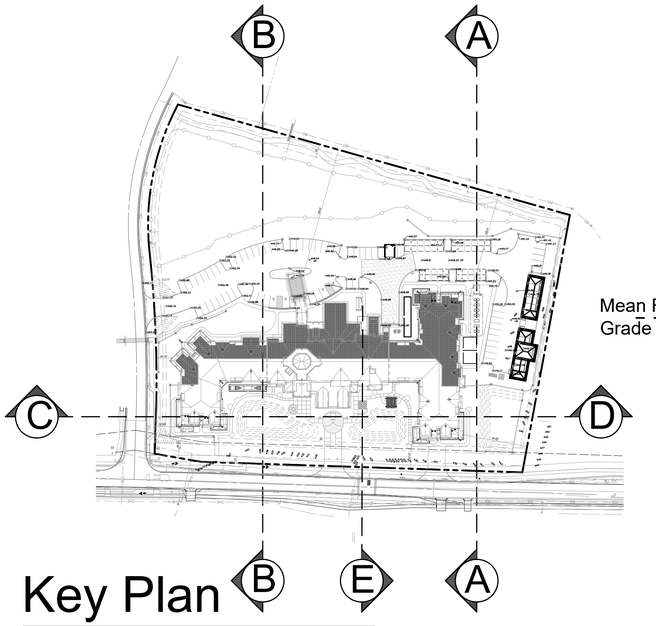
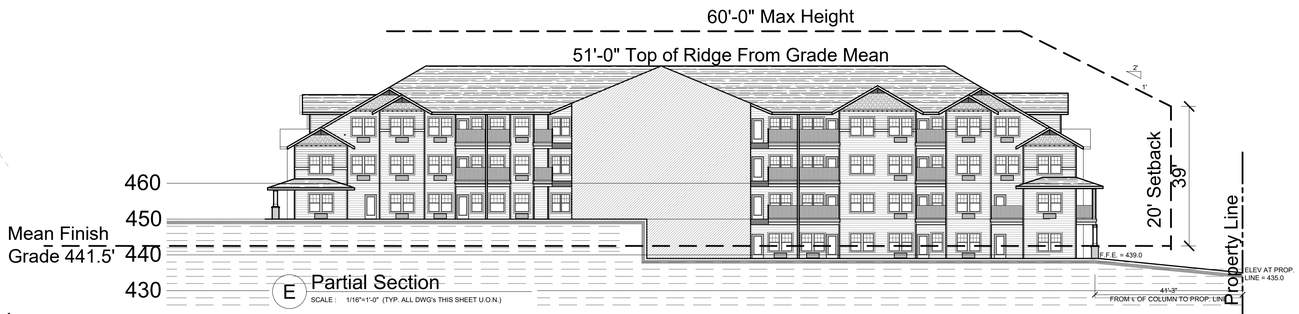
E1.1

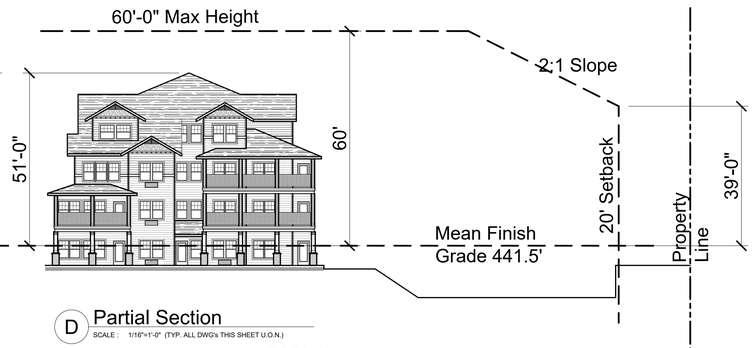


Key Plan



E Partial Section
SCALE : 1/16"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)

C Partial Section
SCALE : 1/16"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)



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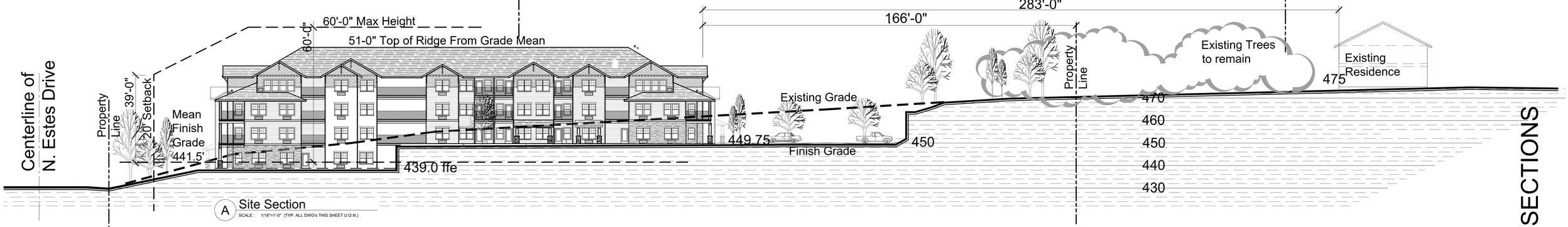
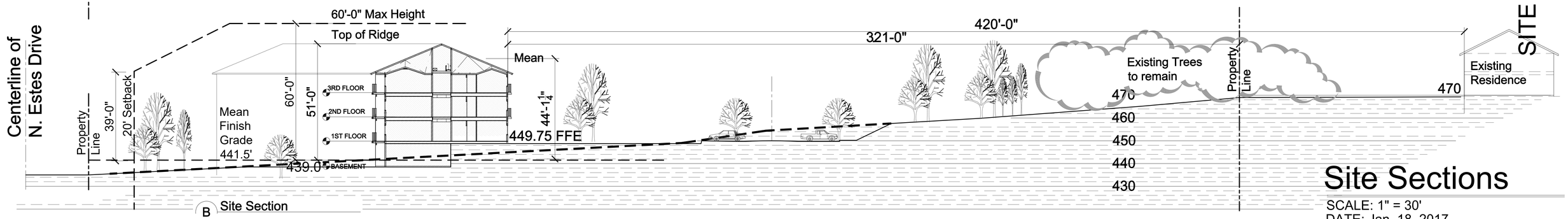
SCALE : 1/16"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)



A Site Section
SCALE : 1/16"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)



B Site Section

SITE SECTIONS

Site Sections

SCALE: 1" = 30'
DATE: Jan. 18, 2017

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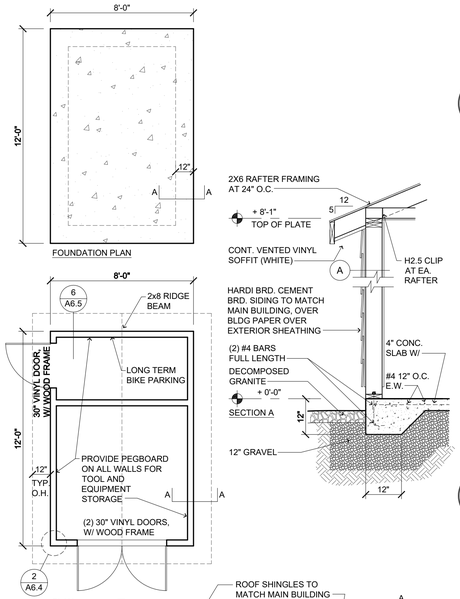
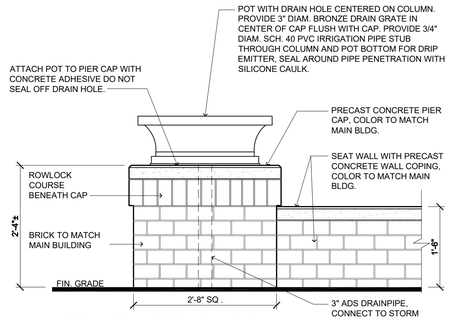


8 TOOL SHED
(GARDEN TOOL AND EQUIPMENT STORAGE)

SCALE: 1/4" = 1'-0"

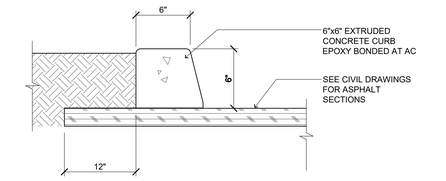
P:/HAWTHORN/NC-CHAPEL HILL/DETAILS/02870018PS



9 COLUMN / BENCH WALL

SCALE: 3/4" = 1'-0"

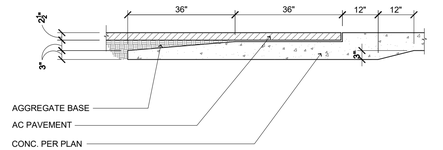
T:/02SITEWK/830FENCE/02830019



5 CURB DETAIL
(CURB / ASPHALT)

SCALE: 1 1/2" = 1'-0"

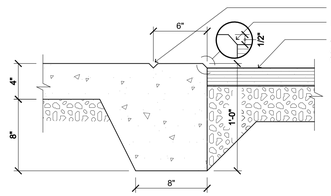
T:/02SITEWK/520PCPAV/02520006



2 PAVEMENT TRANSITION
(PAVEMENT AND CONCRETE)

SCALE: 1/2" = 1'-0"

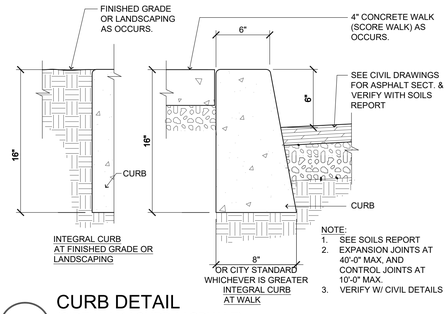
T:/02SITEWK/520PCPAV/02520025



7 WALK DETAIL
(WALK / PAVING AT ENTRY)

SCALE: 1 1/2" = 1'-0"

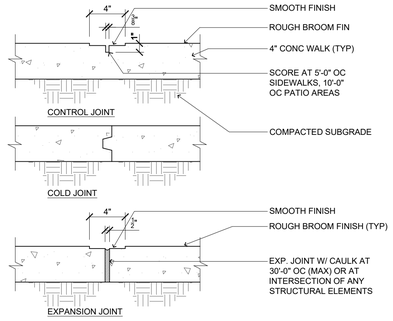
T:/02SITEWK/520PCPAV/02520005



4 CURB DETAIL
(SIDEWALK / CURB / ASPHALT)

SCALE: 1 1/2" = 1'-0"

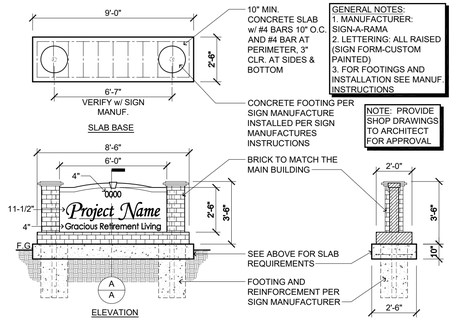
T:/02SITEWK/520PCPAV/02520002



6 WALK/PATIO DETAIL
(CONCRETE WALK JOINTS)

SCALE: 1 1/2" = 1'-0"

T:/02SITEWK/520PCPAV/02520004

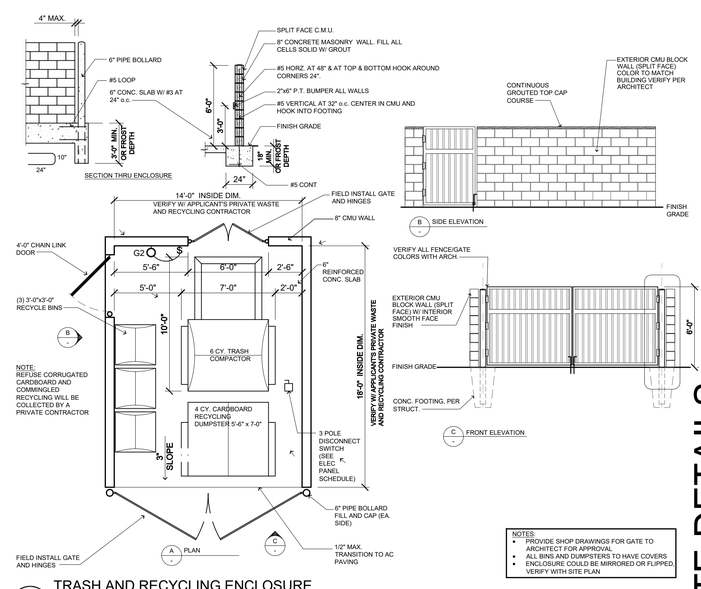


3 PROJECT SIGN
(SEPARATE PERMIT REQUIRED)

SCALE: 1/4" = 1'-0"

T:/01GENERL/580PROJC/01580011

VERIFY ALL DETAILS WITH CIVIL DRAWINGS AND SOILS REPORT



1 TRASH AND RECYCLING ENCLOSURE

SCALE: 1/4" = 1'-0"

P:/HAWTHORN/NC-CHAPEL HILL/DETAILS/02870021

SITE DETAILS

Site Details

DATE: Jan. 18, 2017
SCALE: AS NOTED

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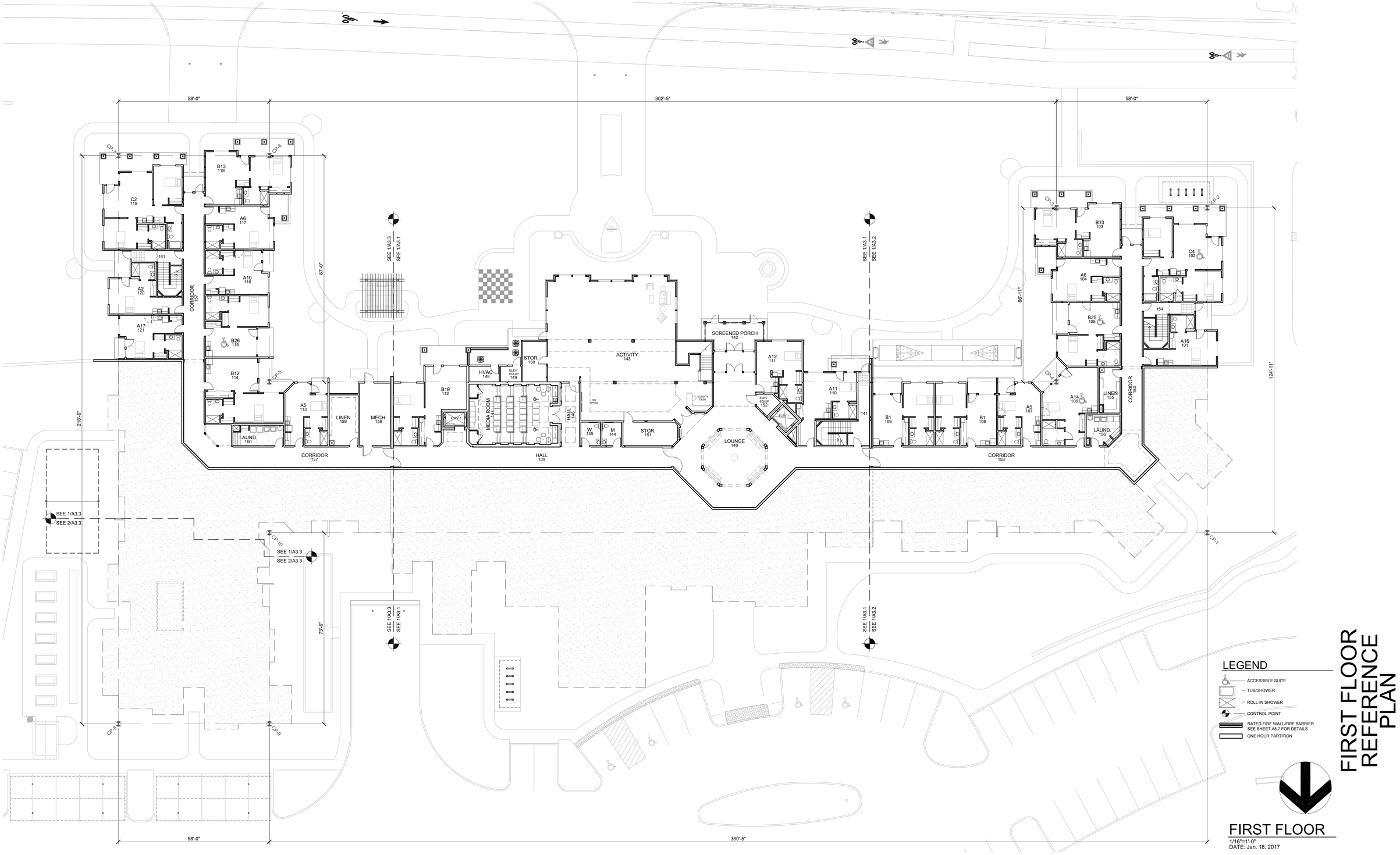

LEGEND

- ACCESSIBLE SUITE
- TUB/SHOWER
- ROLL-IN SHOWER
- CONTROL POINT
- RATED FIRE WALL/FIRE BARRIER SEE SHEET A8.7 FOR DETAILS
- ONE HOUR PARTITION

FIRST FLOOR REFERENCE PLAN

FIRST FLOOR

1/16"=1'-0"
DATE: Jan. 18, 2017

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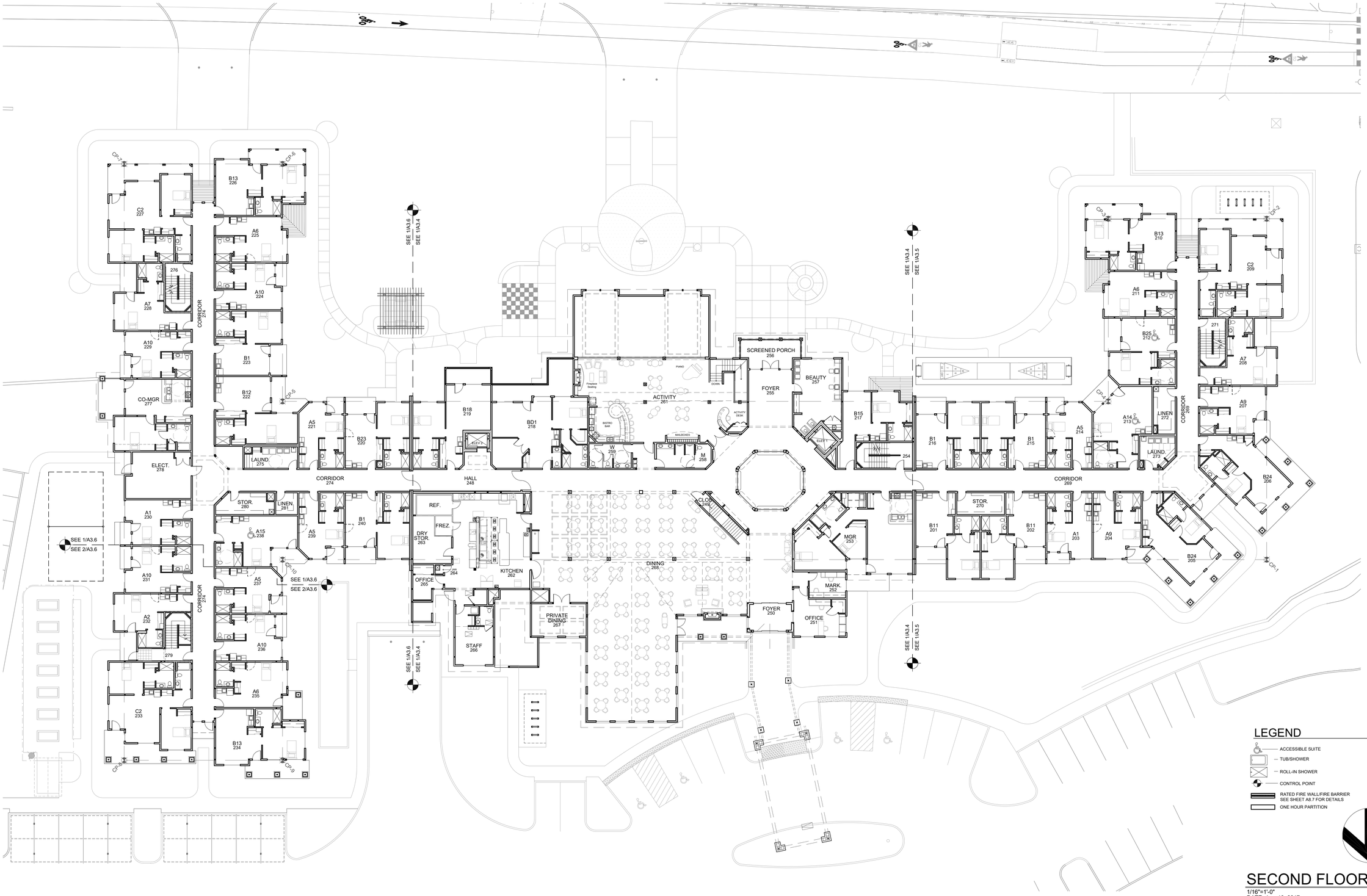
A2.1



LEGEND

- ACCESSIBLE SUITE
- TUB/SHOWER
- ROLL-IN SHOWER
- CONTROL POINT
- RATED FIRE WALL/FIRE BARRIER SEE SHEET A8.7 FOR DETAILS
- ONE HOUR PARTITION

SECOND FLOOR REFERENCE PLAN

SECOND FLOOR

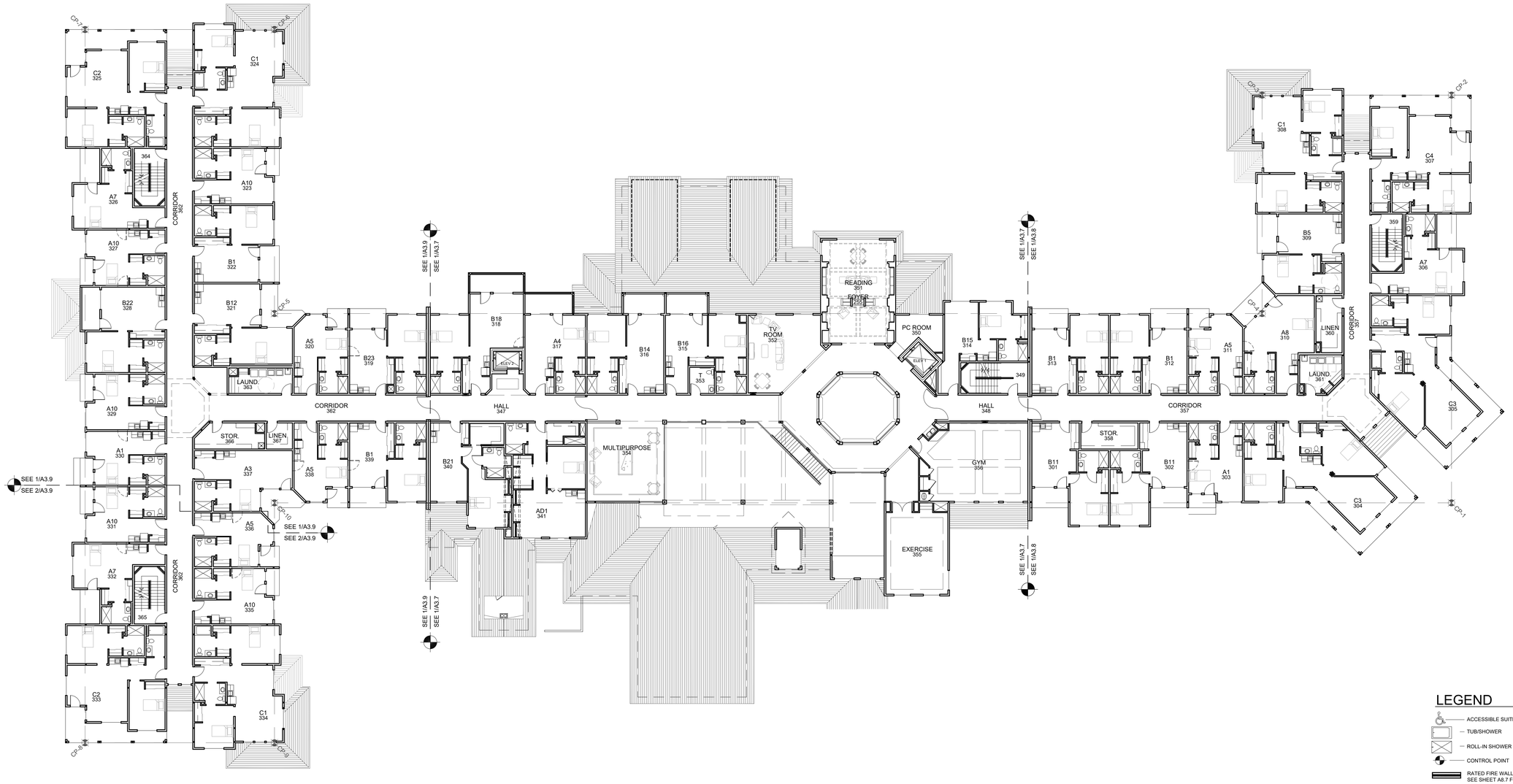
1/16"=1'-0"
DATE: Jan. 18, 2017

Chapel Hill Retirement Residence

Chapel Hill, NC

lenity architecture, inc.
3150 Kettle Court SE, Salem, Oregon 97301
P 503 399 1090 F 503 399 0565 W lenityarchitecture.com

HAWTHORN RETIREMENT GROUP
9310 NE Vancouver Mall Dr., Suite 200
Vancouver, WA 98662-8210
(360) 213-1550 Fax (360) 213-1540



LEGEND

- ACCESSIBLE SUITE
- TUB/SHOWER
- ROLL-IN SHOWER
- CONTROL POINT
- RATED FIRE WALL/FIRE BARRIER SEE SHEET A8.7 FOR DETAILS
- ONE HOUR PARTITION

THIRD FLOOR REFERENCE PLAN

THIRD FLOOR

1/16"=1'-0"
DATE: Jan. 18, 2017

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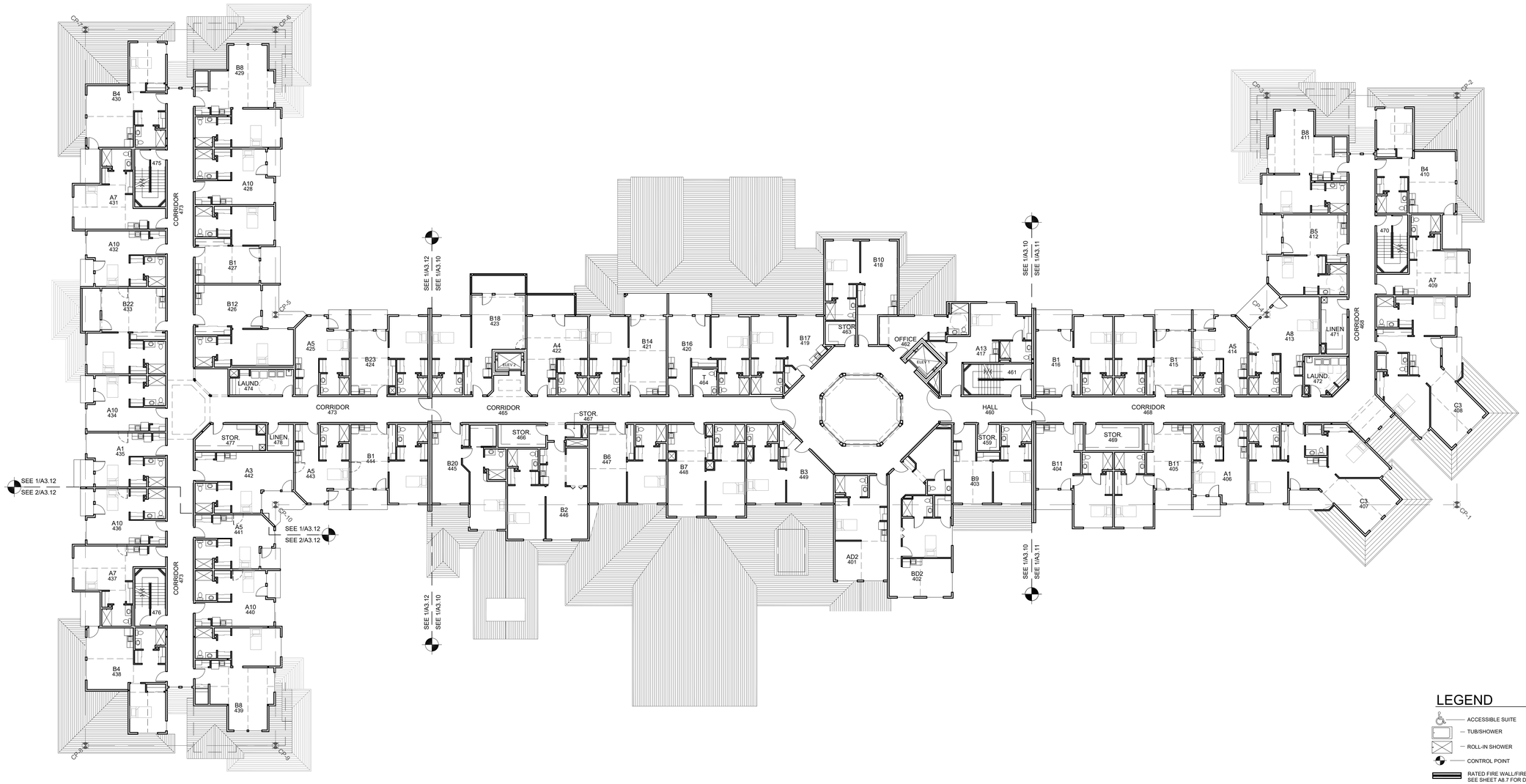

LEGEND

- ACCESSIBLE SUITE
- TUB/SHOWER
- ROLL-IN SHOWER
- CONTROL POINT
- RATED FIRE WALL/FIRE BARRIER SEE SHEET A8.7 FOR DETAILS
- ONE HOUR PARTITION

FOURTH FLOOR REFERENCE PLAN

FOURTH FLOOR

1/16"=1'-0"
DATE: Jan. 18, 2017

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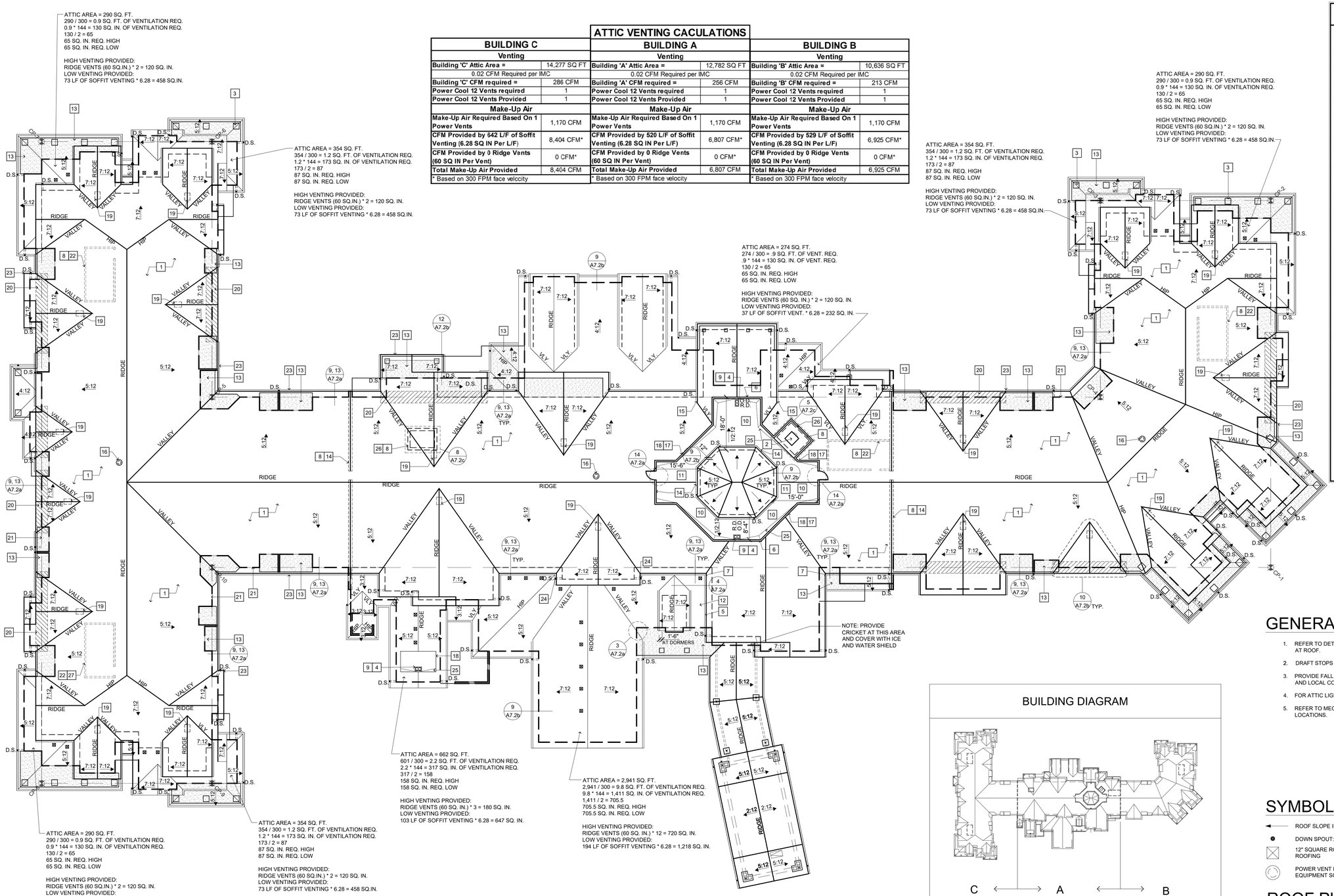
ATTIC VENTING CACULATIONS

BUILDING C		BUILDING A		BUILDING B	
Venting		**Venting**		**Venting**	
Building 'C' Attic Area =	14,277 SQ FT	**Building 'A' Attic Area =**	12,782 SQ FT	**Building 'B' Attic Area =**	10,636 SQ FT
0.02 CFM Required per IMC		0.02 CFM Required per IMC		0.02 CFM Required per IMC	
Building 'C' CFM required =	286 CFM	**Building 'A' CFM required =**	256 CFM	**Building 'B' CFM required =**	213 CFM
Power Cool 12 Vents required	1	**Power Cool 12 Vents required**	1	**Power Cool 12 Vents required**	1
Power Cool 12 Vents Provided	1	**Power Cool 12 Vents Provided**	1	**Power Cool 12 Vents Provided**	1
Make-Up Air		**Make-Up Air**		**Make-Up Air**	
Make-Up Air Required Based On 1 Power Vents	1,170 CFM	**Make-Up Air Required Based On 1 Power Vents**	1,170 CFM	**Make-Up Air Required Based On 1 Power Vents**	1,170 CFM
CFM Provided by 642 L/F of Soffit Venting (6.28 SQ IN Per L/F)	8,404 CFM*	**CFM Provided by 520 L/F of Soffit Venting (6.28 SQ IN Per L/F)**	6,807 CFM*	**CFM Provided by 529 L/F of Soffit Venting (6.28 SQ IN Per L/F)**	6,925 CFM*
CFM Provided by 0 Ridge Vents (60 SQ IN Per Vent)	0 CFM*	**CFM Provided by 0 Ridge Vents (60 SQ IN Per Vent)**	0 CFM*	**CFM Provided by 0 Ridge Vents (60 SQ IN Per Vent)**	0 CFM*
Total Make-Up Air Provided	8,404 CFM	**Total Make-Up Air Provided**	6,807 CFM	**Total Make-Up Air Provided**	6,925 CFM
* Based on 300 FPM face velcity		* Based on 300 FPM face velocity		* Based on 300 FPM face velocity	



KEY NOTES

1. CLASS "A" ARCH. COMP ASPHALT SHINGLE ROOFING, SEE DETAIL 1/A7.2a
2. BUILT UP SHAFT FOR MECHANICAL LOUVER, SEE DETAIL 6/A7.2c
3. OUTLINE OF COLUMN BELOW
4. MOUNT DRAINS INTO 2" DEEP WELL CANT ALL EDGES TYP. SEE DETAIL 6/A7.2a
5. DOWNSPOUT TO RUN DOWN ROOF ALONG DORMER TO EDGE, TYP.
6. PARAPET WALL 8" ABOVE RIDGE W/ 24 GA. CAP FLASHING (TYP).
7. SPLASH BLOCK
8. 2 HR WALL TO UNDERSIDE OF ROOF SHT'G.
9. ROOF DRAINS HARD PIPED TO STORM SEWER, 3" DIA. OVERFLOW DRAINS TO DAYLIGHT AT SOFFIT TRIM OPENING W/ G.I. ESCUTCHEON.
10. FLAT ROOF WITH "TPO" ROOFING COLOR: WHITE
11. MECH. EQUIPMENT ON ROOF SEE M4.2
12. HEAT TAPE THIS AREA.
13. (1) LAYER 5/8" TYPE "C" EXT. GYP. SHT'G. OVER RC, ASSEMBLY 'G1'
14. FIREWALL BELOW SEE DETAIL 13/A8.8
15. OPEN END GUTTERS.
16. POWER VENTS SEE MECHANICAL
17. CANT STRIP (TYP.) SEE DETAIL 2/A7.2a
18. RAKE, SEE DETAILS 12,17/A7.2a AND 1/A7.2b
19. PROVIDE 22"X30" CUT OUT AT EACH HIGH POINT OF GABLE FOR VENTING. TYPICAL OF ALL GABLES.
20. ROOF SHEATHING THIS AREA TO BE CONT. TO EXTERIOR WALL UNDER OVER-FRAMING SEE DETAIL 10/A7.2b.
21. 8'-1" TOP OF PLATE ABV. F.F. AT TOP FLOOR
22. LINE OF STAIR WALL BELOW
23. SEE DETAIL 9/A6.5 FOR GUTTER TERMINATION. (AT DECK LOCATION)
24. D.S. TO ROOF BELOW.
25. CRICKET
26. LINE OF ELEVATOR BELOW
27. 1 HR WALL TO UNDERSIDE OF ROOF SHTG.

KEYNOTES INDICATED ABOVE ARE APPLICABLE FOR THE ROOF PLAN SHEET ONLY

BUILDING DIAGRAM

GENERAL NOTES:

1. REFER TO DETAIL 10/A7.2a FOR VENT PIPE PENETRATIONS AT ROOF.
2. DRAFT STOPS NOT REQUIRED.
3. PROVIDE FALL ARREST HOOKS PER MANUF. SPECIFICATIONS AND LOCAL CODES O.S.H.A.
4. FOR ATTIC LIGHTING AND POWER LAYOUT, SEE "E" SHEETS.
5. REFER TO MECH. AND ELEC. PLANS FOR POWER ATTIC FAN LOCATIONS.

SYMBOLS LEGEND:

- ROOF SLOPE INDICATED ON PLAN
- DOWN SPOUT: 3" x 4" TYPICAL
- 12" SQUARE ROOF VENT W/ 9"Ø OPENING. COLOR TO MATCH ROOFING
- POWER VENT LOCATION - SEE DETAIL 8/E2.2b AND EQUIPMENT SCHEDULE ON M4.2 FOR EF-9 SPECS.

ROOF PLAN

1/16"=1'-0"
DATE: Jan. 18, 2017

ROOF PLAN

Chapel Hill Retirement Residence

Chapel Hill, NC

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A FRONT ELEVATION

SCALE : 1/8"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)

KEY NOTES/COLORS

1	ROOF	= ARCH. COMP. 25 YR. ELK COLOR: WEATHERWOOD
2	SIDING	= CEMENT BOARD SIDING POP OUTS COLOR: JAMES HARDIE - MOUNTAIN SAGE
3	SIDING	= CEMENT BOARD SIDING COLOR: JAMES HARDIE - HEATHERED MOSS
4	SIDING	= CEMENT BOARD SIDING COLOR: JAMES HARDIE - AUTUMN TAN
5	SIDING	= SHINGLE SIDING (EAVE'S) COLOR: JAMES HARDIE - AUTUMN TAN
6	TRIM	= TRIM BOARD COLOR: JAMES HARDIE - WHITE
7	WINDOW	= VINYL FRAMED INSULATED WINDOWS W/TRIM COLOR: WHITE
8	FASCIA	= 2x8 FASCIA W/CONT. GUTTER COLOR: WHITE
9	RAILING	= PRE-MANUFACTERED ALUMINUM RAILING COLOR: WHITE
10	VENTS	= TRIANGLE GABLE VENTS COLOR: WHITE
11	BRICK	= BRICK MUTUAL MATERIALS COLOR: BROWN VARITONE
12	DECTEC	= 60 MIL DEC TEC GUARDIAN MEMBRANE COLOR: BRICK
13	PTAC	= PTAC COLOR: TO MATCH ADJACENT BUILDING COLOR, TYP.

A FRONT ELEVATION

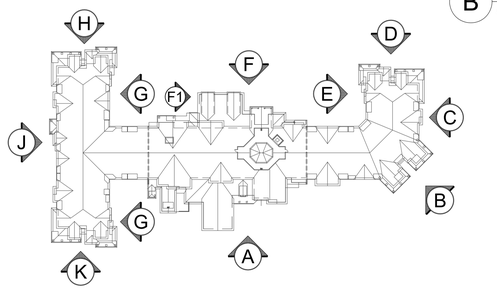
SCALE : 1/8"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)

B WING B ELEVATION

SCALE : 1/8"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)

C WING B ELEVATION

SCALE : 1/8"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)



ELEVATION KEY

SCALE: N.T.S.

NOTE: FOR ALL LIGHTING TYPES, STYLES AND COLORS, PLEASE SEE SEPARATE LIGHTING CUT SHEETS

EXTERIOR BUILDING ELEVATIONS

Building Elevations

DATE: 01/18/2017

SCALE: AS NOTED

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A6.3a

D WING END ELEVATION

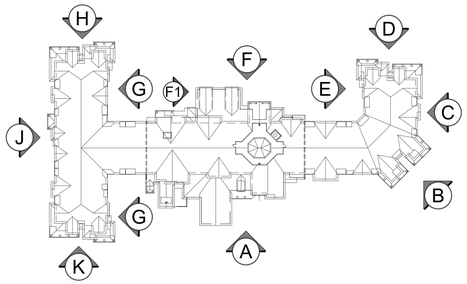
SCALE : 1/8"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)

E WING B ELEVATION

SCALE : 1/8"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)

F REAR ELEVATION

SCALE : 1/8"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)



ELEVATION KEY

SCALE: N.T.S.

F REAR ELEVATION

SCALE : 1/8"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)

NOTE: FOR ALL LIGHTING TYPES, STYLES AND COLORS, PLEASE SEE SEPARATE LIGHTING CUT SHEETS

KEY NOTES/COLORS

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10 VENTS	= TRIANGLE GABLE VENTS COLOR: WHITE
11 BRICK	= BRICK MUTUAL MATERIALS COLOR: BROWN VARITONE
12 DECTEC	= 60 MIL DEC TEC GUARDIAN MEMBRANE COLOR: BRICK
13 PTAC	= PTAC COLOR: TO MATCH ADJACENT BUILDING COLOR, TYP.

EXTERIOR BUILDING ELEVATIONS

Building Elevations

DATE: 01/18/2017
SCALE: AS NOTED

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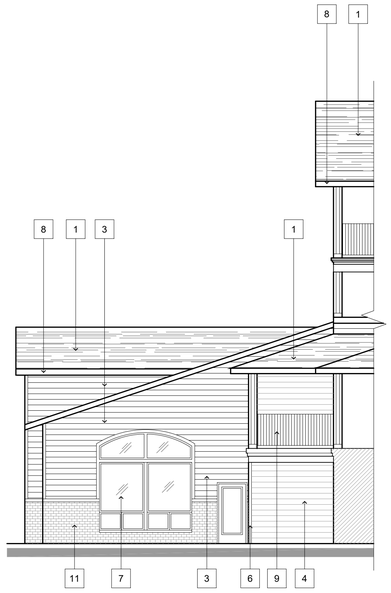
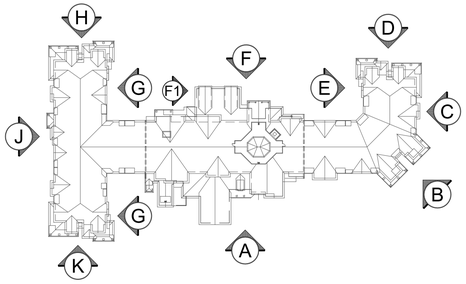


F1 WING B ELEVATION

SCALE : 1/8"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)

H WING END ELEVATION

SCALE : 1/8"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)



ELEVATION KEY

SCALE: N.T.S.

KEY NOTES/COLORS	
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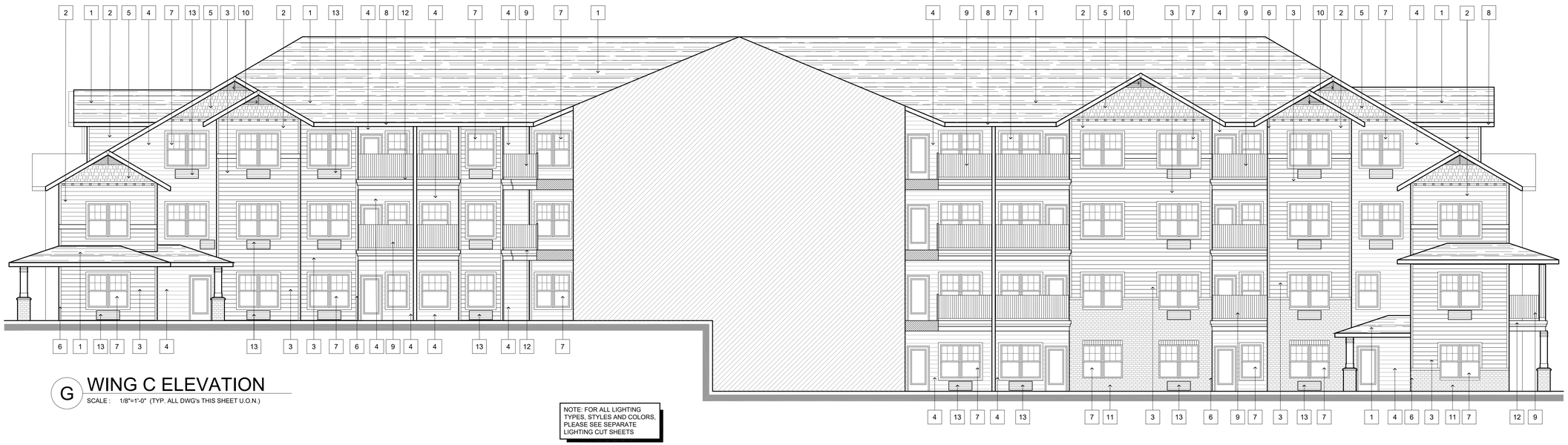

G WING C ELEVATION

SCALE : 1/8"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)

NOTE: FOR ALL LIGHTING TYPES, STYLES AND COLORS, PLEASE SEE SEPARATE LIGHTING CUT SHEETS

EXTERIOR BUILDING ELEVATIONS

Building Elevations

DATE: 01/18/2017
SCALE: AS NOTED

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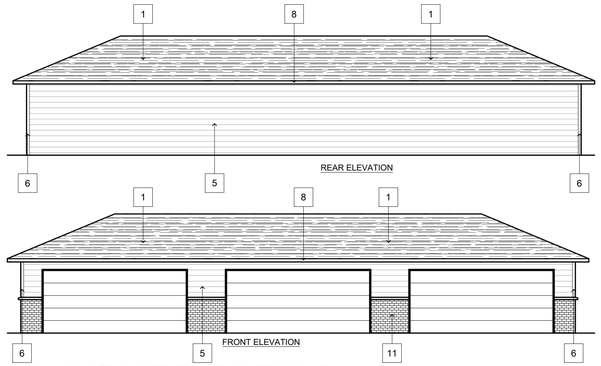
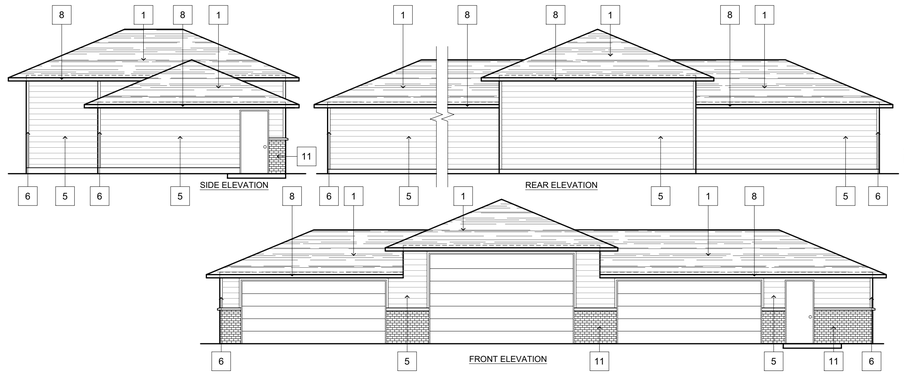


L GARAGE ELEVATIONS

SCALE : 1/8"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)

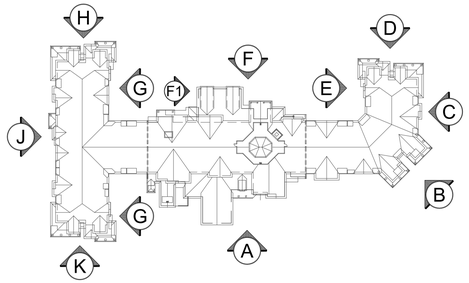


M VAN GARAGE ELEVATIONS

SCALE : 1/8"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)

J WING C ELEVATION

SCALE : 1/8"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)



ELEVATION KEY

SCALE: N.T.S.

J WING C ELEVATION

SCALE : 1/8"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)

NOTE: FOR ALL LIGHTING TYPES, STYLES AND COLORS, PLEASE SEE SEPARATE LIGHTING CUT SHEETS

K WING END ELEVATION

SCALE : 1/8"=1'-0" (TYP. ALL DWG's THIS SHEET U.O.N.)

KEY NOTES/COLORS

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EXTERIOR BUILDING ELEVATIONS

Building Elevations

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700

Amy Harvey

From: Jeanette Coffin
Sent: Tuesday, May 18, 2021 11:20 AM
To: Lynn Wilson
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: AURA and what we neighbors can do

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

-----Original Message-----
From: Lynn Wilson [mailto:lynnswildhearth@gmail.com]
Sent: Tuesday, May 18, 2021 11:16 AM
To: info@estesneighbors.org
Cc: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: AURA and what we neighbors can do

I'm wondering what we neighbors can do to reduce traffic on Estes Drive … and whether the new development can include services that make walking or biking easier for us… possibly including walking-biking options safe for the school kids … and the elders moving in to Azalea. I'd love to be able to walk to a grocery store there … or eat out at a community-focused place (like Weaver Street Market is in Carrboro)! A Community Pharmacy and a bank would be an asset too. I'm SUPER glad to hear that a new bike-way is planned for the MLK-Estes intersection. Thank you!

WHY are we doing so much driving up and down Estes?

Lynn Wilson
208 Justice Street

Amy Harvey

From: Jeanette Coffin
Sent: Tuesday, May 18, 2021 11:21 AM
To: Eduardo Lapetina
Cc: Loryn Clark; Colleen Willger; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Decline Aura!

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

-----Original Message-----
From: Eduardo Lapetina [mailto:lapetina@bellsouth.net]
Sent: Tuesday, May 18, 2021 10:41 AM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Decline Aura!

Please reject the Aura Project since the traffic will be horrible on North Estes Drive where I live. I have disability and It will be difficult for me to drive when the traffic increases in such way.
Sincerely, Eduardo Lapetina

Sent from my iPhone

Amy Harvey

From: Jeanette Coffin
Sent: Tuesday, May 18, 2021 4:56 PM
To: Jessica Lanford Beardsley
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Concern over Aura

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
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Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Jessica Lanford Beardsley [mailto:jessica.beardsley@gmail.com]
Sent: Tuesday, May 18, 2021 4:17 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Concern over Aura

Greetings mayor and town council,

Thank you for serving our community! I live in Coker Hills neighborhood and I'm very concerned for the aura proposed development. The plan does Not take into account our priorities for affordable housing and environmental sustainability (70% impervious surface). What also highly concerns me about this development is the major increase in traffic this will cause. We enjoy living close to our children's s schools and we have the privilege of walking to school- however with the added cases and transportation to and from these residences and businesses will make an already busy intersection unbearable.

Please consider the community impact and precedent that this development will have.

Again, thank you for your thoughtful consideration!

Jessica Beardsley
--
Jessica Beardsley, MS, RD, LDN

Amy Harvey

From: Jeanette Coffin
Sent: Tuesday, May 18, 2021 4:57 PM
To: Katharine Kollins
Cc: Colleen Willger; Dwight Bassett; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Aura development - PLEASE adhere to Central West Dev Plan

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Katharine Kollins [mailto:kwkollins@gmail.com]
Sent: Tuesday, May 18, 2021 11:42 AM
To: Town Council <mayorandcouncil@townofchapelhill.org>; Scott Kollins <scott.kollins@gmail.com>
Subject: Aura development - PLEASE adhere to Central West Dev Plan

Dear CH Town Council -

I am writing to express my concerns about the lack of adherence to the Central West development plan. Why do we spend time and money creating solid stakeholder led development plans, if we just intend to scrap them. This development plan is part of what led us to purchase our home at 602 Surry Rd in the Estes Hills neighborhood. That plan, in addition to the Estes Dr. pedestrian project that has been on hold since we purchased our home 5 years ago!

Please make Estes Dr. a safe place to walk, ride, and go to school. We have two children who are at Estes Hills Elementary and will go to Phillips Middle. I already cringe every day walking to school with the traffic and lack of genuinely safe ways to get to school.

The Aura project will not only be terrible for traffic, but also for sustainable development. When people purchase property, they rely on consistent and predictable decisions from elected officials. We made the biggest purchase of our lives, assuming the town would continue to uphold the responsible development outlined in the Central West plan. Whatever community comes to our corner at Estes and MLK needs to be genuinely sustainable, include green and community space, and most importantly, encourage reasonably priced housing with access to public transportation options that people will use.

I implore you NOT to approve a zoning change for Aura and to please find a developer willing to work on sustainable, human centered development for our community.

Thank you,
Katharine Kollins - voter, mother, NGO executive, neighbor, cyclist, walker, and active community member

Amy Harvey

From: Jeanette Coffin
Sent: Wednesday, May 19, 2021 8:40 AM
To: Chris Wildeman
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: aura project

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

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Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

-----Original Message-----
From: Chris Wildeman [mailto:christopher.wildeman@duke.edu]
Sent: Wednesday, May 19, 2021 7:14 AM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: aura project

Hi,

I don't usually write emails like this -- my assumption is that folks who work in city government have a much better sense of how things in an area should be done than I do -- and I haven't lived in Chapel Hill all that long -- just a little over a year -- but I wanted to write to say that I strongly oppose the Aura project at the intersection of Estes and MLK.

Before highlighting the pieces that I find especially concerning, I wanted to note first that I oppose it even though it is almost certain to increase the value of my property (1705 Audubon Road) since it basically means that I would live in a cute neighborhood that is sandwiched between not one but two luxury apartment complexes (the big one by Whole Foods and the Aura one) if this should go forward. So this isn't a NIMBY sort of email where I'm just trying to protect my own wealth.

That being said, the project strikes me as deeply problematic for three
reasons:

1. It's basically all very high-end units, and there's no increase in services (places to get healthy food, etc.) as a result of the complex going in. I know this is a rapidly growing and expensive area, but I don't think what we need is more luxury units. At the very least, you would want a bit more of a mix than we have in this proposal.

2. The traffic is going to be a mess. I mostly drive out the Franklin side -- I only go out to MLK side to take my youngest kid to childcare
-- but that intersection is already pretty dicey (which I realize is not a particularly technically sophisticated phrase), and this would certainly make it far worse, both because of cars coming in and out of the complex and just because of there being more cars.

3. I've lived all over the country, and flooding/water problems in general are worse here than anywhere else I've lived (which isn't a critique of the city -- I recognize it's just a different climate, topography, and soil type here). As someone who runs right by where the Aura complex would be every day, I can tell you with a high degree of certainty that any raised site on that side of Estes is going to produce a huge amount of water any time we get a heavy rain, which is both dangerous and another traffic disruption.

So please don't move forward with this. That area *should* be developed
-- it's massively beneficial to have more housing right on public transportation -- but it should be done in a way that offers something to the community (in the sense of food, services, etc.) and that is not cost-prohibitive for most folks living in this area. The Aura project, while it's likely to ultimately benefit me by making this area feel even more elite to potential buyers, is not the right fit and should be discarded.

So vote no!

Chris Wildeman

--
Christopher Wildeman

Professor of Sociology
Director of the National Data Archive on Child Abuse and Neglect Duke University

Professor
ROCKWOOL Foundation Research Unit

Amy Harvey

From: Jeanette Coffin
Sent: Wednesday, May 19, 2021 8:41 AM
To: Julia Lawrence
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Aura

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Julia Lawrence [mailto:julialawrence336@gmail.com]
Sent: Tuesday, May 18, 2021 7:07 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Aura

Dear Mayor and Council Men and Women,
I am writing to express my opinion that the Aura project planned for Estes Drive is a very bad idea for our community. I live on Estes drive near Library Drive and have had a child at Estes Hill and Phillips Middle School. We walk Estes Drive every day several times a day with our dogs. The traffic is very difficult and we have been witness to many car accidents both near our house and at the crossing guard near the school all of which could have ended tragically with the pedestrian traffic. We love Chapel Hill because it is a walking town and it was a large part of the reason we moved her 5 years ago. We will be so disappointed if this decision is made that is clearly not in the interest of encouraging walkers on Estes Drive. Our area has too

many uninhabited high end condos that are not being used and further development of similar housing is really taking away from our charm and the spirit of Chapel Hill. I fail to understand why the developer is getting a designation for zoning for university research and development and the council will have to be accountable to how that was justified if the project proceeds.
Sincerely,
Julia Lawrence
336-354-5852

Amy Harvey

From: Jeanette Coffin
Sent: Wednesday, May 19, 2021 8:43 AM
To: Steve Fleck
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: questions from May 3

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Steve Fleck [mailto:magritte88@yahoo.com]
Sent: Tuesday, May 18, 2021 5:15 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Cc: EstesNeighbors1 <estesneighbors@gaggle.email>
Subject: questions from May 3

Dear Mayor, Town Council, and Manager Jones,

It's been brought to my attention that on the Town's Aura website,

https://chapelhill.granicus.com/MediaPlayer.php?clip_id=4877

the May 3 special Council meeting (introducing the townwide traffic analysis model) includes a list of questions posed, with a notice: "answers to be posted":

Are these answers to be posted soon? Time for consideration of the Aura project's zoning request is, as you know, running quickly.

Thank you for your consideration,

Best Regards,
Steve Fleck
102 Sycamore Drive

Amy Harvey

From: Jeanette Coffin
Sent: Wednesday, May 19, 2021 10:37 AM
To: Katherine Cardoza
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Dwight Bassett; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Aura affordability

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Katherine Cardoza [mailto:kacardoza@gmail.com]
Sent: Wednesday, May 19, 2021 10:35 AM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Aura affordability

My name is Kate Cardoza, and I am a Community Home Trust homeowner. I live in inclusionary housing in the East54 community. Thank you for advocating for more inclusionary homeownership units in the proposed Aura development. It's important to me that we continue to build more inclusionary housing in Chapel Hill, like the home I own, because it is important that folks who work in Chapel Hill/Carrboro can afford to live here also. Please continue to encourage the developers of Aura to work with Community Home Trust to ensure homeownership units are included in their plans.
Sincerely,
Kate

~~~~~~

For the ones who are forgotten, the ones the amendments do not stand up for. For the ones who are told to speak only when you are spoken to and then are never spoken to. Speak every time you stand so you do not forget yourself. –Anis.Mojgani
~~~~~~

Amy Harvey

From: Jeanette Coffin
Sent: Wednesday, May 19, 2021 12:46 PM
To: Roberts, Sherry
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Aura

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Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
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Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Roberts, Sherry [mailto:Sherry_Roberts@unc.edu]
Sent: Wednesday, May 19, 2021 12:05 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Cc: Kimberly Sanchez (ksanchez@communityhometrust.org) <ksanchez@communityhometrust.org>
Subject: Aura

My name is Sherry Roberts, and I am a Community Home Trust homeowner. I live in inclusionary housing in the Greenway Condominiums in Meadowmont. Thank you for advocating for more inclusionary homeownership units in the proposed Aura development. It's important to me that we continue to build more inclusionary housing in Chapel Hill, like the home I own, because I would have not been able to afford the beautiful home I have lived in for 17 years and want others to have this opportunity. Please continue to encourage the developers of Aura to work with Community Home Trust to ensure homeownership units are included in their plans.

Best regards,
Sherry Roberts
#
#

Sherry Roberts
919-968-8329
sherry@unc.edu

Amy Harvey

From: Jeanette Coffin
Sent: Wednesday, May 19, 2021 2:22 PM
To: Beth Grimes
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Support for Aura from a Lake Forest Resident

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

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Sincerely,

Jeanette Coffin

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Office Assistant
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Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Beth Grimes [mailto:bethgrimes72@gmail.com]
Sent: Wednesday, May 19, 2021 1:59 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Support for Aura from a Lake Forest Resident

I support Aura. I support the growth and forward movement in Chapel Hill that AUra will bring. I support the taxes, the jobs, the people, the shops, the restaurants, and the new energy that this exciting development can provide to my neighborhood. This community can only grow and thrive with new energy brought by new skills from fresh new ideas and new residents. I have lived in Chapel Hill for 12 years and I welcome new people and new faces.

We can all overcome the challenges that growth might bring, but we cannot overcome the stagnant decline of a community who does not welcome growth and new ideas.

I am an Aura neighbor, and I strongly support Aura.

Beth Grimes
600 Lakeshore Lane

Amy Harvey

From: Jeanette Coffin
Sent: Wednesday, May 19, 2021 2:37 PM
To: Lynn Weller
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Aura development - please adhere to Central West Dev Plan

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Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
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Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Lynn Weller [mailto:lynnweller@gmail.com]
Sent: Wednesday, May 19, 2021 2:35 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Aura development - please adhere to Central West Dev Plan

Dear CH Town Council,
I am writing to express my concerns about the proposed Aura project and the lack of adherence to the Central West development plan - a solid stakeholder-led development plan that we should be using.
The Aura project will not only be terrible for traffic, but also for sustainable development. Whatever community comes to the corner at Estes and MLK needs to be genuinely sustainable, include green and community space, and most importantly, encourage reasonably priced housing with access to public transportation options that people will use.

I implore you NOT to approve a zoning change for Aura and to please find a developer willing to work on sustainable, human centered development for our community.

Thank you,
Lynn Weller

Amy Harvey

From: Jeanette Coffin
Sent: Wednesday, May 19, 2021 2:38 PM
To: carolyn eastwood
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE:

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Sincerely,

Jeanette Coffin

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Office Assistant
Town of Chapel Hill Manager's Office
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Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: carolyn eastwood [mailto:carolyneastwood021@gmail.com]
Sent: Wednesday, May 19, 2021 2:25 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject:

Why would a commercial section be included in the Aura plans if there is an issue of traffic concerns regarding MLK and Estes? It seems obvious that will make a bad situation worse.

Amy Harvey

From: Jeanette Coffin
Sent: Thursday, May 20, 2021 10:41 AM
To: Charles Fiore
Cc: Colleen Willger; Dwight Bassett; Loryn Clark; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Opposition to Aura from Estes Hlls Neighbor

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Charles Fiore [mailto:lcfiore@yahoo.com]
Sent: Wednesday, May 19, 2021 9:11 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Opposition to Aura from Estes Hlls Neighbor

Dear Mayor Hemminger and Town of Chapel Hill City Council,
I am writing to express my opposition to the Aura Development proposal on the corner of MLK and Estes, as it exists now. I am a resident of Estes Hills.

My reasons are numerous, and include traffic concerns. Pre-pandemic, traffic would back-up from MLK and Estes as far east as Somerset during rush hour. I walk my child to and from elementary school each day. We wait to cross Estes on a corner that doesn't have a safe spot to wait to cross. The town has promised pedestrian improvements to Estes now for more than a decade, with nothing

to show for it. The Aura development would only make our neighborhood less safe for pedestrians, less family friendly, and generally less liveable.

My other big issue is the 600 parking spaces and so much impervious surface--and no community green space. There is nothing less walkable and less neighborhood friendly than a giant parking lot. There are real environmental concerns with this development, and the developer has refused to release information about potential water run-off. Also, any development in that marquee property needs to include some kind of feature which the community can enjoy.

Many Chapel Hill residents live here because it's NOT Cary, or Apex, or even Durham. Perhaps development is inevitable--although I can't see a reason to add more retail space when so much retail and office space around Chapel Hill remains vacant--but hasn't Chapel Hill already built enough soulless, lego loft buildings along 15/501 to last for generations?

Thank you for your consideration, and for telling these developers--none of whom have to live with whatever monstrosity they end up building--to go back to the drawing board.

Sincerely,
Charles Fiore
Estes Hills

Amy Harvey

From: Jeanette Coffin
Sent: Thursday, May 20, 2021 3:16 PM
To: Jen Foreman
Cc: Colleen Willger; Loryn Clark; Dwight Bassett; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Feedback on AURA project

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Jen Foreman [mailto:jennifer.foreman@gmail.com]
Sent: Thursday, May 20, 2021 3:06 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Feedback on AURA project

Dear Mayor Hemminger and Council,

I'm writing to share my concerns about the AURA project on Estes Drive. I travel that road very regularly from my home off Homestead Road, to visit friends and family and to get to the grocery store, library, and parks. I meet friends for outdoor exercise at Philips Middle School. Estes is a two-lane road that's already very heavily traveled and the recent Azalea retirement community will add to that volume once fully occupied. I was shocked when I learned the density and lack of environmental considerations planned for the Aura project, given the town's Central West plan. If the town sidesteps its own planning efforts here, you will be setting a

precedent that will jeopardize all future planning. I love living in Chapel Hill/Carrboro and one of the main reasons is that the towns are thoughtful, strategic, and intentional in planning, and that comes across in how my family and I walk to shopping, enjoy outdoor areas, and how safe I feel with my children riding their bikes on the roads. The momentum behind this AURA project leaves me feeling vulnerable for the future. We live in a wonderful community and people will always want to capitalize on that. But please let's do this with consistency and let's keep to our own planning. Please help me keep my faith in the leaders of Chapel Hill. Do not allow the AURA project to move forward without significant revision. Please follow the Central West plan.

Jennifer Foreman

Amy Harvey

From: Jeanette Coffin
Sent: Friday, May 21, 2021 1:23 PM
To: Rachel Kelley
Cc: Colleen Willger; Dwight Bassett; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Aura concerns

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Rachel Kelley [mailto:rbellkelley4@gmail.com]
Sent: Friday, May 21, 2021 11:18 AM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Aura concerns

Good morning,

I am writing about my concerns for the proposal of Aura on MLK and Estes road. As a 10+ year resident of Chapel Hill/Carrboro, I have watched that intersection and all the traffic in town get busier and more dangerous each and every year.

I often cross the road as a pedestrian trying to get to the YMCA and either find myself waiting close to 10 minutes because people do not yield for the walk sign, or nearly get run over because people taking a right don't

stop to look if some one is crossing. I also drive through that intersection multiple times a day and its stressful, but is the only way to drive on Estes to get into Carrboro.

I was part of the community that helped plan and give input in the 2020 plan back in 2013, I was at many of the meetings and NO ONE (except maybe some developers that joined the meeting) wanted something like Aura. The town spent 18 months, 1/2 a million dollars, and countless hours of the time of consultants and townspeople. The result was a beautiful plan that would guide development in this very area. The development would be mixed-use, it would tend to environmental concerns unique to this area, and it would make pedestrian safety and accessibility a high priority. It would also focus on development that would further accentuate the character of the area and promote a village model. The Aura plan does not adhere to ANY of the principles of Central West. Why did the town waste so much time and money making a plan? Why are they choosing to sell out to the first out-of-state money-grabbing developer that comes our way? Those of us who oppose Aura do not oppose development in general…we just sincerely believe that this particular development is way off the mark…completely inappropriate and unsafe for this site and not in line with the goals and needs of the community.

I also question the traffic study. From what I saw the study happened during the pandemic and in the summer. It needs to happen during school and once people get back to the office. Most people I know are still working from home until at least next November and going forward with any traffic study before next fall is a serious mis step in my mind.

If Aura goes in as planned, you will be constantly hearing from the neighbors, nearby, the parents of all the children that attend the school and can't get to pick up or drop off their kids, and the residents of Carrboro who can no longer get over from Carrboro on Estes to reach 40 to get to work.

Thank you for your time, I urge you to please consider and start looking at more local builders who actually live in the area and know our community. We do NOT want to live in generic town-land like Cary.

Rachel Kelley

Amy Harvey

From: Jeanette Coffin
Sent: Monday, May 24, 2021 10:05 AM
To: buckhouse4@nc.rr.com
Cc: Colleen Willger; Dwight Bassett; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Hidden and Suspect Figures in the AURA Stormwater Impact Analysis That the Developer Wants You to Miss

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: buckhouse4@nc.rr.com [mailto:buckhouse4@nc.rr.com]
Sent: Sunday, May 23, 2021 4:44 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Cc: Ernest Odei-Larbi <eodei-larbi@townofchapelhill.org>; Chris Roberts <croberts@townofchapelhill.org>; Lance Norris <lnorris@townofchapelhill.org>
Subject: Hidden and Suspect Figures in the AURA Stormwater Impact Analysis That the Developer Wants You to Miss

I am grateful for your thoughtful consideration of the AURA proposal.

I realize the Mayor and Council have had to adapt to this year like none other. I have as a health care provider. Council is tired of COVID and its challenges. And I suspect you

are tired of AURA, and want the decision to be done. Most importantly, you want the right decision to be done.

Respectful of your time, I'm bringing to your attention as efficiently as I can, worrisome findings within the 90 page Stormwater Impact Analysis (SIA). It is likely you have been told or read a summary narrative that the proposal meets engineering and LUMO standards. But there are serious problems beneath the surface of the water, and the surface of the report. There is a disconnect between the report and reality, and the report buries meaningful adverse outcomes.

Here is the condensed version. Below in paragraph form are itemized detailed descriptions.

1. The report is predicated on 1 day rain events, starting with empty reservoir/water diversion system.

   Bottom line: The premise of calculations based on 1 day rain, while permissible within engineering reporting, is not reality and underestimates rain burden.

2. Pre/post Impervious Surface, Release Volume, and Release Rates don't make sense.

   Bottom line: Real numbers, not modeled predictions that benefit the applicant, should prevail. Real numbers indicate much more water volume than modeled.

3. Developer is paying for excess stormwater run-off with sand.

   Bottom line: Increased stormwater volume is hidden by engineering credit number-crunching, but it will still run downhill.

4. Rain will leave reservoir system rapidly; otherwise it could not be contained.

   Bottom line: Rain will leave the reservoir system rapidly, based on numbers buried in the document.

Thank you for your commitment to making Town of Chapel Hill the best it can be.

Scott Buck

208 Huntington Drive

Itemized detailed description.

1. The report is predicated on 1 day rain events, starting with empty reservoir/water diversion system. Why does it matter? It matters because we frequently have sequential rain days. For example using the NOAA data set that the Town uses, a "10 year rain" is 5.17 inches of rain in one day, and the cumulative probability of that occurring over the next five years is 41%, but the cumulative probability of that same amount of rain over two days is 67%. Even looking at "100 year rain," the amount is 7.62 inches of rain in one day, and the cumulative probability of that occurring over the next ten years is 9.6%, but the cumulative probability of a similar (actually slightly greater amount) falling over two days is 18.3%. Extending this further to "200 year rain," the amount is 8.41 inches of rain in one day, and the cumulative probability of that occurring over the next ten years is 4.9%, but the cumulative probability of a similar (actually slightly greater amount) falling over two days is 9.6%. Bottom line: The premise of calculations based on 1 day rain, while permissible within engineering reporting, is not reality.

2. Pre/post Impervious Surface, Release Volume, and Release Rates don't make sense. The SIA cites pre-development Impervious 0.2% and post-development 75.4%. Nonetheless I'll use the Impervious Surface Area cited on the Town Project Fact Sheet, 66.1%. For the SIA, several "Points of Analysis (POA)" were utilized, most notably Point of Analysis1 (POA1) which is where water leaves the southeast edge of the applicant property and runs downhill to enter the Rummel property before passing beneath Estes Drive. Early in the development process, the developer attempted to minimize the fact that an intermittent stream in this southeast corner exists; now they're saying it's a veritable downhill torrent with flows 7.56 and 12.12 cubic feet per second after 1 year and 2 year rain events, in the pre-development (0.2% impervious surface) condition. Why does it matter? It matters because these pre-development calculations are a basis of the developer's assertion that release rate at this important location will be improved. I live nearby; I seriously question the veracity of the pre-development calculation. Even more concerning are fundamental calculations regarding rain volumes: the SIA states that total Post-Development Volume rain volume after 2-year 24 hour rain event is 1.792 acre-ft (an acre-foot is approximately equal to an 8 lane pool 82 feet long 52 feet wide and 9.8 feet deep), but using the Town Project Sheet (10.7 acres impervious) and Town-vetted NOAA data set, a 2-year 24 hour rain event (3.58 inches) would yield 3.19 acre-ft, almost 80% more water than the developer's model predicts. Bottom line: Real numbers, not modeled predictions that benefit the applicant, should prevail. Real numbers indicate much more water volume than modeled.

3. Developer is paying for excess stormwater run-off with sand. Specifically, the sand filtration components associated with the underground Storm Water Control Measures (SCM) A & B, are calculated to treat 27,479 cubic feet of water after a 2-year 24-hour rain event. This treated volume is credited against the adverse increase in total volume comparing pre- and post development. Without this off-setting credit for treating the water (i.e., passing it through sand filtration, the 2 year, 24-hour volume retention requirement would not be satisfied. Bottom line: Increased stormwater volume is hidden by engineering credit number-crunching, but it will still run downhill.

4. Rain will leave reservoir system rapidly; otherwise it could not be contained. The SIA describes peak flow leaving SCM A at 3.45, 9.19. and 11.2 cubic feet per second after 2-

, 25-, and 100- year rain events. Similarly, flow leaving SCM B at 5.12, 13.44. and 15.99 cubic feet per second after 2-,25-, and 100- year rain events. What does that mean in terms more visualizable? It means that after a 2-year 24-hour rain event of 3.58 inches [which there is a 97% probability of occurring within 5 years], that the flow of water into the downhill southeast corner of the property and downhill onto Rummel property will be 8.57 cubic feet per second = 3846 gallons per minute; and after a 25-year 24-hour rain event [which there is a 33.5% probability of occurring in 10 years], the flow rate is a staggering 10, 157 gallon/minute. A cursory look at the Orange County GIS website demonstrates the likely erosion path southward after the water crosses beneath Estes Drive. Bottom line: Rain will leave the reservoir system rapidly, based on numbers buried in the document.

Amy Harvey

From: Jeanette Coffin
Sent: Monday, May 24, 2021 10:06 AM
To: msJuliemcclintock
Cc: Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Stormwater Letter

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: msJuliemcclintock [mailto:mcclintock.julie@gmail.com]
Sent: Saturday, May 22, 2021 9:41 PM
To: Scott Buck <buckhouse4@nc.rr.com>
Cc: Vencelin Harris <vharris@townofchapelhill.org>; Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Re: Stormwater Letter

Scott

Assuming you want to send to Town staff I would send to these folks and copy mayor and council. They are respectively:
Ernest the middle manager,
his supervisor Chris Roberts, Engineering
and his manager Lance Norris, public works

And the Town manager Maurice Jones. No wonder the division is a mess!

See emails below. mayorandcouncil@townofchapelhill.org

—Julie

Ernest Odei-Larbi <eodei-larbi@townofchapelhill.org>, Chris Roberts <croberts@townofchapelhill.org>, lnorris@townofchapelhill.org, Maurice Jones <mjones@townofchapelhill.org>

> On May 22, 2021, at 9:27 PM, buckhouse4@nc.rr.com wrote:
>
> Here is text of e-mail about stormwater that I will send to who you advise.
>
> Scott
>
> E-mail title: Please Do Not Suspend Disbelief
>
> I am grateful for your thoughtful consideration of the AURA proposal.
>
> I realize the Mayor and Council have had to adapt to this year like none other. I have as a health care provider. Council is tired of COVID and its challenges. And I expect you are tired of AURA, and want the decision to be done. Most importantly, you want the right decision to be done.
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Scott Buck

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volume is credited against the adverse increase in total volume comparing pre- and post development. Without this off-setting credit for treating the water (i.e., if the sand filtration were not in place), the 2 year, 24-hour volume retention requirement would not be satisfied. Bottom line: Increased stormwater volume is hidden by engineering credit number-crunching, but it will still run downhill.

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Amy Harvey

From: Jeanette Coffin
Sent: Tuesday, May 25, 2021 9:11 AM
To: Heather Lindenman
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Aura Project Conditions

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Heather Lindenman [mailto:heatherlindenman@gmail.com]
Sent: Monday, May 24, 2021 10:58 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Aura Project Conditions

Dear Mayor and Councilmembers,

As a resident of the Huntington-Somerset neighborhood, I listened closely to the last council hearing about the Aura proposal. I appreciate your commitment to affordable housing and climate change in making requests to the developer for conditions for approval. I also appreciate your acknowledgement that a traffic light is needed at the Somerset-Estes intersection.

I write today because I find the Aura project promising in theory but, on closer inspection, concerning in practice. Without significant changes, the project as described by the developer is illusory. My hope is that you will consider my specific requests when reviewing the updated proposal on 5/26 in order to ensure that Aura as built accurately reflects Aura as presented.

The developer speaks of the project as if it were mixed use, often referring to it as an inviting space, even a "third space," that will welcome area residents for leisure. Mr. Jewell stated during the last meeting that Aura would likely host "6-8" retail establishments, insinuating that those would include an ice cream store and/or place to buy a bagel. There has been talk of building a bandstand where there could be outdoor concerts. There is discussion of a "central park" where folks can come together to socialize and connect. As someone who moved to Chapel Hill from downtown Washington, DC in 2015, and who lived happily in DC for 7 years without a car, I find these promises of a walkable, bikeable, semi-urban destination to be appealing.

However, Aura as it is described by the developer and Aura in the details are two different projects. The Aura as described is a walkable destination; the Aura in the details is 98% residential. The Aura as described prioritizes walking, biking, and use of the BRT; the Aura in the details has ~640 parking spaces and prioritizes car use. The Aura as described is environmentally friendly; the Aura in the details has ~70% impervious surface and zero solar panels.

To ameliorate these shortfalls, and to ensure that the story the developer is telling residents about Aura is an accurate reflection of the Aura they will build, I request that you firmly require, in writing and with clear consequences for failure to comply, the following six conditions:

1. A significant increase in amenities, particularly retail, available for both Aura residents and those who live in surrounding neighborhoods and apartments.
One of the most compelling speakers during the 5/12 council meeting talked about how much he has enjoyed living in Southern Village during his years as a UNC graduate student because he does not need to drive places to access groceries, restaurants, a coffee shop, and the like. The 12k square feet planned for retail in Aura is not enough to house establishments like this -- certainly not enough to keep people from having to drive. The adjacent Rummel property stands to be developed at a density similar to the Butler property, and the properties on the other side of Estes may become more densely populated as well. If this part of town is going to become urban in appearance and urban in density of residents, *I request that you require Aura to make the property truly urban by providing significantly more retail square footage for residents and neighbors to access without getting in our cars.* Simply making housing denser does not get people out of their cars. Having places to walk to, does.

There was a suggestion during the 5/12 Council meeting that it should be "optional" for the developer to convert residential space into commercial space at some future time. This gentle statement will not be effective because reducing high-rent housing will almost certainly not be lucrative for the developer (or whomever the developer eventually sells the property to). The town should require additional retail space not because it would be profitable to the developer but because if the area is to become urbanized, retail is a crucial component of the recipe: or else Aura will be urban in appearance only but not in terms of folks' daily driving habits.

2. A written promise to follow through on promised programming, along with an up-front monetary contribution to the town (or other entity) to fund said programming.
At the last council meeting, the developer stated they would host outdoor concerts in the "central park." This sounds fabulous. Who wouldn't enjoy outdoor concerts? No one, however, would actually host outdoor concerts when there is no profit to be made from this. How can the town hold the developer accountable for promises such as this one? If they are *not* going to host outdoor concerts, or the farmer's market, or other similar community-oriented programming, then they should state that directly and unequivocally. If they do plan to host such events, they need to be held to that promise in a legally and financially binding way. *I request that the*

council require the developer to commit, in writing and with repercussions for noncompliance, a specific number of events, concerts, or other community activities, that they plan to host per year, or that they contribute money to the town (or other entity) to fund such events.

3. A significant reduction in parking spaces; if necessary, with phased reduction beginning when the BRT is completed.
The ~640 planned parking spaces are inconsistent with the statement that Aura is reducing damage caused by climate change. That number of cars will cause not only more traffic, but will also move the town in the wrong direction environmentally. *I request that the council require a drastic reduction in parking spaces, to half the proposed number. If that is not possible immediately, I request you require the reduction to happen in phases, contingent on successful completion of the BRT.* Just as the affordable housing units "revert" to market rate housing in 30 years, so too can you *require* parking spaces to be cut in half in 10 years' time.

4. A safe, accessible "Central Park" that can be used for its purported purposes, and more closely resembles the Southern Village town green.
The current "central park," in Aura's design plans, is surrounded by cars that will parallel park and pull-in park right up to its edge. This design is neither safe nor conducive to any recreational use. *I request that you require Aura to remove *all* parking surrounding the Central Park, and that the park instead be surrounded by some shrubbery or the like (such as in Southern Village).* That design will make it a space where residents, neighbors, and children can safely enjoy a picnic or chase a soccer ball. I appreciate Councilmember Parker's suggestion about this in particular.

5. A significant reduction in impervious surface, with environmentally friendly alternatives, and a commitment to producing green energy through solar panels.
With the likely imminent development of both Aura and the adjacent Rummel lot, the increase in impervious surface in this area is overwhelming. I have heard many persuasive accounts of stormwater damage and concerns about flooding likely to be exacerbated by climate change. Were this property zoned as residential or multi-use (rather than Office-Institutional), the maximum impervious surface would be lower. *I request that you require the impervious surface of this development to be reduced by 25%, at least.* Tell the developer to be creative: there are all sorts of models of this in the green development world. For instance, the parking spaces could more closely resemble those in the UNC Botanical Gardens; this is one way to do it. There must be others. Likewise, a development of this magnitude ought to take advantage of solar technology. I request that you require solar panels on all townhomes.

6. An alternative to the left-out option on to Estes.
Town residents have spoken at length about the perils of making a left turn on to Estes from Somerset during rush hour -- or, frankly, throughout the day. Without a traffic light, this situation will become even more dangerous for residents of Huntington-Somerset neighborhood as well as residents and employees of Azalea Estates. Even with a traffic light on Somerset, the left turn on to Estes for residents of Aura will be unsafe. *I request that you require Aura to find an alternative to that left turn on to Estes,* whether by buying a portion of the adjacent lot to connect their road to Somerset, or by connecting through Shadowood, or by making the exit on to Estes right-only, at least (as they do in DC) during certain hours of the day, e.g., 7-9am, 4-6pm.

Rather than gently request these things, I hope you will require them. I was encouraged by Councilmembers' and the Mayor's ideas for project revisions, particularly your firm commitment to affordable housing and environmental stewardship. In order to increase the walkability of Aura, and in turn to make the project urban in practice and not just in talk, I hope you will require an increase in retail, a binding promise to provide amenities (such as concerts and the like), a reduction in parking spaces, and changes to design of the central park. For environmental purposes, I hope you will require a reduction in impervious surface area and require solar panels, and for safety, I hope you will reject the left turn on to Estes, at least during certain times of day. I

hope you will require and not suggest these things. Without a firm commitment with binding consequences, the developer will not actually follow through.

Respectfully,
Heather Lindenman
216 Huntington Drive

Amy Harvey

From: Jeanette Coffin
Sent: Tuesday, May 25, 2021 9:11 AM
To: Jason Foureman
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Estes homeowner opposes Aura

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Jason Foureman [mailto:foureman@gmail.com]
Sent: Monday, May 24, 2021 8:26 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Estes homeowner opposes Aura

Hello,
I am a Chapel Hill resident that lives on Estes Drive and I have several concerns about the proposed "Aura" project. Here are my main areas of concern:

1. Environmental impact: A project this big will have a significant effect on water runoff to nearby Bolin Creek which is already prone to flooding. Also, Aura is not engaging the public on this issue and appears to be withholding this information, which should be accessible by the public. The impervious surface area is staggering.

2. Traffic: As an Estes resident I am quite familiar with the congestion and traffic that happens here. Adding another 600 or so parking spaces (and vehicles) to the mix is not only a bad idea, it's dangerous. I have had two children attend Estes Hills and Phillips Middle Schools and am getting ready to send a third. I walk them to and from school every day and it is not safe. The crossing guard for the middle school is in the middle of the road with no crosswalk or lights. They just stand between the two yellow lines. If you support the Aura project, it seems that you are not aware of how bad this is or maybe just don't care.

3. This wasn't the plan. Aura does not fit into the Central West plan that was agreed upon back in 2013. Development on that part of Estes is supposed to be MIXED USE with considerable attention paid to environmental impact, walkability, and traffic safety. The plan was NOT for another giant luxury apartment block. That this development is being seriously considered makes me think the town officials that I voted for are not doing what they said they would and severely undermines my confidence in them.

Personally, I am for development. I would completely support something like the plan we all agreed on (Central West) going through. I would love to be able to walk to a restaurant or some shopping instead of getting in my car and driving to Carrboro to find a cool place to hang out.

With respect,
Jason Foureman

Amy Harvey

From: Jeanette Coffin
Sent: Tuesday, May 25, 2021 3:02 PM
To: melissamccnc@gmail.com
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: FW: Aura
Attachments: ipcc_wg3_ar5_chapter12.pdf

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Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
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405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Melissa McCullough [mailto:melissamccnc@gmail.com]
Sent: Tuesday, May 25, 2021 2:57 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Aura

Dear Mayor and Council,
I am sadly unable to attend the public hearing tomorrow, so I am writing these comments in support of the Aura project. Although I have studied and discussed the project within the Planning Commission context, these comments are mine, from my perspective and expertise in community sustainability and climate, to emphasize some points I think are of greatest importance.

- Chapel Hill went through a long process for the Central West Small Area Plan. This project meets the vision and goals of that plan. Although the numbers for uses are a bit different, it's important for projects to meet the needs of the time in order to succeed, and study has guided the use ratio according to commercial needs now. I like that the design was assisted by the town's own urban designer, and that it has built-in flexibility for when circumstances change. (For example, if they actually need less parking because people love the BRT, the top level of the parking lot can become public space, like one of those parks on old highways. Similarly, some of the residential can become commercial space when local needs change.)

- Traffic concerns have been studied, in both the area and the whole town traffic analyses, and are shown to be negligible. It is most likely that the people who choose to live in this project will be commuting to the University via the NS bus and then the BRT, rather than driving on Estes, as the people moving in will do so knowing existing conditions. More and more people want to live where they do not HAVE to drive everywhere, and Chapel Hill needs more housing for young professionals, empty nesters, and others who are attracted to this type of neighborhood, especially as a growing fraction of US residents are living alone.

- The Council recently declared a climate emergency and adopted the Climate Action and Response plan. Y'all, as a government, and we, as a community, need to act on our principles and commitments for this crisis. Our new plan calls for more sustainable development. As the Intergovernmental Panel on Climate Change noted in their mitigation report (attached, if you are curious), we will not address the climate problem without addressing the US's largest fraction of emissions, transportation, which are driven by vehicle miles travelled and determined by land use patterns. This project represents the kind of development that can address that need, but at a density that is moderate enough for our town. (Plus we need to make up for losing the density opportunity of 1200 MLK.)

- It is not fair for proposed projects, which meet town ordinances and guidelines, to be held responsible for fixing problems created by the old way of doing things. It is the existing development patterns that created the traffic and stormwater problems. This project is designed to not exacerbate those problems, but should not be required to fix problems created by others.

- The town needs to be predictable and to stick to the professed priorities and plans. When we make everything a lengthy negotiation, despite meeting town guidance, then we drive away the smaller developers who could build the kind of incremental projects that can create local character.

I hope you will take all this into account and approve the Aura project. It may not be perfect, but it's a very good one for Chapel Hill's future.

Many thanks,
Melissa McCullough

12 Human Settlements, Infrastructure, and Spatial Planning

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Seto K.C., S. Dhakal, A. Bigio, H. Blanco, G.C. Delgado, D. Dewar, L. Huang, A. Inaba, A. Kansal, S. Lwasa, J.E. McMahon, D.B. Müller, J. Murakami, H. Nagendra, and A. Ramaswami, 2014: Human Settlements, Infrastructure and Spatial Planning. In: *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Contents

Executive Summary

The shift from rural to more urban societies is a global trend with significant consequences for greenhouse gas (GHG) emissions and climate change mitigation. Across multiple dimensions, the scale and speed of urbanization is unprecedented: more than half of the world population live in urban areas and each week the global urban population increases by 1.3 million. Today there are nearly 1000 urban agglomerations with populations of 500,000 or greater; by 2050, the global urban population is expected to increase by between 2.5 to 3 billion, corresponding to 64 % to 69 % of the world population (*robust evidence, high agreement*). Expansion of urban areas is on average twice as fast as urban population growth, and the expected increase in urban land cover during the first three decades of the 21st century will be greater than the cumulative urban expansion in all of human history (*medium evidence, high agreement*). Urban areas generate around 80 % of global Gross Domestic Product (GDP) (*medium evidence, medium agreement*). Urbanization is associated with increases in income, and higher urban incomes are correlated with higher consumption of energy use and GHG emissions (*medium evidence, high agreement*) [Sections 12.1, 12.2, 12.3].

Current and future urbanization trends are significantly different from the past (*robust evidence, high agreement*). Urbanization is taking place at lower levels of economic development and the majority of future urban population growth will take place in small- to medium-sized urban areas in developing countries. Expansion of urban areas is on average twice as fast as urban population growth, and the expected increase in urban land cover during the first three decades of the 21st century will be greater than the cumulative urban expansion in all of human history (*robust evidence, high agreement*). [12.1, 12.2]

Urban areas account for between 71 % and 76 % of CO_2 emissions from global final energy use and between 67–76 % of global energy use (*medium evidence, medium agreement*). There are very few studies that have examined the contribution of all urban areas to global GHG emissions. The fraction of global CO_2 emissions from urban areas depends on the spatial and functional boundary definitions of urban and the choice of emissions accounting method. Estimates for urban energy related CO_2 emissions range from 71 % for 2006 to between 53 % and 87 % (central estimate, 76 %) of CO_2 emissions from global final energy use (*medium evidence, medium agreement*). There is only one attempt in the literature that examines the total GHG (CO_2, CH_4, N_2O and SF_6) contribution of urban areas globally, estimated at between 37 % and 49 % of global GHG emissions for the year 2000. Using Scope1 accounting, urban share of global CO_2 emissions is about 44 % (*limited evidence, medium agreement*). [12.2]

No single factor explains variations in per-capita emissions across cities, and there are significant differences in per capita GHG emissions between cities within a single country (*robust evidence, high agreement*). Urban GHG emissions are influenced by a variety of physical, economic and social factors, development levels, and urbanization histories specific to each city. Key influences on urban GHG emissions include income, population dynamics, urban form, locational factors, economic structure, and market failures. There is a prevalence for cities in Annex I countries to have lower per capita final energy use and GHG emissions than national averages, and for per capita final energy use and GHG emissions of cities in non-Annex I countries tend to be higher than national averages (*robust evidence, high agreement*) [12.3].

The anticipated growth in urban population will require a massive build-up of urban infrastructure, which is a key driver of emissions across multiple sectors (*limited evidence, high agreement*). If the global population increases to 9.3 billion by 2050 and developing countries expand their built environment and infrastructure to current global average levels using available technology of today, the production of infrastructure materials alone would generate approximately 470 Gt of CO_2 emissions. Currently, average per capita CO_2 emissions embodied in the infrastructure of industrialized countries is five times larger than those in developing countries. The continued expansion of fossil fuel-based infrastructure would produce cumulative emissions of 2,986–7,402 $GtCO_2$ during the remainder of the 21st century (*limited evidence, high agreement*). [12.2, 12.3]

The existing infrastructure stock of the average Annex I resident is three times that of the world average and about five times higher than that of the average non-Annex I resident (*medium evidence, medium agreement*). The long life of infrastructure and the built environment, make them particularly prone to lock-in of energy and emissions pathways, lifestyles and consumption patterns that are difficult to change. The committed emissions from energy and transportation infrastructures are especially high, with respective ranges of 127–336 and 63–132 Gt, respectively (*medium evidence, medium agreement*). [12.3, 12.4]

Infrastructure and urban form are strongly linked, especially among transportation infrastructure provision, travel demand and vehicle kilometres travelled (*robust evidence, high agreement*). In developing countries in particular, the growth of transport infrastructure and ensuing urban forms will play important roles in affecting long-run emissions trajectories. Urban form and structure significantly affect direct (operational) and indirect (embodied) GHG emissions, and are strongly linked to the throughput of materials and energy in a city, the wastes that it generates, and system efficiencies of a city. (*robust evidence, high agreement*) [12.4, 12.5]

Key urban form drivers of energy and GHG emissions are density, land use mix, connectivity, and accessibility (*medium evidence, high agreement*). These factors are interrelated and interdependent. Pursuing one of them in isolation is insufficient for lower emissions. Connectivity and accessibility are tightly related: highly connected places are accessible. While individual measures of urban form

have relatively small effects on vehicle miles travelled, they become more effective when combined. There is consistent evidence that co-locating higher residential densities with higher employment densities, coupled with significant public transit improvements, higher land use mixes, and other supportive demand management measures can lead to greater emissions savings in the long run. Highly accessible communities are typically characterized by low daily commuting distances and travel times, enabled by multiple modes of transportation (*robust evidence, high agreement*). [12.5]

Urban mitigation options vary across urbanization trajectories and are expected to be most effective when policy instruments are bundled (*robust evidence, high agreement*). For rapidly developing cities, options include shaping their urbanization and infrastructure development towards more sustainable and low carbon pathways. In mature or established cities, options are constrained by existing urban forms and infrastructure and the potential for refurbishing existing systems and infrastructures. Key mitigation strategies include co-locating high residential with high employment densities, achieving high land use mixes, increasing accessibility and investing in public transit and other supportive demand management measures. Bundling these strategies can reduce emissions in the short term and generate even higher emissions savings in the long term (*robust evidence, high agreement*). [12.5]

Successful implementation of mitigation strategies at local scales requires that there be in place the institutional capacity and political will to align the right policy instruments to specific spatial planning strategies (*robust evidence, high agreement*). Integrated land-use and transportation planning provides the opportunity to envision and articulate future settlement patterns, backed by zoning ordinances, subdivision regulations, and capital improvements programmes to implement the vision. While smaller scale spatial planning may not have the energy conservation or emissions reduction benefits of larger scale ones, development tends to occur parcel by parcel and urbanized areas are ultimately the products of thousands of individual site-level development and design decisions (*robust evidence, high agreement*). [12.5, 12.6]

The largest opportunities for future urban GHG emissions reduction are in rapidly urbanizing areas where urban form and infrastructure are not locked-in, but where there are often limited governance, technical, financial, and institutional capacities (*robust evidence, high agreement*). The bulk of future infrastructure and urban growth is expected in small- to medium-size cities in developing countries, where these capacities are often limited or weak (*robust evidence, high agreement*). [12.4, 12.5, 12.6, 12.7]

Thousands of cities are undertaking climate action plans, but their aggregate impact on urban emissions is uncertain (*robust evidence, high agreement*). Local governments and institutions possess unique opportunities to engage in urban mitigation activities and local mitigation efforts have expanded rapidly. However, there has been little systematic assessment regarding the overall extent to which cities are implementing mitigation policies and emission reduction targets are being achieved, or emissions reduced. Climate action plans include a range of measures across sectors, largely focused on energy efficiency rather than broader land-use planning strategies and cross-sectoral measures to reduce sprawl and promote transit-oriented development. The majority of these targets have been developed for Annex I countries and reflect neither their mitigation potential nor implementation. Few targets have been established for non-Annex I country cities, and it is in these places where reliable city-level GHG emissions inventory may not exist (*robust evidence, high agreement*). [12.6, 12.7, 12.9]

The feasibility of spatial planning instruments for climate change mitigation is highly dependent on a city's financial and governance capability (*robust evidence, high agreement*). Drivers of urban GHG emissions are interrelated and can be addressed by a number of regulatory, management, and market-based instruments. Many of these instruments are applicable to cities in both developed and developing countries, but the degree to which they can be implemented varies. In addition, each instrument varies in its potential to generate public revenues or require government expenditures, and the administrative scale at which it can be applied. A bundling of instruments and a high level of coordination across institutions can increase the likelihood of achieving emissions reductions and avoiding unintended outcomes (*robust evidence, high agreement*). [12.6, 12.7]

For designing and implementing climate policies effectively, institutional arrangements, governance mechanisms, and financial resources should be aligned with the goals of reducing urban GHG emissions (*robust evidence, high agreement*). These goals will reflect the specific challenges facing individual cities and local governments. The following have been identified as key factors: (1) institutional arrangements that facilitate the integration of mitigation with other high-priority urban agendas; (2) a multilevel governance context that empowers cities to promote urban transformations; (3) spatial planning competencies and political will to support integrated land-use and transportation planning; and (4) sufficient financial flows and incentives to adequately support mitigation strategies (*robust evidence, high agreement*). [12.6, 12.7]

Successful implementation of urban climate change mitigation strategies can provide co-benefits (*robust evidence, high agreement*). Urban areas throughout the world continue to struggle with challenges, including ensuring access to energy, limiting air and water pollution, and maintaining employment opportunities and competitiveness. Action on urban-scale mitigation often depends on the ability to relate climate change mitigation efforts to local co-benefits. The co-benefits of local climate change mitigation can include public savings, air quality and associated health benefits, and productivity increases in urban centres, providing additional motivation for undertaking mitigation activities (*robust evidence, high agreement*). [12.5, 12.6, 12.7, 12.8]

This assessment highlights a number of key knowledge gaps. First, there is lack of consistent and comparable emissions data at local scales, making it particularly challenging to assess the urban share of global GHG emissions as well as develop urbanization typologies and their emissions pathways. Second, there is little scientific understanding of the magnitude of the emissions reduction from altering urban form, and the emissions savings from integrated infrastructure and land use planning. Third, there is a lack of consistency and thus comparability on local emissions accounting methods, making cross-city comparisons of emissions or climate action plans difficult. Fourth, there are few evaluations of urban climate action plans and their effectiveness. Fifth, there is lack of scientific understanding of how cities can prioritize mitigation strategies, local actions, investments, and policy responses that are locally relevant. Sixth, there are large uncertainties about future urbanization trajectories, although urban form and infrastructure will play large roles in determining emissions pathways. [12.9]

12.1 Introduction

Urbanization is a global phenomenon that is transforming human settlements. The shift from primarily rural to more urban societies is evident through the transformation of places, populations, economies, and the built environment. In each of these dimensions, urbanization is unprecedented for its speed and scale: massive urbanization is a megatrend of the 21st century. With disorienting speed, villages and towns are being absorbed by, or coalescing into, larger urban conurbations and agglomerations. This rapid transformation is occurring throughout the world, and in many places it is accelerating.

Today, more than half of the global population is urban, compared to only 13 % in 1900 (UN DESA, 2012). There are nearly 1,000 urban agglomerations with populations of 500,000 or more, three-quarters of which are in developing countries (UN DESA, 2012). By 2050, the global urban population is expected to increase between 2.5 to 3 billion, corresponding to 64 % to 69 % of the world population (Grubler et al., 2007; IIASA, 2009; UN DESA, 2012). Put differently, each week the urban population is increasing by approximately 1.3 million.

Future trends in the levels, patterns, and regional variation of urbanization will be significantly different from those of the past. Most of the urban population growth will take place in small- to medium-sized urban areas. Nearly all of the future population growth will be absorbed by urban areas in developing countries (IIASA, 2009; UN DESA, 2012). In many developing countries, infrastructure and urban growth will be greatest, but technical capacities are limited, and governance, financial, and economic institutional capacities are weak (Bräutigam and Knack, 2004; Rodrik et al., 2004). The kinds of towns, cities, and urban agglomerations that ultimately emerge over the coming decades will have a critical impact on energy use and carbon emissions.

The Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC) did not have a chapter on human settlements or urban areas. Urban areas were addressed through the lens of individual sector chapters. Since the publication of AR4, there has been a growing recognition of the significant contribution of urban areas to GHG emissions, their potential role in mitigating them, and a multi-fold increase in the corresponding scientific literature. This chapter provides an assessment of this literature and the key mitigation options that are available at the local level. The majority of this literature has focused on urban areas and cities in developed countries. With the exception of China, there are few studies on the mitigation potential or GHG emissions of urban areas in developing countries. This assessment reflects these geographic limitations in the published literature.

Urbanization is a process that involves simultaneous transitions and transformations across multiple dimensions, including demographic, economic, and physical changes in the landscape. Each of these dimensions presents different indicators and definitions of urbanization. The chapter begins with a brief discussion of the multiple dimensions and definitions of urbanization, including implications for GHG emissions accounting, and then continues with an assessment of historical, current, and future trends across different dimensions of urbanization in the context of GHG emissions (12.2). It then discusses GHG accounting approaches and challenges specific to urban areas and human settlements.

In Section 12.3, the chapter assesses the drivers of urban GHG emissions in a systemic fashion, and examines the impacts of drivers on individuals sectors as well as the interaction and interdependence of drivers. In this section, the relative magnitude of each driver's impact on urban GHG emissions is discussed both qualitatively and quantitatively, and provides the context for a more detailed assessment of how urban form and infrastructure affect urban GHG emissions (12.4). Here, the section discusses the individual urban form drivers such as density, connectivity, and land use mix, as well as their interactions with each other. Section 12.4 also examines the links between infrastructure and urban form, as well as their combined and interacting effects on GHG emissions.

Section 12.5 identifies spatial planning strategies and policy instruments that can affect multiple drivers, and Section 12.6 examines the institutional, governance, and financial requirements to implement such policies. Of particular importance with regard to mitigation potential at the urban or local scale is a discussion of the geographic and administrative scales for which policies are implemented, overlapping, and/or in conflict. The chapter then identifies the scale and range of mitigation actions currently planned and/or implemented by local governments, and assesses the evidence of successful implementation of the plans, as well as barriers to further implementation (12.7). Next, the chapter discusses major co-benefits and adverse side-effects of mitigation at the local scale, including opportunities for sustainable development (12.8). The chapter concludes with a discussion of the major gaps in knowledge with respect to mitigation of climate change in urban areas (12.9).

12.2 Human settlements and GHG emissions

This section assesses past, current, and future trends in human settlements in the context of GHG emissions. It aims to provide a multi-dimensional perspective on the scale of the urbanization process. This section includes a discussion of the development trends of urban areas, including population size, land use, and density. Section 12.2.1 outlines historic urbanization dynamics in multiple dimensions as drivers of GHG emissions. Section 12.2.2 focuses on current GHG emissions. Finally, Section 12.2.3 assesses future scenarios of urbanization in order to frame the GHG emissions challenges to come.

12.2.1 The role of cities and urban areas in energy use and GHG emissions

Worldwide, 3.3 billion people live in rural areas, the majority of whom, about 92 %, live in rural areas in developing countries (UN DESA, 2012). In general, rural populations have lower per capita energy consumption compared with urban populations in developing countries (IEA, 2008). Globally, 32 % of the rural population lack access to electricity and other modern energy sources, compared to only 5.3 % of the urban population (IEA, 2010). Hence, energy use and GHG emissions from human settlements is mainly from urban areas rather than rural areas, and the role of cities and urban areas in global climate change has become increasingly important over time.

Table 12.1 | Arithmetic growth of human settlement classes for five periods between 1950–2050. Number of human settlements by size class at four points in time.

Population	Average annual growth [%]					Number of cities			
	1950–1970	1970–1990	1990–2010	1950–2010	2010–2050	1950	1970	1990	2010
10,000,000 and more	2.60	6.72	4.11	4.46	2.13	2	2	10	23
5,000,000—10,000,000	7.55	1.34	2.53	3.77	1.22	4	15	19	38
1,000,000—5,000,000	3.27	3.17	2.70	3.05	1.36	69	128	237	388
100,000–1,000,000	2.86	2.48	1.87	2.40	0.70	Not Available			
Less than 100,000	2.54	2.37	1.71	2.21	1.95				
Rural	1.38	1.23	0.61	1.07	-0.50				

Source: (UN DESA, 2012).

Box 12.1 | What is urban? The system boundary problem

Any empirical analysis of urban and rural areas, as well as human settlements, requires clear delineation of physical boundaries. However, it is not a trivial or unambiguous task to determine where a city, an urban area, or human settlement physically begins and ends. In the literature, there are a number of methods to establish the boundaries of a city or urban area (Elliot, 1987; Buisseret, 1998; Churchill, 2004). Three common types of boundaries include:

1. **Administrative boundaries**, which refer to the territorial or political boundaries of a city (Hartshorne, 1933; Aguilar and Ward, 2003).
2. **Functional boundaries**, which are delineated according to connections or interactions between areas, such as economic activity, per capita income, or commuting zone (Brown and Holmes, 1971; Douglass, 2000; Hidle et al., 2009).
3. **Morphological boundaries**, which are based on the form or structure of land use, land cover, or the built environment. This is the dominant approach when satellite images are used to delineate urban areas (Benediktsson et al., 2003; Rashed et al., 2003).

What approach is chosen will often depend on the particular research question under consideration. The choice of the physical boundaries can have a substantial influence on the results of the analysis. For example, the Global Energy Assessment (GEA) (GEA, 2012) estimates global urban energy consumption between 180–250 EJ/yr depending on the particular choice of the physical delineation between rural and urban areas. Similarly, depending on the choice of different administrative, morphological, and functional boundaries, between 37 % and 86 % in buildings and industry, and 37 % to 77 % of mobile diesel and gasoline consumption can be attributed in urban areas (Parshall et al., 2010). Thus any empirical evidence presented in this chapter is dependent on the particular boundary choice made in the respective analysis.

Urbanization involves change across multiple dimensions and accordingly is defined differently by different disciplines. Demographers define urbanization as a demographic transition that involves a population becoming urbanized through the increase in the urban proportion of the total population (Montgomery, 2008; Dorélien et al., 2013). Geographers and planners describe urbanization as a land change process that includes the expansion of the urban land cover and growth in built-up areas and infrastructure (Berry et al., 1970; Blanco et al., 2011; Seto et al., 2011). Economists characterize urbanization as a structural shift from primary economic activities such as agriculture and forestry to manufacturing and services (Davis and Henderson, 2003; Henderson, 2003). Sociologists, political scientists, and other social scientists describe urbanization as cultural change, including change in social interactions and the growing complexity of political, social, and economic institutions (Weber, 1966; Berry, 1973). The next sections describe urbanization trends across the first three of these four dimensions and point to the increasing and unprecedented speed and scale of urbanization.

12.2.1.1 Urban population dynamics

In the absence of any other independent data source with global coverage, assessments of historic urban and rural population are commonly based on statistics provided by the United Nations Department for Economic and Social Affairs (UN DESA). The *World Urbanization Prospects* is published every two years by UN DESA and provides projections of key demographic and urbanization indicators for all countries in the world. Even within this dataset, there is no single definition of urban or rural areas that is uniformly applied across the data. Rather, each country develops its own definition of urban, often based on a combination of population size or density, and other criteria such as the percentage of population not employed in agriculture; the availability of electricity, piped water, or other infrastructure; and characteristics of the built environment such as dwellings and built structures (UN DESA, 2012). The large variation in criteria gives rise to significant differences in national definitions. However, the underlying variations in the data do not seriously affect an assessment of urbanization dynamics as long as the national definitions are sufficiently consistent over time (GEA, 2012; UN DESA, 2012). Irrespective of definition, the underlying assumption in all the definitions is that urban areas provide a higher standard of living than rural areas (UN DESA, 2013). A comprehensive assessment of urban and rural population dynamics is provided in the Global Energy Assessment (2012). Here, only key developments are briefly summarized.

For most of human history, the world population mostly lived in rural areas and in small urban settlements, and growth in global urban population occurred slowly. In 1800, when the world population was around one billion, only 3 % of the total population lived in urban areas and only one city—Beijing—had had a population greater than one million (Davis, 1955; Chandler, 1987; Satterthwaite, 2007). Over the next one hundred years, the global share of urban population

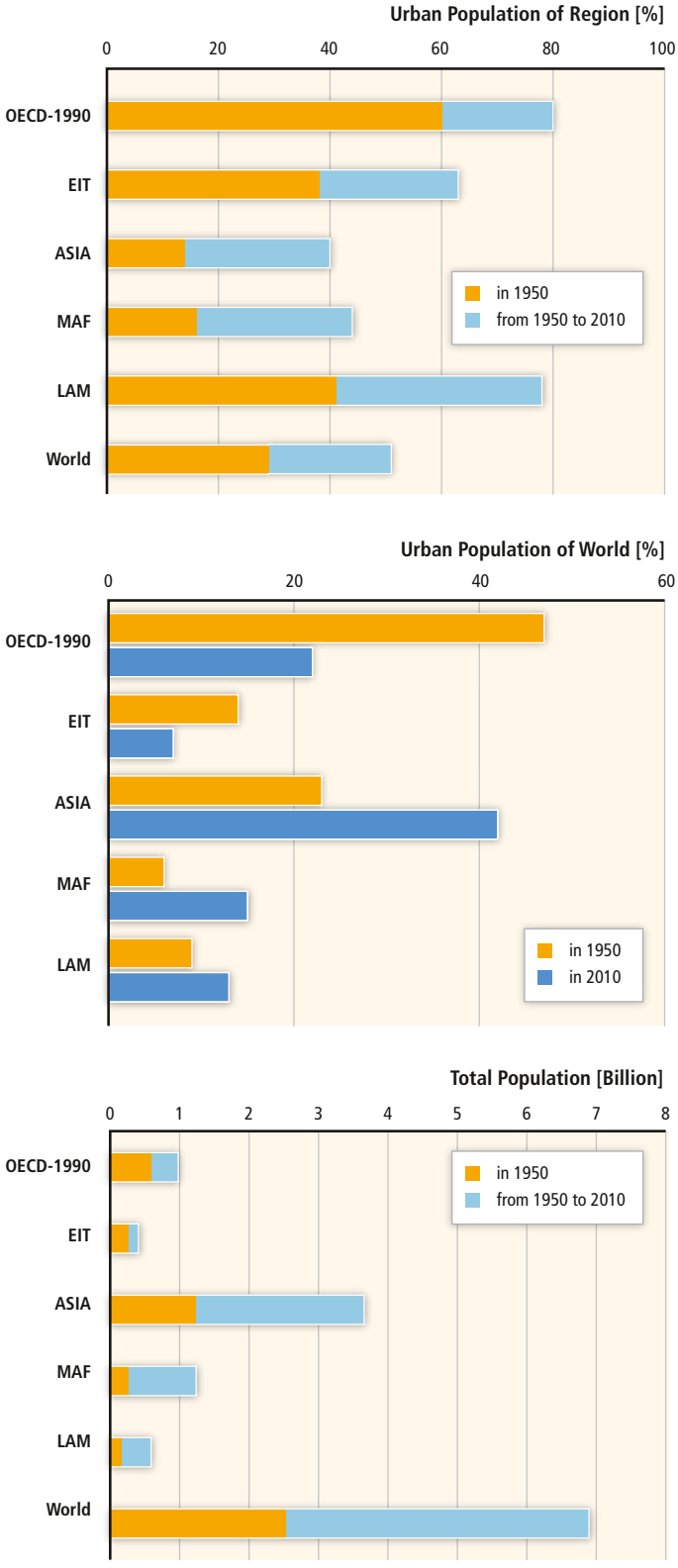

Figure 12.1 | Urban population as percentage of regional and world populations and in absolute numbers for RC5 regions (see Annex II.2), 1950–2010 Source: UN DESA (2012).

increased to 13 % in 1900. The second half of the 20th century experienced rapid urbanization. The proportion of world urban population increased from 13 % in 1900, to 29 % in 1950, and to 52 % in 2011 (UN DESA, 2012). In 1960, the world reached a milestone when global urban population surpassed one billion (UN DESA, 2012). Although it took all previous human history to 1960 to reach one billion urban dwellers, it took only additional 26 years to reach two billion (Seto et al., 2010). Since then, the time interval to add an additional one billion urban dwellers is decreasing, and by approximately 2030, the world urban population will increase by one billion every 13 years (Seto et al., 2010). Today, approximately 52 % of the global population, or 3.6 billion, are estimated to live in urban areas (UN DESA, 2012).

While urbanization has been occurring in all major regions of the world (Table 12.1) since 1950, there is great variability in urban transitions across regions and settlement types. This variability is shaped by multiple factors, including history (Melosi, 2000), migration patterns (Harris and Todaro, 1970; Keyfitz, 1980; Chen et al., 1998), technological development (Tarr, 1984), culture (Wirth, 1938; Inglehart, 1997), governance institutions (National Research Council, 2003), as well as environmental factors such as the availability of energy (Jones, 2004; Dredge, 2008). Together, these factors partially account for the large variations in urbanization levels across regions.

Urbanization rates in developed regions are high, between 73 % in Europe to 89 % in North America, compared to 45 % in Asia and 40 % in Africa (UN DESA, 2012).The majority of urbanization in the future is expected to take place primarily in Africa and Asia, and will occur at lower levels of economic development than the urban transitions that occurred in Europe and North America. While its urbanization rate is still lower than that of Europe and the Americas, the urban population in Asia increased by 2.3 billion between 1950 and 2010 (Figure 12.1).

Overall, urbanization has led to the growth of cities of all sizes (Figure 12.2). Although mega-cities (those with populations of 10 million or greater) receive a lot of attention in the literature, urban population growth has been dominated by cities of smaller sizes. About one-third of the growth in urban population between 1950 and 2010 (1.16 billion) occurred in settlements with populations fewer than 100 thousand. Currently, approximately 10 % of the 3.6 billion urban dwellers live in mega-cities of 10 million or greater (UN DESA, 2012). Within regions and countries, there are large variations in development levels, urbanization processes, and urban transitions. While the dominant global urbanization trend is growth, some regions are experiencing significant urban population declines. Urban shrinkage is not a new phenomenon, and most cities undergo cycles of growth and decline, which is argued to correspond to waves of economic growth and recession (Kondratieff and Stolper, 1935). There are few systematic analyses on the scale and prevalence of shrinking cities (UN-Habitat, 2008). A recent assessment by the United Nations (UN) (UN DESA, 2012) indicates that about 11 % of 3,552 cities with populations of 100,000 or more in 2005 experienced total population declines of 10.4 million between 1990 and 2005. These 'shrinking cities' are distributed globally but concentrated mainly in Eastern Europe (Bontje, 2005; Bernt, 2009) and the rust belt in the United States (Martinez-Fernandez et al., 2012), where de-urbanization is strongly tied with de-industrialization.

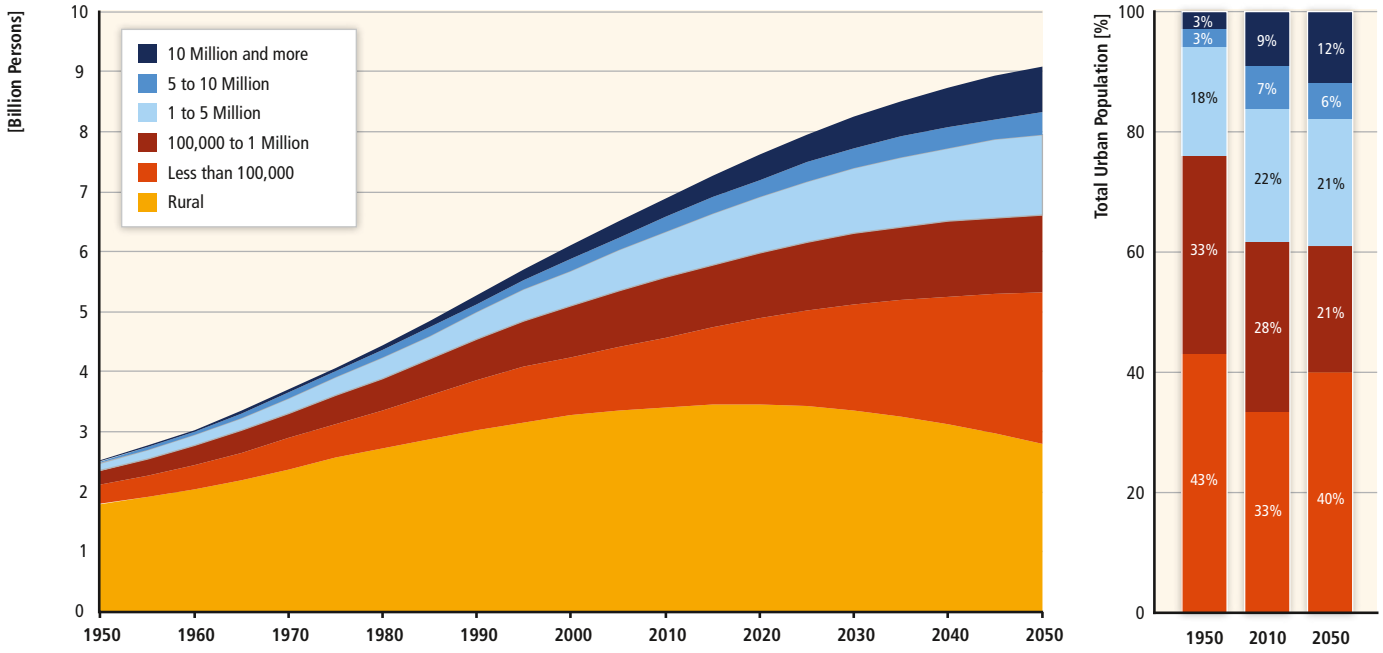

Figure 12.2 | Population by settlement size using historical (1950–2010) and projected data to 2050. Source: UN DESA (2010), Grubler et al. (2012). Note: rounded population percentages displayed across size classes sum do not sum to 100 % for year 2010 due to rounding. Urbanization results in not only in growth in urban population, but also changes in household structures and dynamics. As societies industrialize and urbanize, there is often a decline in household size, as traditional complex households become more simple and less extended (Bongaarts, 2001; Jiang and O'Neill, 2007; O'Neill et al., 2010). This trend has been observed in Europe and North America, where household size has declined from between four to six in the mid 1800s to between two and three today (Bongaarts, 2001).

12.2.1.2 Urban land use

Another key dimension of urbanization is the increase in built-up area and urban land cover. Worldwide, urban land cover occupies a small fraction of global land surface, with estimates ranging between 0.28 to 3.5 million km^2, or between 0.2 % to 2.7 % of ice free terrestrial land (Schneider et al., 2009). Although the urban share of global land cover is negligible, urban land use at the local scale shows trends of declining densities and outward expansion.

Analyses of 120 global cities show significant variation in densities across world regions, but the dominant trend is one of declining built-up and population densities across all income levels and city sizes (Figure 12.3) (Angel et al., 2010). For this sample of cities, built-up area densities have declined significantly between 1990 and 2000, at an average annual rate of 2.0±0.4 % (Angel et al., 2010). On average, urban population densities are four times higher in low-income countries (11,850 persons/km^2 in 2000) than in high-income countries (2,855 persons/km^2 in 2000). Urban areas in Asia experienced the largest decline in population densities during the 1990s. Urban population densities in East Asia and Southeast Asia declined 4.9 % and 4.2 %, respectively, between 1990 and 2000 (World Bank, 2005). These urban population densities are still higher than those in Europe, North America, and Australia, where densities are on average 2,835 persons/km^2. As the urban transition continues in Asia and Africa, it is expected that their urban population densities will continue to decline. Although urban population densities are decreasing, the amount of built-up area per person is increasing (Seto et al., 2010; Angel et al., 2011). A meta-analysis of 326 studies using satellite data shows a minimum global increase in urban land area of 58,000km^2 between 1970 and 2000, or roughly 9 % of the 2000 urban extent (Seto et al., 2011). At current rates of declining densities among developing country cities, a doubling of the urban population over the next 30 years will require a tripling of built-up areas (Angel et al., 2010). For a discussion on drivers of declining densities, see Box 12.4.

12.2.1.3 Urban economies and GDP

Urban areas are engines of economic activities and growth. Further, the transition from a largely agrarian and rural society to an industrial and consumption-based society is largely coincident with a country's level of industrialization and economic development (Tisdale, 1942; Jones, 2004), and reflects changes in the relative share of GDP by both sector and the proportion of the labour force employed in these sectors (Satterthwaite, 2007; World Bank, 2009). The concentration and scale of people, activities, and resources in urban areas fosters economic growth (Henderson et al., 1995; Fujita and Thisse, 1996; Duranton and Puga, 2004; Puga, 2010), innovation (Feldman and Audretsch, 1999; Bettencourt et al., 2007; Arbesman et al., 2009), and an increase of economic and resource use efficiencies (Kahn, 2009; Glaeser and Kahn, 2010). The agglomeration economies made possible by the concentration of individuals and firms make cities ideal settings for innovation, job, and wealth creation (Rosenthal and Strange, 2004; Carlino et al., 2007; Knudsen et al., 2008; Puga, 2010).

A precise estimate of the contribution of all urban areas to global GDP is not available. However, a downscaling of global GDP during the Global Energy Assessment (Grubler et al., 2007; GEA, 2012) showed that urban areas contribute about 80 % of global GDP. Other studies show that urban economies generate more than 90 % of global gross value (Gutman, 2007; United Nations, 2011). In OECD countries, more than 80 % of the patents filed are in cities (OECD, 2006a). Not many cities report city-level GDP but recent attempts have been made by the Metropolitan Policy Program of the Brookings Institute, PriceWaterhouseCoopers (PWC), and the McKinsey Global Institute to provide such estimates. The PWC report shows that key 27 key global cities[1] accounted for 8 % of world GDP for 2012 but only 2.5 % of the global population (PwC and Partnership for New York City, 2012).

In a compilation by UN-Habitat, big cities are shown to have disproportionately high share of national GDP compared to their population (UN-Habitat, 2012). The importance of big cities is further underscored in a recent report that shows that 600 cities generated 60 % of global GDP in 2007 (McKinsey Global Institute, 2011). This same report shows that the largest 380 cities in developed countries account for half of the global GDP. More than 20 % of global GDP comes from 190 North American cities alone (McKinsey Global Institute, 2011). In contrast, the 220 largest cities in developing countries contribute to only 10 % global of GDP, while 23 global megacities generated 14 % of global GDP in 2007. The prevalence of economic concentration in big cities highlights their importance but does not undermine the role of small and medium size cities. Although top-down and bottom-up estimates suggest a large urban contribution to global GDP, challenges remain in estimating the size of this, given large uncertainties in the downscaled GDP, incomplete urban coverage, sample bias, methodological ambiguities, and limitations of the city-based estimations in the existing studies.

12.2.2 GHG emission estimates from human settlements

Most of the literature on human settlements and climate change is rather recent.[2] Since AR4, there has been a considerable growth in scientific evidence on energy consumption and GHG emissions from human settlements. However, there are very few studies that have examined the contribution of all urban areas to global GHG emissions.

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[1] Paris, Hong Kong, Sydney, San Francisco, Singapore, Toronto, Berlin, Stockholm, London, Chicago, Los Angeles, New York, Tokyo, Abu Dhabi, Madrid, Kuala Lumpur, Milan, Moscow, São Paulo, Beijing, Buenos Aires, Johannesburg, Mexico City, Shanghai, Seoul, Istanbul, and Mumbai.

[2] A search on the ISI Web of Science database for keywords "urban AND climate change" for the years 1900–2007 yielded over 700 English language publications. The same search for the period from 2007 to present yielded nearly 2800 English language publications.

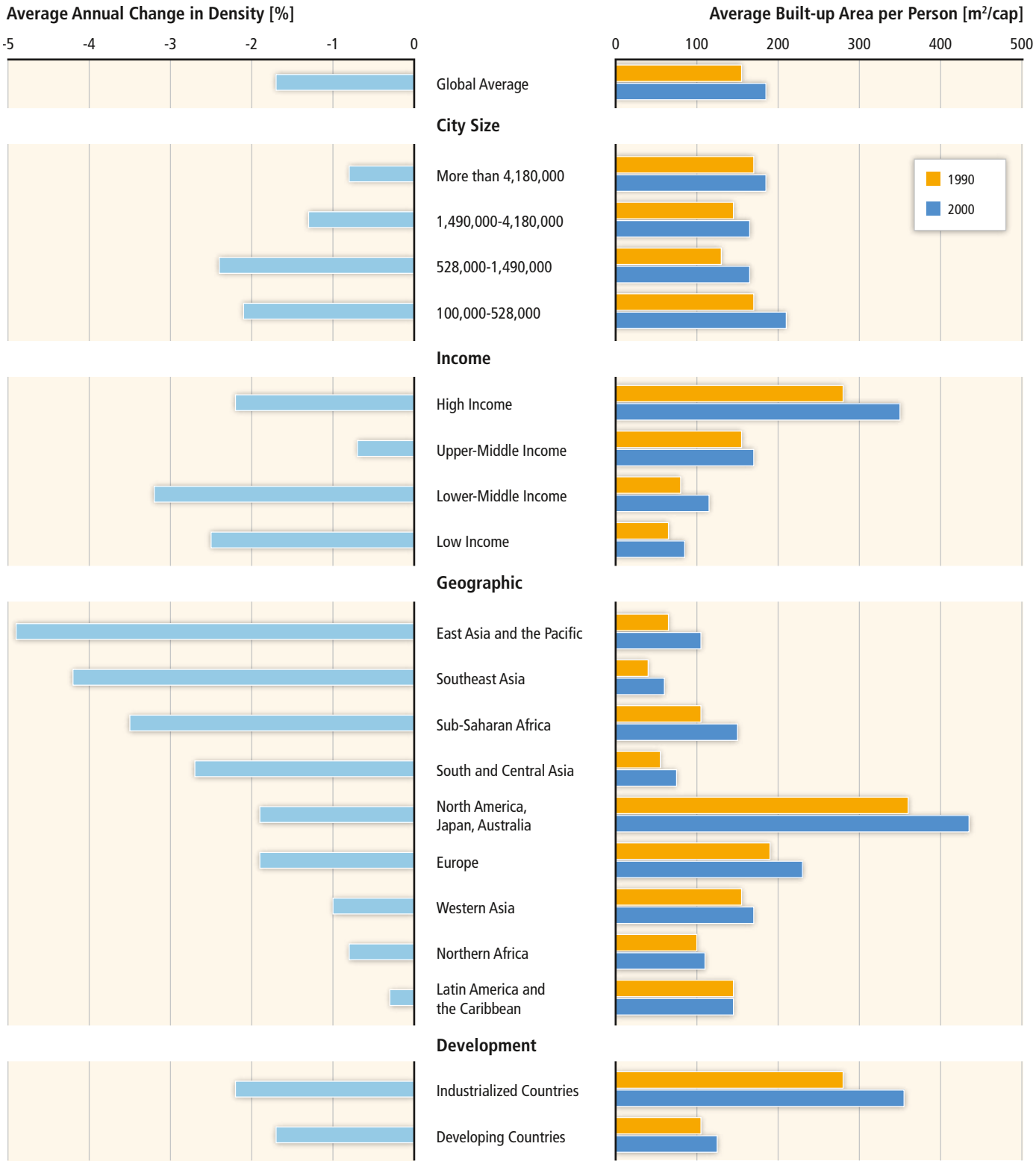


Figure 12.3 | Left: Average annual percent change in density between 1990 and 2010 (light blue). Right: Average built-up area per person (m^2) in 1990 (yellow) and 2000 (blue). Data from 120 cities. Source: Angel et al. (2005).

The few studies that do exist will be discussed in Section 12.2.2.1. In contrast, a larger number of studies have quantified GHG emissions for individual cities and other human settlements. These will be assessed in Section 12.2.2.2.

12.2.2.1 Estimates of the urban share of global emissions

There are very few studies that estimate the relative urban and rural shares of global GHG emissions. One challenge is that of boundary definitions and delineation: it is difficult to consistently define and delineate rural and urban areas globally (see Box 12.1). Another challenge is that of severe data constraints about GHG emissions. There is no comprehensive statistical database on urban or rural GHG emissions. Available global estimates of urban and rural emission shares are either derived bottom-up or top-down. Bottom-up, or up-scaling studies, use a representative sample of estimates from regions or countries and scale these up to develop world totals (see IEA, 2008). Top-down studies use global or national datasets and downscale these to local grid cells. Urban and rural emissions contributions are then estimated based on additional spatial information such as the extent of urban areas or the location of emission point sources (GEA, 2012). In the absence of a more substantive body of evidence, large uncertainties remain surrounding the estimates and their sensitivities (Grubler et al., 2012).

The *World Energy Outlook 2008* estimates urban energy related CO_2 emissions at 19.8 Gt, or 71 % of the global total for the year 2006 (IEA, 2008). This corresponds to 330 EJ of primary energy, of which urban final energy use is estimated to be at 222 EJ. The Global Energy Assessment provides a range of final urban energy use between 180 and 250 EJ with a central estimate of 240 EJ for the year 2005. This is equivalent to an urban share between 56 % and 78 % (central estimate, 76 %) of global final energy use. Converting the GEA estimates on urban final energy (Grubler et al., 2012) into CO_2 emissions (see Methodology and Metrics Annex) results in global urban energy related CO_2 emissions of 8.8—14.3 Gt (central estimate, 12.5Gt) which is between 53 % and 87 % (central estimate, 76 %) of CO_2 emissions from global final energy use and between 30 % and 56 % (central estimate, 43 %) of global primary energy related CO_2 emissions (CO_2 includes flaring and cement emissions which are small). Urban CO_2 emission estimates refer to commercial final energy fuel use only and exclude upstream emissions from energy conversion.

Aside from these global assessments, there is only one attempt in the literature to estimate the total GHG (CO_2, CH_4, N_2O and SF_6) contribution of urban areas globally (Marcotullio et al., 2013). Estimates are provided in ranges where the lower end provides an estimate of the direct emissions from urban areas only and the higher end provides an estimate that assigns all emissions from electricity consumption to the consuming (urban) areas. Using this methodology, the estimated total GHG emission contribution of all urban areas is lower than other approaches, and ranges from 12.8 $GtCO_{2eq}$ to 16.9 $GtCO_{2eq}$, or between 37 % and 49 % of global GHG emissions in the year 2000. The estimated urban share of energy related CO_2 emissions in 2000 is slightly lower than the GEA and IEA estimate, at 72 % using Scope 2 accounting and 44 % using Scope 1 accounting (see Figure 12.4). The urban GHG emissions (CO_2, N_2O, CH_4, and SF_6) from the energy share of total energy GHGs is between 42 % and 66 %. Hence, while the sparse evidence available suggests that urban areas dominate final energy consumption and associated CO_2 emissions, the contribution to total global GHG emissions may be more modest as the large majority of CO_2 emissions from land-use change, N_2O emissions, and CH_4 emissions take place outside urban areas.

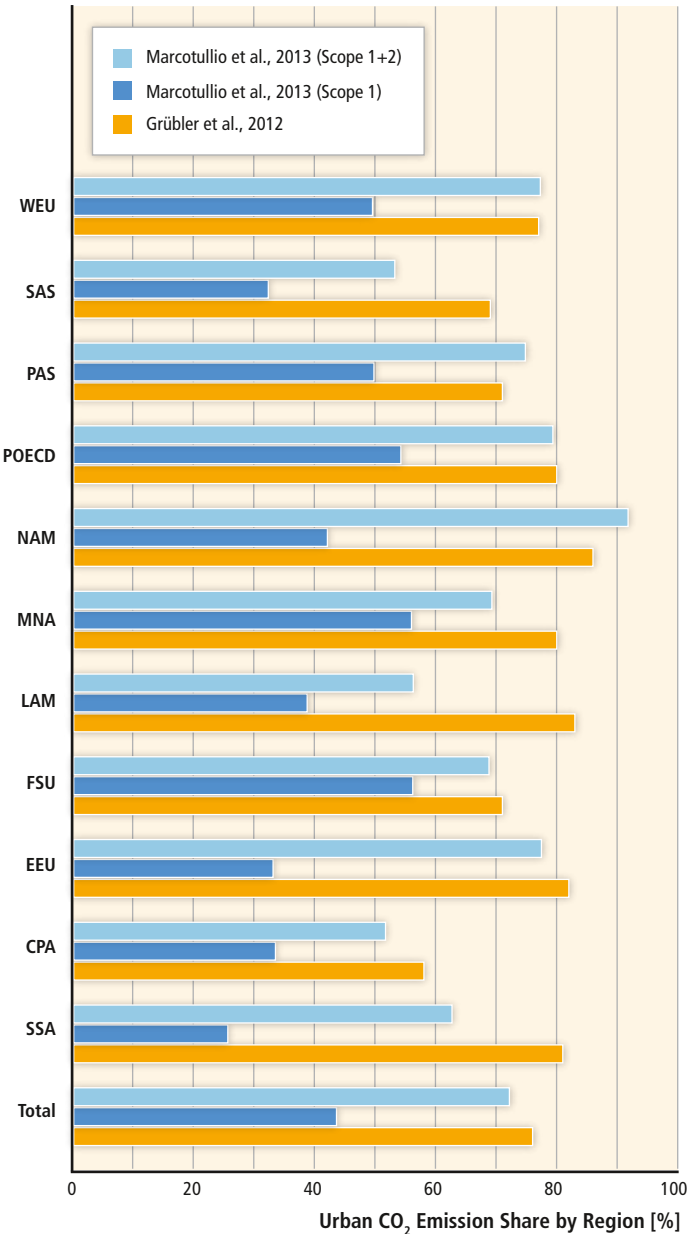


Figure 12.4 | Estimates of urban CO_2 emissions shares of total emissions across world regions. Grubler et al. (2012) estimates are based on estimates of final urban and total final energy use in 2005. Marcotullio et al. (2013) estimates are based on emissions attributed to urban areas as share of regional totals reported by EDGAR. Scope 2 emissions allocate all emissions from thermal power plants to urban areas.

Figure 12.4 shows CO_2 estimates derived from Grubler et al. (2012) and Marcotullio et al. (2013). It highlights that there are large variations in the share of urban CO_2 emissions across world regions. For example, urban emission shares of final energy related CO_2 emissions range from 58 % in China and Central Pacific Asia to 86 % in North America. Ranges are from 31 % to 57 % in South Asia, if urban final energy related CO_2 emissions are taken relative to primary energy related CO_2 emissions in the respective region.

Although differences in definitions make it challenging to compare across regional studies, there is consistent evidence that large variations exist (Parshall et al., 2010; Marcotullio et al., 2011, 2012). For example, the International Energy Agency (IEA) (2008) estimates of the urban primary energy related CO_2 emission shares are 69 % for the EU (69 % for primary energy), 80 % for the United States (85 % for primary energy, see also (Parshall et al., 2010), and 86 % for China (75 % for primary energy, see also Dhakal, 2009). Marcotullio et al. (2013) highlight that non-energy related sectors can lead to substantially different urban emissions shares under consideration of a broader selection of greenhouse gases (CO_2, CH_4, N_2O, SF_6). For example, while Africa tends to have a high urban CO_2 emissions share (64 %–74 %) in terms of energy related CO_2 emissions, the overall contribution of urban areas across all sectors and gases is estimated to range between 21 % and 30 % of all emissions (Marcotullio et al., 2013).

12.2.2.2 Emissions accounting for human settlements

Whereas the previous section discussed the urban proportion of total global emissions, this section assesses emissions accounting methods for human settlements. A variety of emission estimates have been published by different research groups in the scientific literature (e.g.,Ramaswami et al., 2008; Kennedy et al., 2009, 2011; Dhakal, 2009; World Bank, 2010; Hillman and Ramaswami, 2010; Glaeser and Kahn, 2010; Sovacool and Brown, 2010; Heinonen and Junnila, 2011a, c; Hoornweg et al., 2011; Chavez and Ramaswami, 2011; Chavez et al., 2012; Grubler et al., 2012; Yu et al., 2012; Chong et al., 2012). The estimates of GHG emissions and energy consumption for human settlements are very diverse. Comparable estimates are usually only available across small samples of human settlements, which currently limit the insights that can be gained from an assessment of these estimates. The limited number of comparable estimates is rooted in the absence of commonly accepted GHG accounting standards and a lack of transparency over data availabilities, as well as choices that have been made in the compilation of particular estimates:

- **Choice of physical urban boundaries.** Human settlements are open systems with porous boundaries. Depending on how physical boundaries are defined, estimates of energy consumption and GHG emissions can vary significantly (see Box 12.1).

- **Choice of accounting approach/reporting scopes**. There is widespread acknowledgement in the literature for the need to report beyond the direct GHG emissions released from within a settlement's territory. Complementary accounting approaches have therefore been proposed to characterize different aspects of the GHG performance of human settlements (see Box 12.2). Cities and other human settlements are increasingly adopting dual approaches (Baynes et al., 2011; Ramaswami et al., 2011; ICLEI et al., 2012; Carbon Disclosure Project, 2013; Chavez and Ramaswami, 2013).

- **Choice of calculation methods**. There are differences in the methods used for calculating emissions, including differences in emission factors used, methods for imputing missing data, and methods for calculating indirect emissions (Heijungs and Suh, 2010; Ibrahim et al., 2012).

A number of organizations have started working towards standardization protocols for emissions accounting (Carney et al., 2009; ICLEI, 2009; Covenant of Mayors, 2010; UNEP et al., 2010; Arikan, 2011). Further progress has been achieved recently when several key efforts joined forces to create a more broadly supported reporting framework (ICLEI et al., 2012). Ibrahim et al. (2012) show that the differences across reporting standards explains significant cross-sectional variability in reported emission estimates. However, while high degrees of cross-sectional comparability are crucial in order to gain further insight into the emission patterns of human settlements across the world, many applications at the settlement level do not require this. Cities and other localities often compile these data to track their own performance in reducing energy consumption and/or greenhouse gas emissions (see Section 12.7). This makes a substantial body of evidence difficult to use for scientific inquiries.

Beyond the restricted comparability of the available GHG estimates, six other limitations of the available literature remain. First, the growth in publications is restricted to the analysis of energy consumption and GHG emissions from a limited set of comparable emission estimates. New estimates do not emerge at the same pace. Second, available evidence is particularly scarce for medium and small cities as well as rural settlements (Grubler et al., 2012). Third, there is a regional bias in the evidence. Most studies focus on emissions from cities in developed countries with limited evidence from a few large cities in the developing world (Kennedy et al., 2009, 2011; Hoornweg et al., 2011; Sugar et al., 2012). Much of the most recent literature provides Chinese evidence (Dhakal, 2009; Ru et al., 2010; Chun et al., 2011; Wang et al., 2012a, b; Chong et al., 2012; Yu et al., 2012; Guo et al., 2013; Lin et al., 2013; Vause et al., 2013; Lu et al., 2013), but only limited new emission estimates are emerging from that. Evidence on human settlements in least developed countries is almost non-existent with some notable exceptions in the non peer-reviewed literature (Lwasa, 2013). Fourth, most of the available emission estimates are focusing on energy related CO_2 rather than all GHG emissions. Fifth, while there is a considerable amount of evidence for territorial emissions, studies that include Scope 2 and 3 emission components are growing but remain limited (Ramaswami et al., 2008, 2012b; Kennedy et al.,

Box 12.2 | Emission accounting at the local scale

Three broad approaches have emerged for GHG emissions accounting for human settlements, each of which uses different boundaries and units of analysis.

1) Territorial or production-based emissions accounting includes all GHG emissions from activities within a city or settlement's territory (see Box 12.1). This is also referred to as Scope 1 accounting (Kennedy et al., 2010; ICLEI et al., 2012). Territorial emissions accounting is, for example, commonly applied by national statistical offices and used by countries under the United Nations Framework Convention on Climate Change (UNFCCC) for emission reporting (Ganson, 2008; DeShazo and Matute, 2012; ICLEI et al., 2012).

However, human settlements are typically smaller than the infrastructure in which they are embedded, and important emission sources may therefore be located outside the city's territorial boundary. Moreover, human settlements trade goods and services that are often produced in one settlement but are consumed elsewhere, thus creating GHG emissions at different geographic locations associated with the production process of these consumable items. Two further approaches have thus been developed in the literature, as noted below.

2) Territorial plus supply chain accounting approaches start with territorial emissions and then add a well defined set of indirect emissions which take place outside the settlement's territory. These include indirect emissions from (1) the consumption of purchased electricity, heat and steam (Scope 2 emissions), and (2) any other activity (Scope 3 emissions). The simplest and most frequently used territorial plus supply chain accounting approach includes Scope 2 emissions (Hillman and Ramaswami, 2010; Kennedy et al., 2010; Baynes et al., 2011; ICLEI et al., 2012).

3) Consumption-based accounting approaches include all direct and indirect emissions from final consumption activities associated with the settlement, which usually include consumption by residents and government (Larsen and Hertwich, 2009, 2010a, b; Heinonen and Junnila, 2011a, b; Jones and Kammen, 2011; Minx et al., 2013). This approach excludes all emissions from the production of exports in the settlement territory and includes all indirect emissions occurring outside the settlement territory in the production of the final consumption items.

2009; Larsen and Hertwich, 2009, 2010a, b; Hillman and Ramaswami, 2010; White et al., 2010; Petsch et al., 2011; Heinonen and Junnila, 2011a, b; Heinonen et al., 2011; Chavez et al., 2012; Paloheimo and Salmi, 2013; Minx et al., 2013). Finally, the comparability of available evidence of GHG emissions at the city scale is usually restricted across studies. There prevails marked differences in terms of the accounting methods, scope of covered sectors, sector definition, greenhouse gas covered, and data sources used (Bader and Bleischwitz, 2009; Kennedy et al., 2010; Chavez and Ramaswami, 2011; Grubler et al., 2012; Ibrahim et al., 2012).

Across cities, existing studies point to a large variation in the magnitude of total and per capita emissions. For this assessment, emission estimates for several hundred individual cities were reviewed. Reported emission estimates for cities and other human settlements in the literature range from 0.5 tCO_2/cap to more than 190 tCO_2/cap (Carney et al., 2009; Kennedy et al., 2009; Dhakal, 2009; Heinonen and Junnila, 2011a, c; Wright et al., 2011; Sugar et al., 2012; Ibrahim et al., 2012; Ramaswami et al., 2012b; Carbon Disclosure Project, 2013; Chavez and Ramaswami, 2013; Department of Energy & Climate Change, 2013). Local emission inventories in the UK for 2005–2011 show that end use activities and industrial processes of both rural and urban localities vary from below 3 to 190 tCO_2/cap and more (Department of Energy & Climate Change, 2013). The total CO_2 emissions from end use activities for ten global cities range (reference year ranges 2003–2006) between 4.2 and 21.5 tCO_2eq/cap (Kennedy et al., 2009; Sugar et al., 2012), while there is variation reported in GHG estimates from 18 European city regions from 3.5 to 30 tCO_2eq/cap in 2005 (Carney et al., 2009).

In many cases, a large part of the observed variability will be related to the underlying drivers of emissions such as urban economic structures (balance of manufacturing versus service sector), local climate and geography, stage of economic development, energy mix, state of public transport, urban form and density, and many others (Carney et al., 2009; Kennedy et al., 2009, 2011; Dhakal, 2009, 2010; Glaeser and Kahn, 2010; Shrestha and Rajbhandari, 2010; Gomi et al., 2010; Parshall et al., 2010; Rosenzweig et al., 2011; Sugar et al., 2012; Grubler et al., 2012; Wiedenhofer et al., 2013). Normalizing aggregate city-level emissions by population therefore does not necessarily result in robust cross-city comparisons, since each city's economic function, trade typology, and imports-exports balance can differ widely. Hence, using different emissions accounting methods can lead to substantial differences in reported emissions (see Figure 12.4). Therefore, understanding differences in accounting approaches is essential in order to draw meaningful conclusions from cross-city comparisons of emissions.

Evidence from developed countries such as the United States, Finland, or the United Kingdom suggests that consumption-based emission estimates for cities and other human settlements tend to be higher than their territorial emissions. However, in some cases,

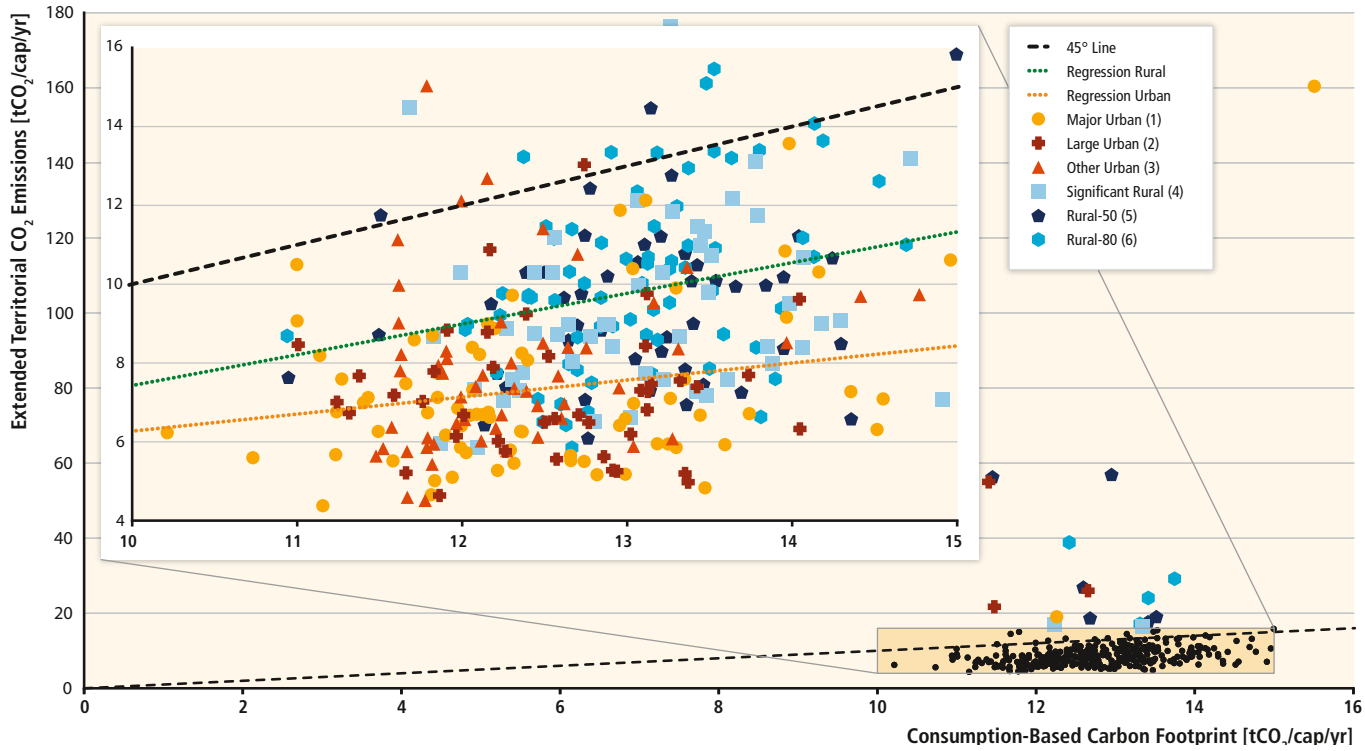


Figure 12.5 | Extended territorial and consumption-based per capita CO_2 emissions for 354 urban (yellow/orange/red) and rural (blue) municipalities in England in 2004. The extended territorial CO_2 emissions accounts assign CO_2 emissions from electricity consumption to each municipality's energy use. The consumption-based carbon footprint accounts assign all emissions from the production of goods and services in the global supply chain to the municipality where final consumption takes place. At the 45° line, per capita extended territorial and consumption-based CO_2 emissions are of equal size. Below the 45° line, consumption-based CO_2 emission estimates are larger than extended territorial emissions. Above the 45° line, estimates of extended territorial CO_2 emissions are larger than consumption-based CO_2 emissions. Robust regression lines are shown for the rural (blue) and urban (yellow/orange/red) sub-samples. In the inset, the x-axis shows 10–15 tonnes of CO_2 emissions per capita and the y-axis shows 4–16 tonnes of CO_2 emissions per capita. Source: Minx et al. (2013).

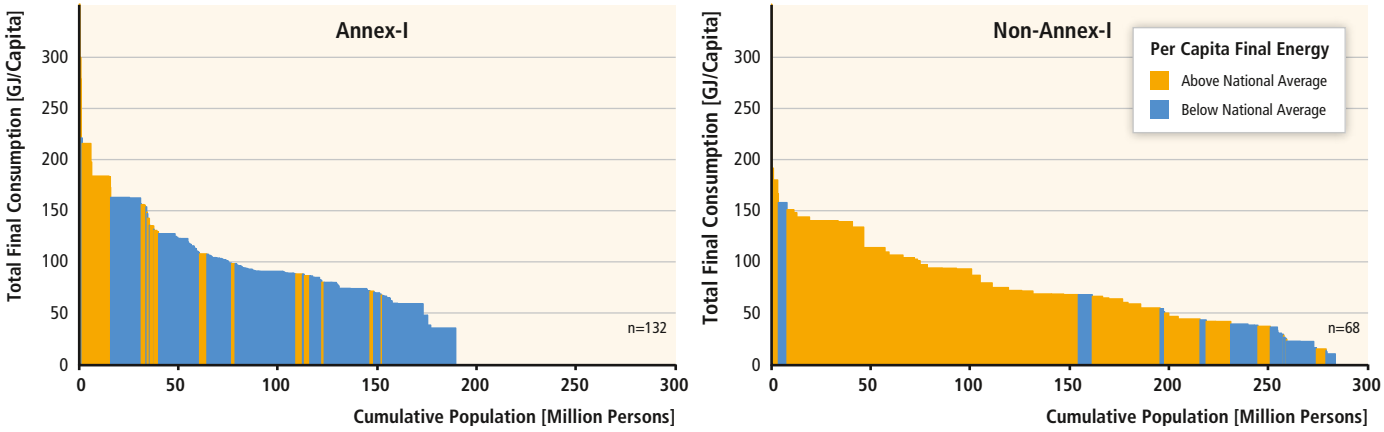


Figure 12.6 | Per capita (direct) total final consumption (TFC) of energy (GJ) versus cumulative population (millions) in urban areas. Source: Grubler et al. (2012).

territorial or extended territorial emission estimates (Scope 1 and Scope 2 emissions) can be substantially higher. This is mainly due to the large fluctuations in territorial emission estimates that are highly dependent on a city's economic structure and trade typology. Consumption-based estimates tend to be more homogenous (see Figure 12.5).

Based on a global sample of 198 cities by the Global Energy Assessment, Grubler et al. (2012) found that two out of three cities in Annex I countries have a lower per capita final energy use than national levels. In contrast, per capita final energy use for more than two out of three cities in non-Annex I countries have higher than national averages (see Figure 12.6). There is not sufficient comparable evidence available for this assessment to confirm this finding for energy related CO_2 emissions, but this pattern is suggested by the close relationship between final energy use and energy related CO_2 emissions. Individual studies for 35 cities in China, Bangkok, and 10 global cities provide additional evidence of these trends (Dhakal,

2009; Aumnad, 2010; Kennedy et al., 2010; Sovacool and Brown, 2010). Moreover, the literature suggests that differences in per capita energy consumption and CO_2 emission patterns of cities in Annex I and non-Annex I countries have converged more than their national emissions (Sovacool and Brown, 2010; Sugar et al., 2012). For consumption-based CO_2 emissions, initial evidence suggests that urban areas tend to have much higher emissions than rural areas in non-Annex I countries, but the evidence is limited to a few studies on India and China (Parikh and Shukla, 1995; Guan et al., 2008, 2009; Pachauri and Jiang, 2008; Minx et al., 2011). For Annex I countries, studies suggest that using consumption based CO_2 emission accounting, urban areas can, but do not always, have higher emissions than rural settlements (Lenzen et al., 2006; Heinonen and Junnila, 2011c; Minx et al., 2013).

There are only a few downscaled estimates of CO_2 emissions from human settlements and urban as well as rural areas, mostly at regional and national scales for the EU, United States, China, and India (Parshall et al., 2010; Raupach et al., 2010; Marcotullio et al., 2011, 2012; Gurney et al., 2012). However, these studies provide little to no representation of intra-urban features and therefore cannot be substitutes for place-based emission studies from cities. Recent studies have begun to combine downscaled estimates of CO_2 emissions with local urban energy consumption information to generate fine-scale maps of urban emissions (see Figure 12.7 and Gurney et al., 2012). Similarly, geographic-demographic approaches have been used for downscaling consumption-based estimates (Druckman and Jackson, 2008; Minx et al., 2013). Such studies may allow more detailed analyses of the drivers of urban energy consumption and emissions in the future.

12.2.3 Future trends in urbanization and GHG emissions from human settlements

This section addresses two issues concerning future scenarios of urbanization. It summarizes projected future urbanization dynamics in multiple dimensions. It assesses and contextualizes scenarios of urban population growth, urban expansion, and urban emissions.

12.2.3.1 Dimension 1: Urban population

Worldwide, populations will increasingly live in urban settlements. By the middle of the century, the global urban population is expected to reach between 5.6 to 7.1 billion, with trends growth varying substantially across regions (Table 12.2). While highly urbanized North America, Europe, Oceania, and Latin America will continue to urbanize, the increase in urbanization levels in these regions is relatively small. Urbanization will be much more significant in Asia and Africa where

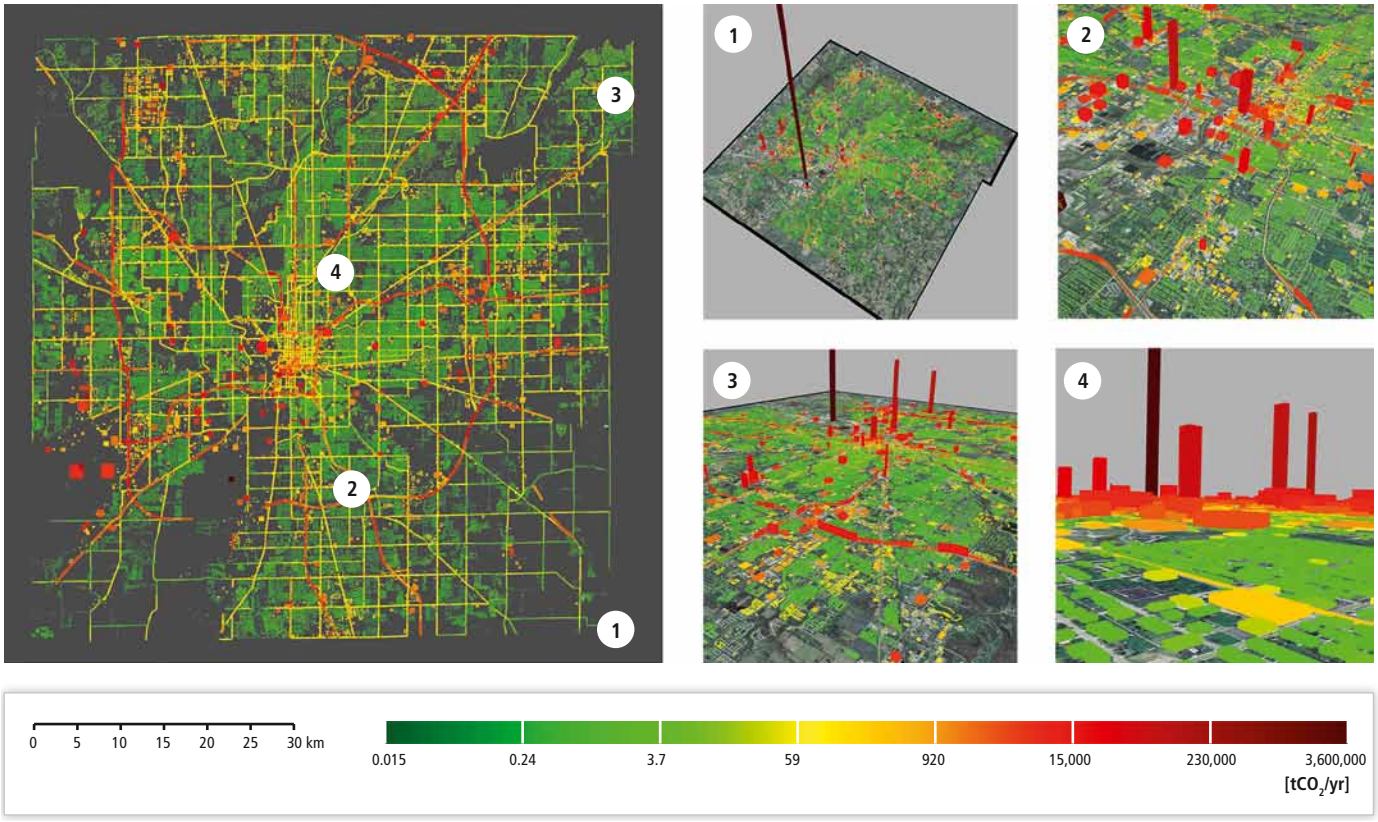


Figure 12.7 | Total fossil fuel emissions of Marion County, Indiana, USA, for the year 2002. Left map: Top-down view with numbered zones. Right four panels: Blow ups of numbered zones. Box height units: Linear. Source: Gurney et al. (2012).

Table 12.2 | Global urban population in 2050 (mid-year)

Source	Total Pop. *in billions*	% Urban	Urban Pop. *in billions*
IIASA Greenhouse Gas Index, A2R Scenario	10.245	69	7.069
World Bank	9.417	67	6.308
United Nations	9.306	67	6.252
IIASA Greenhouse Gas Index, B2 Scenario	9.367	66	6.182
IIASA Greenhouse Gas Index, B1 Scenario	8.721	64	5.581

Sources: IIASA (2009), UN DESA (2012), World Bank (2013).

the majority of the population is still rural. Urban population growth will also largely occur in the less developed Africa, Asia, and Latin America. The proportion of rural population in the developed regions have declined from about 60 % in 1950 to less than 30 % in 2010, and will continue to decline to less than 20 % by 2050.

Uncertainties in future global urbanization trends are large, due in part to different trajectories in economic development and population growth. While the United Nations Development Programme (UNPD) produces a single urbanization scenario for each country through 2050, studies suggests that urbanization processes in different countries and different periods of time vary remarkably. Moreover, past UN urbanization projections have contained large errors and have tended to overestimate urban growth, especially for countries at low and middle urbanization levels (Bocquier, 2005; Montgomery, 2008; Alkema et al., 2011).

Given these limitations, recent studies have begun to explore a range of urban population growth scenarios. A study undertaken at International Institute for Applied Systems Analysis (IIASA) extrapolates UN scenarios to 2100 and develops three alternative scenarios by making assumptions about long-term maximum urbanization levels (Grubler et al., 2007). However, missing from these scenarios is the full range of uncertainty over the next twenty to thirty years, the period when the majority of developing countries will undergo significant urban transitions. For instance, variation across different urbanization scenarios before 2030 is negligible (0.3 %) for India and also very small (< 4 %) for China (see Figure 12.8, dashed lines). By 2050, urbanization levels could realistically reach between 38–69 % in India, and 55–78 % in China (O'Neill et al., 2012). In other words, there are large uncertainties in urbanization trajectories for both countries. The *speed* (fast or slow) as well as the *nature* (an increase in industrialization) of urbanization could lead to significant effects on future urban energy use and emissions.

12.2.3.2 Dimension 2: Urban land cover

Recently, global forecasts of urban expansion that take into account population and economic factors have become available (Nelson et al., 2010; Angel et al., 2011; Seto et al., 2011, 2012). These studies vary in their baseline urban extent, model inputs, assumptions about future trends in densities, economic and population growth, and modelling methods. They forecast that between 2000 and 2030, urban areas will expand between 0.3 million to 2.3 million km^2, corresponding to an increase between 56 % to 310 % (see Table 12.3 and Angel et al., 2011; Seto et al., 2011, 2012). It is important to note that these studies forecast changes in urban land cover (features of Earth's surface) and not changes in the built environment and infrastructure (e.g., buildings, roads). However, these forecasts of urban land cover can be useful to project infrastructure development and associated emissions. Given worldwide trends of declining densities, the zero population density decline scenario and associated urban growth forecast (0.3 million) is unlikely, as is the *Special Report on Emissions Scenarios* (SRES) A1 scenario of very rapid economic growth and a peak in global population mid-century. According to the studies, the most likely scenarios are SRES B2 (Seto et al., 2011), > 75 % probability (Seto et al., 2012), and 2 % decline (Angel et al., 2011), which reduces the range of forecast estimates to between 1.1 to 1.5 million km^2 of new urban land. This corresponds to an increase in urban land cover between 110 % to 210 % over the 2000 global urban extent. Hurtt et al. (2011) report

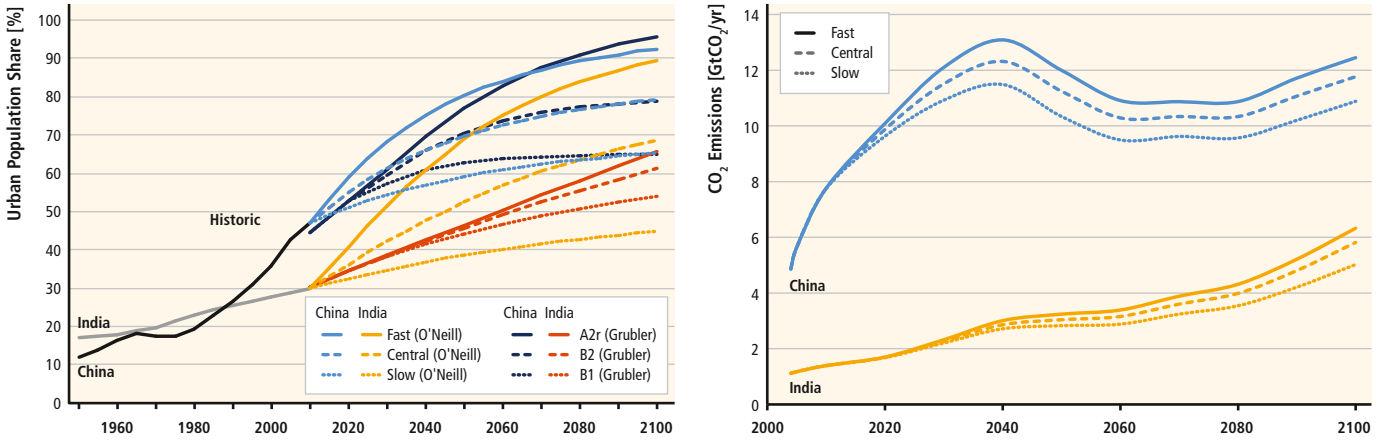


Figure 12.8 | Projected urban population growth for India and China under fast, central, and slow growth scenarios (left) and associated growth in CO_2 emissions (right). Sources: O'Neill et al. (2012), Grubler et al. (2007).

projected land-use transitions including urbanization, out to 2100, for the intended use in Earth System Models (ESMs). However, they do not give a detailed account of the projected urban expansion in different parts of the world.

Depending on the scenario and forecast, 55 % of the total urban land in 2030 is expected to be built in the first three decades of the 21st century. Nearly half of the global growth in urban land cover is forecasted to occur in Asia, and 55 % of the regional growth will take place in China and India (Seto et al., 2012). China's urban land area is expected to expand by almost 220,000 km^2 by 2030, and account for 18 % of the global increase in urban land cover (Seto et al., 2012). These forecasts provide first-order estimates of the likelihood that expansion of urban areas will occur in areas of increasing vulnerability to extreme climate events including floods, storm surges, sea level rise, droughts, and heat waves (see WGII AR5 Chapter 8). Urban expansion and associated land clearing and loss of aboveground biomass carbon in the pan-tropics is expected to be 1.38 PgC between 2000 and 2030, or 0.05 PgC/yr (Seto et al., 2012).

12.2.3.3 Dimension 3: GHG emissions

Recent developments in integrated models are beginning to capture the interdependence among urban population, urban land cover, and GHG emissions. Some integrated models have found that changes in urbanization in China and India have a less than proportional effect on aggregate emissions and energy use (O'Neill et al., 2012). These studies find that income effects due to economic growth and urbanization result in household consumption shifts toward cleaner cooking fuels (O'Neill et al., 2012). In India, the urbanization level in 2050 will be 16 percentage points lower under the slow urbanization scenario than under the central scenario, or 15 percentage points higher under the fast scenario than under the central scenario. However, these large differences in potential urbanization levels in India lead to relatively small differences in emissions: 7 % between the slow and central urbanization scenarios, and 6 % between the fast and central urbanization scenarios (O'Neill et al., 2012). The relatively small effect of urbanization on emissions is likely due to relatively small differences in per capita income between rural and urban areas (O'Neill et al., 2012). In contrast, large differences in per capita income between urban and rural areas in China result in significant differences in household consumption, including for energy (O'Neill et al., 2012). Differences in urbanization pathways also reflect different speeds of transition away from the use of traditional fuels toward modern fuels such as electricity and natural gas (Krey et al., 2012). Slower rates of urbanization result in slower transitions away from traditional to modern fuels (Jiang and O'Neill, 2004; Pachauri and Jiang, 2008). A large share of solid fuels or traditional biomass in the final energy mix can have adverse health impacts due to indoor air pollution (Bailis et al., 2005; Venkataraman et al., 2010).

Accounting for uncertainties in urban population growth, the scenarios show that urbanization as a demographic process does not lead to a

Table 12.3 | Forecasts of global urban land expansion to 2030. Sources: Angel et al. (2011), Seto et al. (2011, 2012).

Study	Scenario	Projected Urban Expansion to 2030 (km^2)								% of projected urban land in 2030 to be built between 2000–2030
		Urban Land 2000 (km^2)	Africa	Asia	Europe	Latin America	North America	Oceania	Total (% increase from 2000)	
Seto et al. (2011)	SRES A1	726,943	107,551	1,354,001	296,638	407,214	73,176	16,996	2,255,576 (310)	76
	SRES A2	726,943	113,423	702,772	162,179	122,438	49,487	15,486	1,165,785 (160)	62
	SRES B1	726,943	107,551	1,238,267	232,625	230,559	86,165	18,106	1,913,273 (263)	72
	SRES B2	726,943	136,419	989,198	180,265	131,016	74,572	15,334	1,526,805 (210)	68
Seto et al. (2012)	> 75 % probability	652,825	244,475	585,475	77,575	175,075	118,175	9,700	1,210,475	65
		Urban Land 2000 (km^2)	Africa	Asia	East Asia and the Pacific	Europe and Japan	Latin America and the Caribbean	Land Rich Developed Countries	Total (% increase from 2000)	
Angel et al. (2011)	0 % density decline	602,864	58,132	120,757	43,092	9,772	49,348	54,801	335,902 (56)	36
	1 % density decline	602,864	92,002	203,949	75,674	74,290	98,554	119,868	664,337 (110)	52
	2 % density decline	602,846	137,722	316,248	119,654	161,379	164,975	207,699	1,107,677 (184)	65

corresponding growth in emissions and energy use (Figure 12.8b). In China, for example, under the central scenario (similar to UN projections) the country will reach 70 % urban population by 2050 and the total carbon emissions will reach 11 GtC/yr. Under the slow urbanization scenario, the urbanization level is 13 % lower than the central urbanization scenario, but results in emissions that are 9 % lower than under the central urbanization scenario. Similarly, the fast urbanization scenario results in emissions that are 7 % higher than under the central scenario, but with urbanization levels that are 11 % higher.

Studies of the effects of demographic change on GHG emissions come to contradicting conclusions (Dalton et al., 2008; Kronenberg, 2009). Many of the forecasts on urbanization also do not explicitly account for the infrastructure for which there is a separate set of forecasts (Davis et al., 2010; Kennedy and Corfee-Morlot, 2013; Müller et al., 2013) including those developed by the IEA (IEA, 2013) and the Organisation for Economic Co-operation and Development (OECD) (OECD, 2006b, 2007). However these infrastructure forecasts, typically by region or country, do not specify the portion of the forecasted infrastructure in urban areas and other settlements. One study finds that both ageing and urbanization can have substantial impacts on emissions in certain world regions such as the United States, the EU, China, and India. Globally, a 16–29 % reduction in the emissions by 2050 (1.4–2.5 GtC/yr) could be achieved through slowing population growth (O'Neill et al., 2010).

12.3 Urban systems: Activities, resources, and performance

How does urbanization influence global or regional CO_2 emissions? This section discusses drivers of urban GHG emissions, how they affect different sectors, and their interaction and interdependence. The magnitude of their impact on urban GHG emissions is also discussed qualitatively and quantitatively to provide context for a more detailed assessment of urban form and infrastructure (12.4) and spatial planning (12.5).

12.3.1 Overview of drivers of urban GHG emissions

Urban areas and nations share some common drivers of GHG emissions. Other drivers of urban GHG emissions are distinct from national drivers and are locally specific. The previous section discussed important accounting issues that affect the estimation of urban-scale GHG emissions. (For a more comprehensive review, see Kennedy et al., 2009; ICLEI et al., 2012; Ramaswami et al., 2012b; Steinberger and Weisz, 2013). Another characteristic of urban areas is that their physical form and structure in terms of land-use mix and patterns, density, and spatial configuration of infrastructure can strongly influence GHG emissions (see discussion below and in 12.4). The basic constituent elements of cities such as streets, public spaces, buildings, and their design, placement, and function reflect their socio-political, economic, and technological histories (Kostof, 1992; Morris, 1994; Kostof and Tobias, 1999). Hence, cities often portray features of 'path dependency' (Arthur, 1989), a historical contingency that is compounded by the extent of pre-existing policies and market failures that have lasting impacts on emissions (see Section 12.6 below).

The following sections group and discuss urban GHG emission drivers into four clusters that reflect both the specificity of urban scale emissions as well as their commonality with national-scale drivers of GHG emissions addressed in the other chapters of this assessment:

- Economic geography and income
- Socio-demographic factors
- Technology
- Infrastructure and urban form

Economic geography refers to the function of a human settlement within the global hierarchy of places and the international division of labour, as well as the resulting trade flows of raw materials, energy, manufactured goods, and services. Income refers to the scale of economic activity, often expressed through measures of Gross Regional Product (GRP) (i.e., the GDP equivalent at the scale of human settlements), calculated either as an urban (or settlement) total, or normalized on a per capita basis.

Socio-demographic drivers of urban GHG emissions include population structure and dynamics (e.g., population size, age distribution, and household characteristics) (O'Neill et al., 2010) as well as cultural norms (e.g., consumption and lifestyle choices) and distributional and equity factors (e.g., access or lack thereof to basic urban infrastructure). Unequal access to housing and electricity is a significant social problem in many rapidly growing cities of the Global South (Grubler and Schulz, 2013) and shapes patterns of urban development. Here, 'technology' refers to macro-level drivers such as the technology of manufacturing and commercial activities. 'Infrastructure' and 'urban form' refer to the patterns and spatial arrangements of land use, transportation systems, and urban design elements (Lynch, 1981; Handy, 1996) and are discussed in greater detail in Section 12.4.

12.3.1.1 Emission drivers decomposition via IPAT

Explaining GHG emission growth trends via decomposition analysis is a widely used technique in the scientific literature and within IPCC assessments ever since Kaya (1990). The so-called IPAT identity (for a review, see Chertow, 2000) is a multiplicative identity in which Impacts (e.g., emissions) are described as being the product of Population *x* Affluence *x* Technology. First derivatives (growth rates) of the components of this identity become additive, thus allowing a first analysis on the relative weight of different drivers. The IPAT identity is

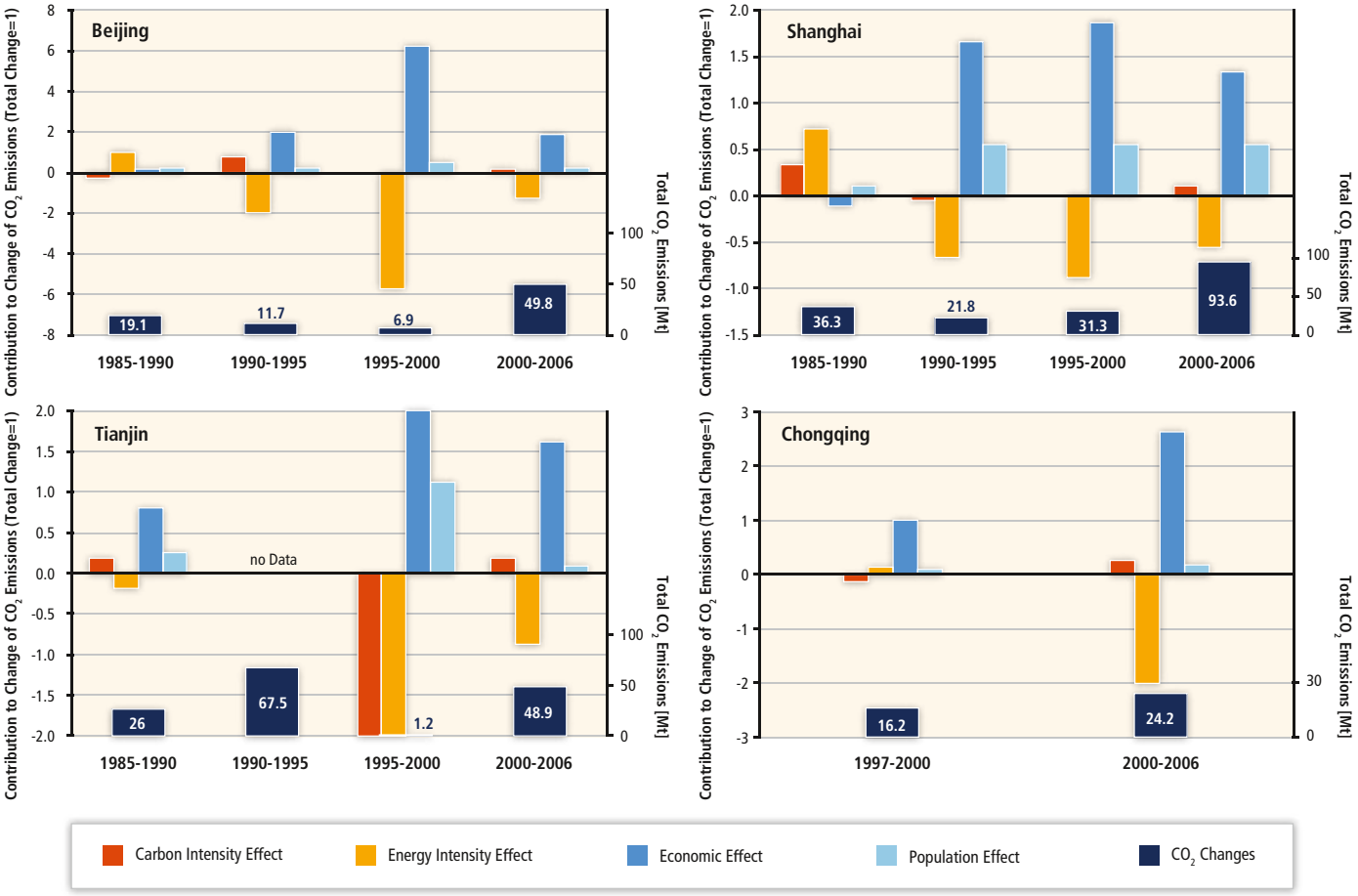


Figure 12.9 | Decomposition of urban-scale CO_2 emissions (absolute difference over time period specified (dark blue) and renormalized to index 1 (other colours)) for four Chinese cities 1985 to 2006. Source: Grubler et al. (2012) based on Dhakal (2009). Note the 'economic effect' in the graph corresponds to an income effect as discussed in the text. For comparison, per capita CO_2 emissions for these four cities range between 11.7 (Shanghai), 11.1 (Tianjin), 10.1 (Beijing), and 3.7 (Chongqing) tCO_2/cap (Hoornweg et al., 2011).

a growth accounting framework and does not lend itself to explaining differences between urban settlements in terms of absolute GHG emission levels and their driving forces (see discussion below).

There is great interest in understanding the drivers of China's urban GHG emissions, which has resulted in a large literature on the decomposition of GHG emissions for Chinese megacities. With approximately 10 tonnes of CO_2 per urban capita—three times the national average—China approaches and in some cases, surpasses levels for Annex-I countries and cities (Dhakal, 2009). Studies have used national emission inventory methods following the IPCC/OECD guidelines (Dhakal, 2009; Chong et al., 2012) or input-output techniques (Wang et al., 2013) and thus have used both production and consumption accounting perspectives. Studies have also gone beyond the simple IPAT accounting framework, such as using index decomposition (Donglan et al., 2010). Together, these studies show considerable variation in per capita GHG emissions across Chinese cities (see, for example, Figure 12.9). Although the relative contribution of different drivers of emissions varies across cities and time periods, one study of several Chinese cities found that income is the most important driver of increases in urban carbon emissions, far surpassing population growth, with improvements in energy efficiency serving as a critical counterbalancing factor to income growth (Dhakal, 2009). The importance of economic growth as a driver of urban CO_2 emissions in China has been consistently corroborated in other studies, including those that examine relatively smaller cities and with the use of alternative types of data and methods (Li et al., 2010; Liu et al., 2012; Chong et al., 2012; Jiang and Lin, 2012).

However, the evidence on whether the gains in efficiency can counterbalance the scale of infrastructure construction and income growth in China is less conclusive. Several studies implemented at different spatial scales have found that the scale of urbanization and associated consumption growth in China have outpaced gains from improvements in efficiency (Peters et al., 2007; Feng et al., 2012; Güneralp and Seto, 2012). Other studies have found that improvements in efficiency offset the increase in consumption (Liu et al., 2007; Zhang et al., 2009; Minx et al., 2011).

The literature on drivers of urban GHG emissions in other non-Annex I countries is more sparse, often focusing on emission drivers at the sectoral level such as transport (Mraihi et al., 2013) or household energy use (Ekholm et al., 2010). In these sectoral studies, income and other factors (that are highly correlated with income) such as vehicle ownership and household discount rates, are also shown as important determining variables.

Decomposition analyses are available for cities in the United States (Glaeser and Kahn, 2010), the UK (Minx et al., 2013), Japan (Makido et al., 2012), and Australia (Wiedenhofer et al., 2013). These studies show that income is an important driver of urban GHG emissions. Studies using more disaggregated emission accounts complement these findings by also identifying other significant influencing factors including automobile dependence, household size, and education (Minx et al., 2013) or additional variables such as climate represented by heating- or cooling-degree days (Wiedenhofer et al., 2013). The latter two studies are of particular interest as they provide an in-depth analysis of the determining variables of urban GHG emissions using both production and consumption-based accounting approaches. In both accounting approaches, income emerges as an important determinant of urban GHG emissions.

12.3.1.2 Interdependence between drivers

The drivers outlined above vary in their ability to be influenced by local decision making. It is difficult to isolate the individual impact of any of these factors on urban energy use and GHG emissions since they are linked and often interact across different spatial and temporal scales. The interaction among the factors and the relative importance of each will vary from place to place. Moreover, many of these factors change over time and exhibit path dependence.

A legitimate concern with the IPAT decomposition approach is that the analysis assumes variable independence, thus ignoring variable interdependence and co-variance. For instance, a study of 225 cities suggests a robust negative correlation between per capita income levels and energy intensity (Grubler et al., 2012) that holds for both high-income as well as low-income cities. Income growth has the potential to drive investment in technology, changing investment in newer and more efficient technologies, as higher income segments have lower discount rates or higher tolerance to longer payback times (Hausman, 1979).

12.3.1.3 Human settlements, linkages to sectors, and policies

The major drivers discussed above affect urban GHG emissions through their influence on energy demand in buildings, transport, industry, and services. These can be mitigated through demand-side management options. As such, human settlements cut across the assessment of mitigation options in sector-specific chapters of this Assessment (see Table 12.4). The drivers also affect the demand for urban energy, water, and waste infrastructure systems, whose GHG emissions can be mitigated via technological improvements within each individual infrastructure system (e.g., methane recovery from municipal wastewater treatment plants and landfills) as well as through improved system integration (e.g., using urban waste as an energy source). Given the interdependence between drivers and across driver groups discussed above, independent sectoral assessments have limitations and risk omitting important mitigation potentials that arise from systems integration.

On one hand, governance and institutions for addressing mitigation options at the urban scale are more dispersed (see 12.6) and face a legacy of inadequately addressing a range of market failures (see Box 12.3). On the other hand, the urban scale also provides unique opportunities for policy integration between urban form and density, infrastructure planning, and demand management options. These are key, especially in the domain of urban transport systems. Lastly, governance and institutional capacity are scale and income dependent, i.e., tend to be weaker in smaller scale cities and in low income/revenue settings. In so far as the bulk of urban growth momentum is expected to unfold in small- to medium-size cities in non-Annex I countries (see Section 12.2), mitigation of GHG emissions at the scale of human settlements faces a new type of 'governance paradox' (Grubler et al., 2012): the largest opportunities for GHG emission reduction (or avoidance of unfettered emission growth) might be precisely in urban areas where governance and institutional capacities to address them are weakest (Bräutigam and Knack, 2004; Rodrik et al., 2004).

12.3.2 Weighing of drivers

This section assesses the relative importance of the GHG drivers in different urban contexts such as size, scale, and age, and examines the differences between cities in developed and developing countries.

12.3.2.1 Qualitative weighting

In the previous discussion of the respective role of different emission drivers, the emphasis was placed on the role of drivers in terms of emission growth. That perspective is complemented in this section by a consideration of the absolute level of emissions, and the issue of urban size/scale. This section also differentiates the role of emission drivers between mature versus growing human settlements.

Importance of size and scaling

Given the significance of human settlements for global resource use, an improved understanding of their size distribution and likely growth dynamics is crucial. For many physical, biological, social, and technological systems, robust quantitative regularities like stable patterns of rank distributions have been observed. Examples of such power law-scaling patterns include phenomena like the frequency of vocabulary in languages, the hierarchy of urban population sizes across the world (Zipf, 1949; Berry and Garrison, 1958; Krugman, 1996) or the allometric scaling patterns in biology, such as Kleiber's Law, which observes the astonishing constancy in the relation between body mass and metabolic rates: for living organisms across many orders of magnitude in size that metabolic rate scales to the ¾ power of the body mass (Kleiber, 1961). There is a vigorous debate in many fields, including

Table 12.4 | Examples of policies across sectors and mitigation options at the scale of human settlements.

	ENERGY SYSTEMS (Chapter 7)	TRANSPORT (Chapter 8)	BUILDINGS (Chapter 9)	INDUSTRY (Chapter 10)	AFOLU (Chapter 11)
Carbon Sinks / Sequestration					Tradable Credits, EQ Policies
Enegy Efficiency	Taxes, Credits / Permits	Subsidies for Fuel Efficiency, Standards, Targets	Taxes, Preferential Lending, Codes, Standards	Taxes, Standards, Emissions Trading, Target-setting	
Fuel / Energy Switching / Renewables	Taxes, EQ Policies, Ren Energy Portfolio Stds, Energy Security Policies	Taxes, Biofuel Incentives, Standards			Taxes, Targets, Subsidies
High-Performance / Passive Design		Bike sharing, Urban Planning	Codes, Standards, Integrated Planning, Certification		
Improved Planning / Management	Demand Response Measures	Integrated Planning	Commissioning, Audits, Education		Land Planning, Protected Areas
Materials Efficiency			Codes, Standards, Taxes, LCA, Certification	Standards	Taxes
New / Improved Technology	B & D Policies, Low Carbon Tech Targets	Subsidies for Fuel Efficiency, Bike Sharing, Real-time Information	Real-time Information		Bioenergy Targets
Recycling / Reducing Waste				Taxes, Target-setting, Education	Education
Reduced Demand / Behavior Change		Tolls, Congestion Pricing		Taxes, Subsidies, Education	Education, Standards
Urban Form / Density		Smart Growth, Urban Planning, Growth Management	Certification, Urban Planning		

Geography (Batty, 2007, 2008), Ecology (Levin, 1992; West et al., 1999; Brown et al., 2004), Architecture (Weinstock, 2011), and Physics (Carvalho and Penn, 2004) about the extent to which underlying hierarchical networks of metabolic systems or transportation networks are the ultimate causes of the size, shape and rank-distribution of entities, be they organisms or urban systems (Decker et al., 2000, 2007).

With the scale of urbanization trends currently underway, whether the relationship between city size and GHG emissions is linear (i.e., one to one, or proportional increase), super-linear (i.e., increasing returns to scale) or sub-linear (i.e., economies of scale such as efficiency gains through shared infrastructure) will be critical for understanding future urban GHG emissions. Super-linear scaling has been observed for many urban phenomena: as a city's population increases, there is a greater than one to one increase in productivity, wages, and innovation as well as crime (Bettencourt et al., 2007, 2010). If cities exhibit sub-linear scaling with respective to energy and GHG emissions, it suggests that larger cities are more efficient than smaller ones. While there are many studies of urban scaling, few studies explicitly examine city size and GHG emissions or energy use, and the limited empirical evidence on the scaling relationship is inconclusive. A study of 930 urban areas in the United States—nearly all the urban settlements—shows a barely sub-linear relationship (coefficient=0.93) between urban population size and GHG emissions (Fragkias et al., 2013).

In a study of 225 cities across both Annex I and non-Annex I countries, Grubler and Schulz (2013) find non-uniform scaling for urban final energy use, with a distribution characterized by threshold effects across an overall convex distribution (Figure 12.10). In terms of final energy use, which is an important determinant of urban GHG emissions, increasing the urban scale in terms of energy use has different implications as a function of three different urban energy scale classes. Small cities with low levels of final energy use—below 30 PJ—present the steepest growth in energy use with respect to increasing city size: a doubling of rank position tends to increase the urban energy use by a factor of 6.1. For medium-sized cities with moderate energy

use (between 30 and 500 PJ final energy use per city), a doubling of city rank corresponds to an increase in energy consumption only by a factor of 1.6. For the largest urban energy users in the dataset, cities with greater than 500 PJ of final energy use per year, a doubling of urban rank is associated with an increase in urban energy use by a factor of only 0.5. This indicates considerable positive agglomeration economies of bigger cities with respect to energy use. Only four urban agglomerations of the entire sample of 225 have an annual final energy use significantly greater than one EJ: Shanghai (2 EJ), Moscow (1.6 EJ), Los Angeles (1.5 EJ), and Beijing (1.2 EJ). With urban growth anticipated to be the most rapid in the smaller cities of fewer than 500,000 inhabitants (UN DESA, 2010), the patterns observed by (Grubler and Schulz, 2013) suggest very high elasticities of energy demand growth with respect to future increases in urban population.

Mature versus growing cities

The relative impacts of the four drivers on emissions differ depending upon whether urban areas are established and mature versus growing and developing.

Economic geography and income have high impact for both mature and growing cities. Mature cities in developed countries often have high income, high consumption, and are net consumers of goods and services, with a large share of imports. These cities have high emissions, depending upon the energy supply mix. Many imported goods are produced in growing cities in developing countries. The resulting differentiation within the international division of labour and corresponding trade flows can be categorized into three types of cities: Net Producers, Trade Balanced, and Net Consumers (Chavez and Ramaswami, 2013). As a result, differences in reported urban GHG emissions are pronounced for Net Producer and Net Consumer cities, illustrating the critical importance of taking economic geography and international trade into account when considering urban GHG emission inventory frameworks. The degree to which economic growth drives GHG emissions includes the type of economic specialization of urban activities and the energy supply mix (Brownsword et al., 2005; Kennedy et al., 2012). Cities with energy intensive industries are likely to contribute higher total and per capita GHG emissions than those whose economic base is in the service sector (Dhakal, 2009, 2010).

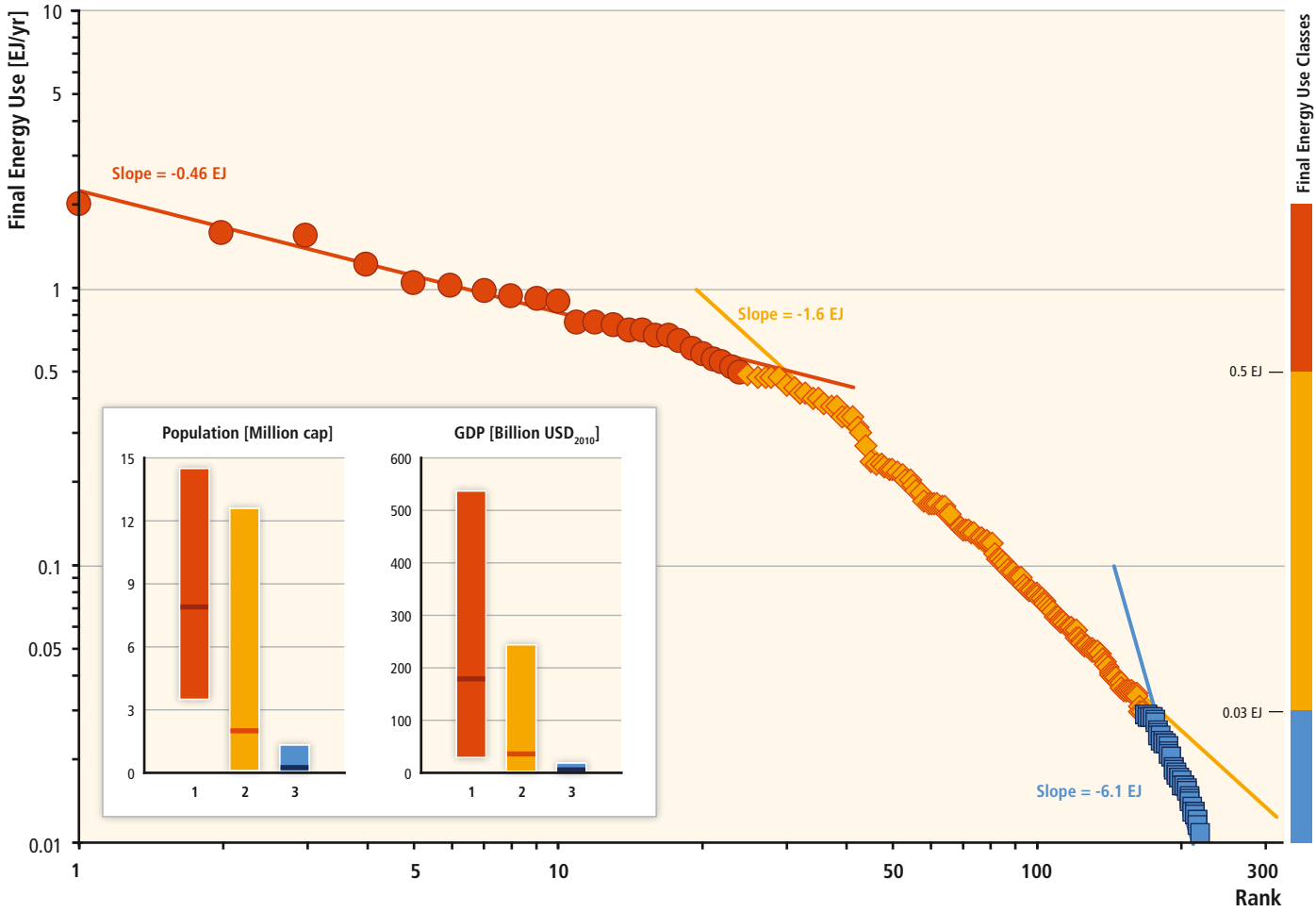


Figure 12.10 | Rank size distribution of 225 cities in terms of their final energy use (in EJ) regrouped into 3 subsamples (> 0.5EJ, 0.03–0.5EJ, < 0.03EJ) and corresponding sample statistics. The rank of a city is its position in the list of all cities sorted by size, measured in terms of final energy use. Note the different elasticities of energy use with respect to changes in urban size rank. The factors (slopes) shown in the figure detail the increase of energy use when doubling the rank for the respective groups. Source: Grubler et al. (2012) based on Grubler and Schulz (2013).

Specialization in energy-intensive sectors creates a strong correlation between economic growth and GHG emissions growth. This relationship is further strengthened if the energy supply mix is carbon intensive (Parikh and Shukla, 1995; Sugar et al., 2012).

Higher **urban incomes** are correlated with higher consumption of energy and GHG emissions (Kahn, 2009; Satterthwaite, 2009; Kennedy et al., 2009; Weisz and Steinberger, 2010; Zheng et al., 2010; Hoornweg et al., 2011; Marcotullio et al., 2012). At the household level, studies in a variety of different countries (Netherland, India, Brazil, Denmark, Japan, and Australia) have also noted positive correlations between income and energy use (Vringer and Blok, 1995; Cohen et al., 2005; Lenzen et al., 2006; Pachauri and Jiang, 2008; Sahakian and Steinberger, 2011). As such, income exerts a *high* influence on GHG emissions. The Global Energy Assessment concluded that cities in non-Annex I countries generally have much higher levels of energy use compared to the national average, in contrast to cities in Annex I countries, which generally have lower energy use per capita than national averages (see Figure 12.6 and Grubler et al., 2012). One reason for this inverse pattern is due to the significantly higher urban to rural income gradient in cities in non-Annex I countries compared to Annex I countries. That is, per capita incomes in non-Annex I cities tend to be several fold higher than rural per capita incomes, thus leading to much higher energy use and resulting emissions.

Socio-demographic drivers are of *medium* importance in rapidly growing cities, further mediated as growth rates decline, incomes increase and lifestyle choices change. Social demographic drivers are of *relatively small* importance in mature cities, where growth is slow and populations are ageing. Household size, defined as the number of persons in a household, has been steadily declining over the last fifty years. Worldwide, average household size declined from 3.6 to 2.7 between 1950 to 1990, and this trend is occurring in both developed and developing countries although at different rates (MacKellar et al., 1995; Bongaarts, 2001). Smaller household size is correlated with higher per capita emissions, whereas larger household size can take advantage of economies of scale. Evidence on the relationship between urban population size and per capita emissions is inconclusive. Scale effects have been shown for cities in Asia (Marcotullio et al., 2012) but little to no scaling effect for GHG emissions in the United States (Fragkias et al., 2013).

Infrastructure and urban form are of *medium to high* importance as drivers of emissions. In rapidly growing cities, infrastructure is of high importance where the largest share of infrastructure construction is occurring. In mature cities, urban form drivers are of high importance as they set in place patterns of transport and other energy use behaviour. In mature cities, infrastructure is of medium importance, as they are largely established, and thus refurbishing or repurposing of old infrastructures offers primary mitigation opportunities. The global expansion of infrastructure used to support urbanization is a key driver of emissions across multiple sectors. Due to the high capital costs, increasing returns, and network externalities related to infrastructures that provide fundamental services to cities, emissions associated with infrastructure systems are particularly prone to lock-in (Unruh and Carrillo-Hermosilla, 2006; Unruh, 2002, 2000). The committed emissions from energy and transportation infrastructures are especially high, with respective ranges of committed CO_2 of 127–336 and 63–132 Gt (Davis et al., 2010). For example, the GHG emissions from primary production alone for new infrastructure development for non-Annex I countries are projected to be 350 Gt CO_2 (Müller et al., 2013). For a detailed discussion see Sections 12.4 and 12.5.

Technology is a driver of *high* importance. Income and scale exert important influences on the mitigation potential for technologies. While lock-in may limit the rate of mitigation in mature cities, the opportunity exists in rapidly growing cities to leapfrog to new technologies. For mature cities, technology is important due to agglomeration externalities, Research and Development (R&D) and knowledge concentration, and access to capital that facilitate the development and early deployment of low-carbon technologies (Grubler et al., 2012). For rapidly growing cities, the importance of technology as a driver may be low for systems with high capital requirements but high for less capital-intensive (e.g., some demand-side efficiency or distributed supply) systems. The influence of all drivers depends upon governance, institutions, and finance (Section 12.6).

12.3.2.2 Relative weighting of drivers for sectoral mitigation options

Drivers affect GHG emissions via influence on energy demand (including demand management) in buildings (households and services), transport, and industry, as well as on energy supply, water, and waste systems. Over time, structural transitions change both the shares of emissions by sectors—with industrial, then services and transport shares of final energy increasing with development (Schäfer, 2005; Hofman, 2007)—as well as the relative importance of drivers. Economic geography has a large influence on emissions from the industry and service sectors (Ramaswami, 2013) plus international transport (bunkers fuels). These influences are particularly pronounced in urban agglomerations with very porous economies. For example Schulz (2010) analyzed Singapore and found that GHG emission embodied in the imports and exports of the city are five to six times larger than the emissions from the direct primary energy use of the city's population. Similarly, Grubler et al. (2012) examined New York and London, which are global transportation hubs for international air travel and maritime commerce. As a result, international aviation and maritime fuels (bunker fuels) make up about one-third of the total direct energy use of these cities, even if associated emissions are often excluded in inventories, following a practice also used in national GHG emission inventories (Macknick, 2011).

Income has a large influence on direct emissions due to energy use in buildings by influencing the floor area of residential dwellings,

the amount of commercial floor space and services purchased, and buildings' energy intensities (see Table 9.2), and also on transport, including increasing vehicle ownership, activity, energy intensity and infrastructure (see Chapter 8.2). Income also has large indirect effects on emissions, for example influencing the number of products purchased (e.g., increasing sales of electronics) (see Chapter 10.2) and their energy intensity (e.g., consumables like food) (see Chapter 11.4), perhaps produced by the industrial and services sectors somewhere else, and transported to the consumers (increasing freight transport activity).

Social demographic drivers have a large effect on emissions, particularly in buildings (e.g., number of households, persons per household, see Chapter 9.2.2) and transport sectors (see Chapter 8.2.1). Infrastructure and urban form have a large impact on transport (Chapter 8.4) and medium impact on energy systems (grid layout and economics) (see Chapter 7.6). Technology has a large impact in all sectors. Income interacts with technology, increasing both innovative (e.g., R&D) and adoptive capacity (purchases and replacement rate of products, which in turn can increase energy efficiency). In demand sectors, mitigation from efficiency may be mediated by behaviours impacting consumption (e.g., more efficient yet larger televisions or refrigerators, or more efficient but larger or more powerful vehicles). See the sectoral Chapters 7–11 for further discussion of these issues.

12.3.2.3 Quantitative modelling to determine driver weights

An inherent difficulty in any assessment of emission drivers at the urban scale is that both mitigation options as well as policy levers are constrained by the legacy of past decisions as reflected in existing urban spatial structures and infrastructures, the built environment, and economic structures. Modelling studies that simulate alternative development strategies, even the entire evolution of a human settlement, or that explore the effects of policy integration across sectors can shed additional light on the relative weight of drivers as less constrained or entirely unconstrained by the existing status quo or by more limited sectoral assessment perspectives.

For instance, large-scale urban simulation models have been used to study the joint effects of policy integration such as pursuing smart-growth planning that restricts urban sprawl with market-based pricing mechanisms. One study of metropolitan regions in OECD countries concludes that policies such as those that encourage higher urban densities and road tolls such as congestion charges have lower stabilization costs than economy-wide approaches such as a carbon tax (Crassous et al., 2006; OECD, 2010a) . Models suggest that adding substantially upgraded urban services to the mix of bundled strategies yields even greater benefits. A meta-analysis of 14 urban simulations of scenarios with varying degrees of urban containment, road pricing, and transit services upgrades forecasted median transportation demand volumes (VKT, vehicle-kilometre-travelled) reductions of 3.9 % within 10 years, rising to 15.8 % declines over 40 years (Rodier, 2009). Estimates from a review of published studies of U.S. cities forecasted a 5 % to 12 % VKT reduction from doubling residential densities and as high as 25 % reductions when combined with other strategies, including road pricing (National Research Council, 2009a). GHG emissions were estimated to decline 11 % from the most aggressive combination of densification and market-based pricing. The combination of introducing VKT charges, upgrading transit, and more compact development from simulation studies in Helsinki, Dortmund, Edinburgh, and Sacramento yielded simulation-model estimates of 14.5 % reductions in VKT within 10 years and 24.1 % declines over 40 years (Rodier, 2009).

A more holistic modelling strategy with a much larger system boundary was followed with the Sincity model, a combined engineering-type systems-optimization model that integrates agent-based and spatially explicit modelling of urban form and density with transport and energy infrastructure planning to simulate the entire evolution of a 'synthetic' city (Keirstead and Shah, 2013; Steinberger and Weisz, 2013) or of large scale new urban developments (Hao et al., 2011). Using an illustrative European city of 20,000 inhabitants and with a service dominated economy (i.e., holding the economic geography and income variables constant), alternative urban designs were explored to separate out the various effects of different policy measures in determining urban energy use. The results suggest that compared to a baseline (sprawl city with current practice technologies), improvements by a factor of two each were possible by either a combination of energy efficiency measures for the urban building stock and the vehicle fleet, versus modifying urban form and density. Conversely energy systems optimization through cogeneration and distributed energy systems were found to yield improvements of between 15–30 % (Keirstead and Shah, 2013; Steinberger and Weisz, 2013). The largest improvements of a factor of three were found through an integration of policy measures across all domains.

12.3.2.4 Conclusions on drivers of GHG emissions at the urban scale

Perhaps the most significant conclusion emerging from Section 12.2 and above discussion of urban GHG emission drivers is the realization that the traditional distinction between Annex I and non-Annex I becomes increasingly blurred at the urban scale. There is an increasing number of cities, particularly in the rapidly growing economies of Asia, where per capita resource use, energy consumption, and associated GHG emissions are not different from the ones in developed economies. A second important conclusion is that economic geography and income by themselves are often such important drivers of urban GHG emissions that they dwarf the effects of technology choices or of place-based policy variables of urban form and infrastructures. However, the latter policy options are those for which urban-scale decision making can make the *largest* impact on GHG emissions.

A more detailed discussion on the different leverage effects of urban scale policy options using the example of urban energy use is provided in the Global Energy Assessment, Chapter 18 (Grubler et al., 2012), which can be combined with above assessment on the relative weight of emission drivers to derive a categorization of urban policy intervention levels as a function of potential impacts on emissions as well as the degree to which policy interventions can be implemented by urban-scale decision making processes by local governments, firms, and individuals (Figure 12.11).

The categorization in Figure 12.11 is necessarily stylized. It will vary across local contexts, but it helps to disentangle the impacts of macro- from micro-drivers. For instance, urban GHG emission levels will be strongly influenced by differences in urban function, such as the role of a city as a manufacturing centre for international markets, versus a city providing service functions to its regional or national hinterlands. Conversely, the emissions impact from smaller-scale decisions such as increasing local and urban-scale renewable energy flows—which has been assessed to be very limited, particularly for larger and more dense cities (Grubler et al., 2012)—is much smaller. The largest leverage on urban GHG emissions from urban scale decision making thus is at the 'meso' scale level of the energy/emissions and urban policy hierarchy: improving the efficiency of equipment used in a city, improving and integrating urban infrastructure, and shaping urban form towards low carbon pathways. Pursuing multiple strategies simultaneously at this scale may be most effective at reducing the urban-related emissions. This conclusion echoes concepts such as integrated community-energy-management strategies (Jaccard et al., 1997).

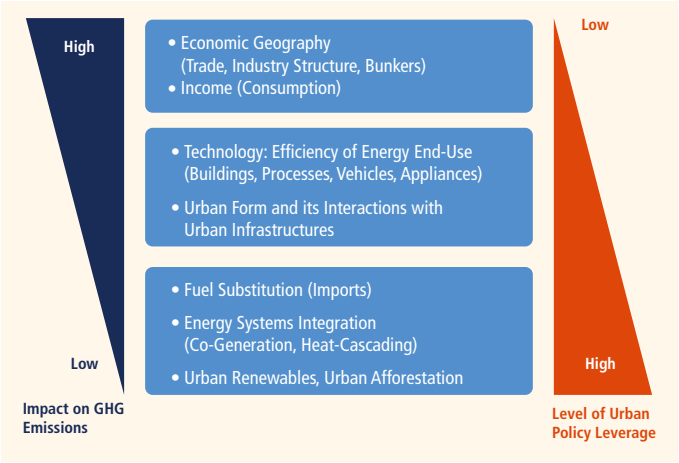


Figure 12.11 | Stylized hierarchy of drivers of urban GHG emissions and policy leverages by urban scale decision making. Cities have little control over some of the most important drivers of GHG emissions and have large control over comparatively smaller drivers of emissions. Source: Synthesized from Jaccard et al. (1997), Grubler et al. (2012) and this assessment.

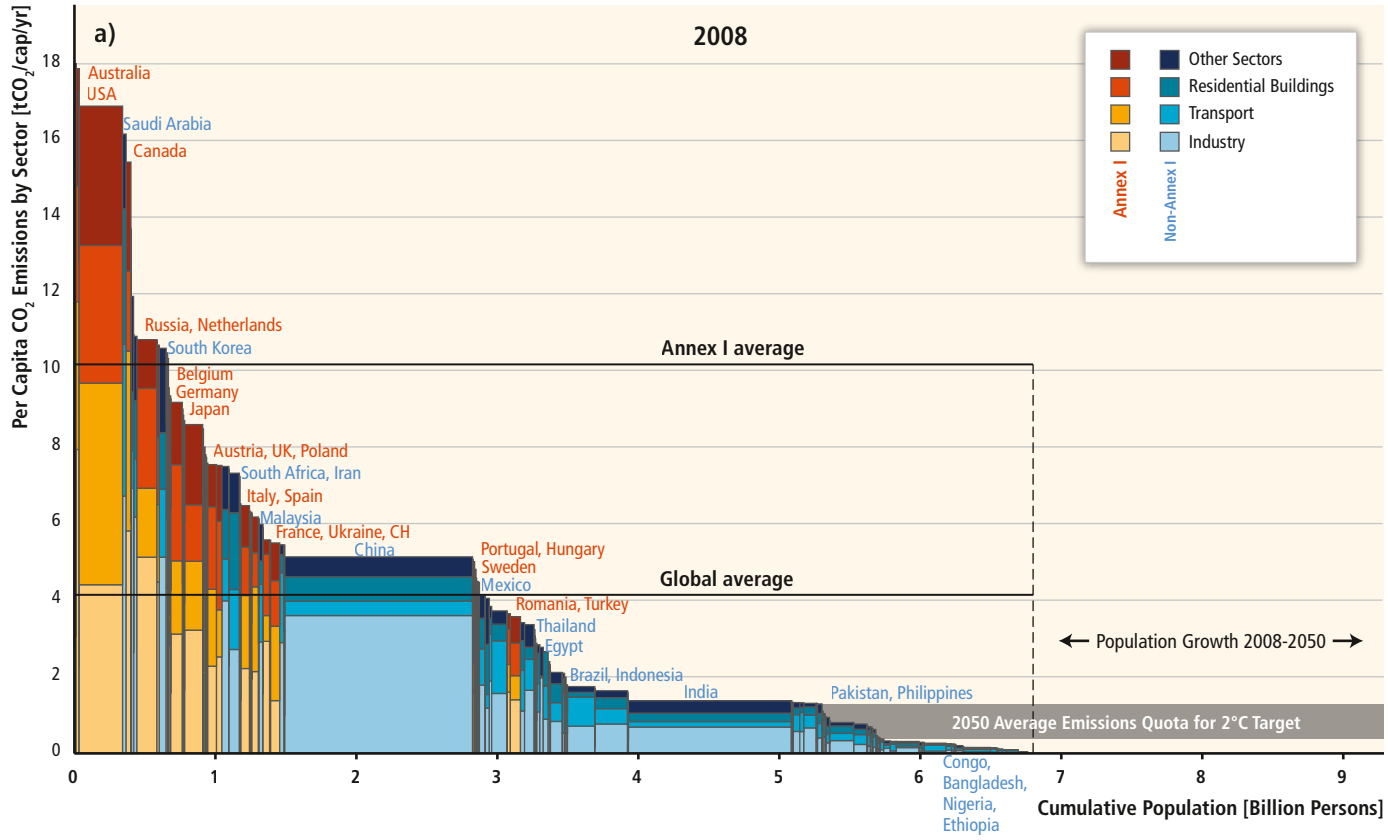
12.3.3 Motivation for assessment of spatial planning, infrastructure, and urban form drivers

Urban form and infrastructure significantly affect direct (operational) and indirect (embodied) GHG emissions, and are strongly linked to the throughput of materials and energy in a city, the waste that it generates, and system efficiencies of a city. Mitigation options vary by city type and development levels. The options available for rapidly developing cities include shaping their urbanization and infrastructure development trajectories. For mature, built-up cities, mitigation options lie in urban regeneration (compact, mixed-use development that shortens journeys, promotes transit/walking/cycling, adaptive reuse of buildings) and rehabilitation/conversion to energy-efficient building designs. Urban form and infrastructure are discussed in detail in Section 12.4. A combination of integrated sustainable infrastructure (Section 12.4), spatial planning (Section 12.5), and market-based and regulatory instruments (Section 12.6) can increase efficiencies and reduce GHG emissions in already built-up cities and direct urban and infrastructure development to reduce the growth of GHG emissions in rapidly expanding cities in developing countries.

12.4 Urban form and infrastructure

Urban form and structure are the patterns and spatial arrangements of land use, transportation systems, and urban design elements, including the physical urban extent, layout of streets and buildings, as well as the internal configuration of settlements (Lynch, 1981; Handy, 1996). Infrastructure comprises services and built-up structures that support the functions and operations of cities, including transport infrastructure, water supply systems, sanitation and wastewater management, solid waste management, drainage and flood protection, telecommunications, and power generation and distribution. There is a strong connection between infrastructure and urban form (Kelly, 1993; Guy and Marvin, 1996), but the causal order is not fully resolved (Handy, 2005). Transport, energy, and water infrastructure are powerful instruments in shaping where urban development occurs and in what forms (Hall, 1993; Moss, 2003; Muller, 2004). The absence of basic infrastructure often—but not always—inhibits urban development.

This section assesses the literature on urban form and infrastructure drivers of GHG emissions, details what data exist, the ranges, effects on emissions, and their interplay with the drivers discussed in Section 12.3. Based on this assessment, conclusions are drawn on the diversity of favourable urban forms and infrastructure highlighting caveats and conflicting goals. This literature is dominated by case studies of cities in developed countries. The literature on conditions in developing country cities, especially for large parts of Africa, is



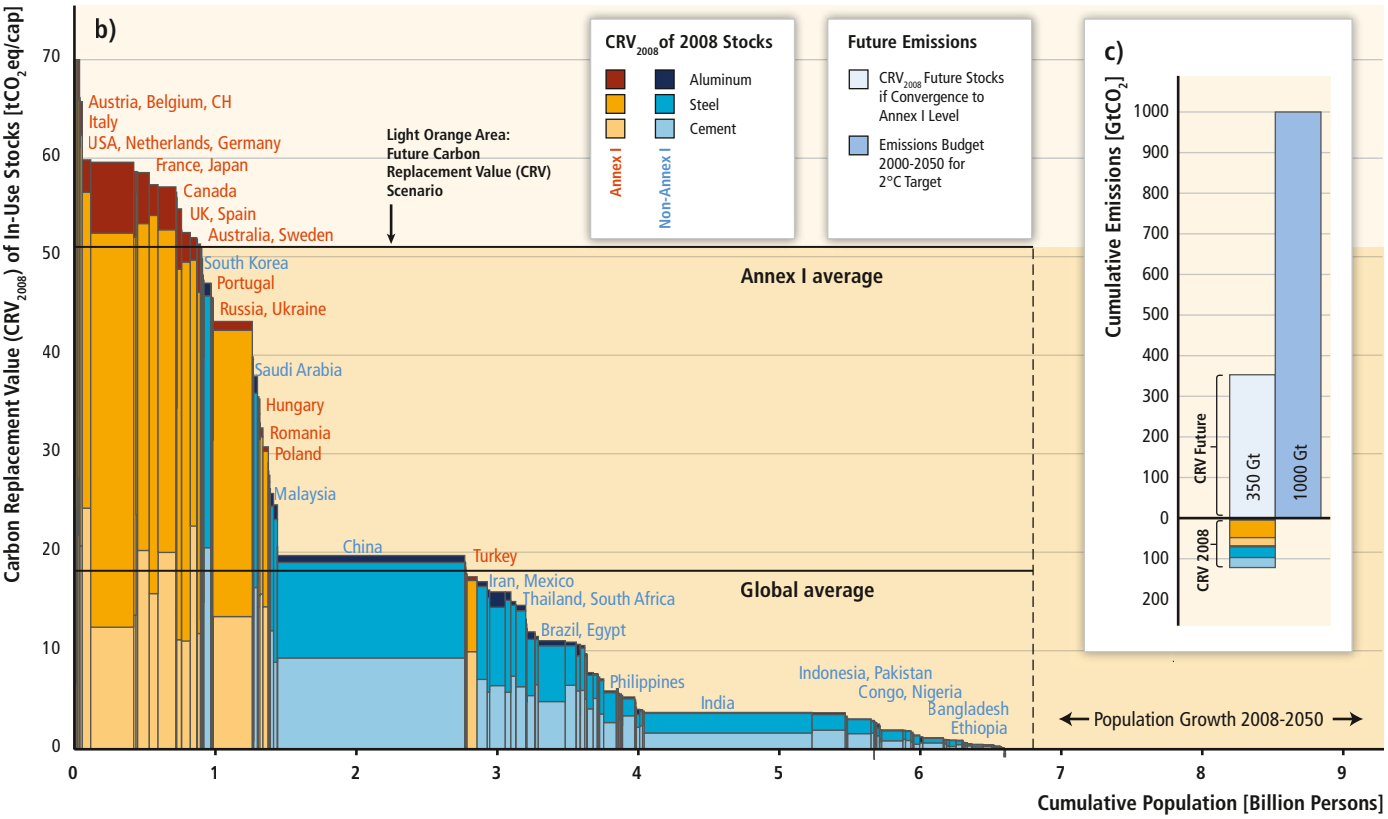


Figure 12.12 | (a) Total fuel-related per-capita CO_2 emissions in 2008 by country (red/orange/yellow and blue bars) compared to the global per-capita emission level in 2050 to reach the 2 °C target with a 50–75 % probability; (b) Carbon Replacement Value (CRV_{2008}) per capita of existing stocks by country (red/orange and blue) and as yet unbuilt stocks if developing countries converge on the current average Annex I level (light yellow background area); (c) comparison with emission budget for the period 2000–2050 to reach the 2 °C target with a 75 % probability. Of this emission budget (1000 Gt CO_2), approximately 420 GtCO2 was already emitted during the period from 2000 to 2011.Source: Müller et al. (2013).

particularly limited. This assessment reflects this limitation in the literature.

12.4.1 Infrastructure

Infrastructure affects GHG emissions primarily during three phases in its lifecycle: 1) construction, 2) use/operation, and 3) end-of-life. The production of infrastructure materials such as concrete and metals is energy and carbon intensive (Cole, 1998; Horvath, 2004). For example, the manufacturing of steel and cement, two of the most common infrastructure materials, contributed to nearly 9 % and 7 %, respectively, of global carbon emissions in 2006 (Allwood et al., 2010). Globally, the carbon emissions embodied in built-up infrastructure as of 2008 was estimated to be 122 (–20/+15) Gt CO_2 (Müller et al., 2013). Much of the research on the mitigation potential of infrastructure focuses on the use/operation phase and increasing the efficiency of the technology. Estimating emissions from urban infrastructure such as electricity grids and transportation networks is challenging because they often extend beyond a city's administrative boundaries (Ramaswami et al., 2012b) (see Section 12.2 for detailed discussion). Several studies show that the trans-boundary emissions of infrastructure can be as large as or even larger than the direct GHG emissions within city boundaries (Ramaswami et al., 2008; Kennedy et al., 2009; Hillman and Ramaswami, 2010; Chavez and Ramaswami, 2013). Thus, a full accounting of GHG emissions from urban infrastructure would need to include both primary and embodied energy of infrastructure materials, as well as energy from the use/operation phase and end-of-life, including reuse and recycling.

Rates of infrastructure construction in mature versus rapidly developing cities lead to fundamentally different impacts on GHG emissions. Infrastructure growth is hypothesized to follow an S-shaped curve starting with an early development phase, continuing with a rapid growth and expansion phase, and ending with a saturation phase (Ausubel and Herman, 1988). The build-up of infrastructure that occurs during early phases of urbanization is particularly emissions intensive. Currently, the average per capita emissions embodied in the infrastructure of industrialized countries is 53 (±6) t CO_2 (see Figure 12.12) which is more than five times larger than that in developing countries (10 (±1) t CO_2) (Müller et al., 2013). While there have been energy efficiency improvements in the industrial sector, especially steel and cement production, the scale and pace of urbanization can outstrip efficiency gains and lead to continued growth in emissions (Levine and Aden, 2008; Güneralp and Seto, 2012). China accounts for roughly 37 % of the global emissions commitments in part due to its large-scale urbanization–the United States adds 15 %; Europe 15 %, and Japan 4 %, together representing 71 % of total global emissions commitments by 2060 (Davis et al., 2010).

Emissions related to infrastructure growth are therefore tied to existing urban energy systems, investment decisions, and regulatory policies that shape the process of urban growth. The effects of these decisions are difficult to reverse: high fixed costs, increasing returns, and network externalities make emissions intensive infrastructure systems particularly prone to lock-in (Unruh and Carrillo-Hermosilla, 2006; Unruh, 2002, 2000). Furthermore, the long lifespan of infrastructure affects the turnover rate of the capital stock, which can limit the speed at which emissions in the use/operation phase can be reduced (Jaccard and Rivers, 2007).

The build-up of infrastructure in developing countries as part of the massive urbanization currently underway will result in significant future emissions. Under one scenario, if the global population increases to 9.3 billion by 2050 and developing countries expand their built environment and infrastructure to the current global average levels using available technology today, the production of infrastructure materials alone would generate approximately 470 Gt of CO_2 emissions (see Figure 12.12). This is in addition to the "committed emissions" from existing energy and transportation infrastructure, estimated to be in the range of 282 to 701 Gt of CO_2 between 2010 and 2060 (Davis et al., 2010).

The links between infrastructure and urban form are well established, especially among transportation infrastructure provision, travel demand, and VKT. In developing countries in particular, the growth of transport infrastructure and resulting urban forms are playing important roles in affecting long-run emissions trajectories (see Chapter 8). The committed emissions from existing energy and transportation infrastructure are high, with ranges of CO_2 of 127–336 and 63–132 Gt, respectively (see Figure 12.13 and Davis et al., 2010). Transport infrastructure affects travel demand and emissions in the short-run by reducing the time cost of travel, and in the long-run by shaping land-use patterns (Vickrey, 1969; Downs, 2004). Development of transport infrastructure tends to promote 'sprawl', characterized by low-density, auto-dependent, and separated land uses (Brueckner, 2000; Ewing et al., 2003). Consistent evidence of short-run effects show that the demand elasticities range between 0.1–0.2. That is, a doubling of transport infrastructure capacity increases VKT by 10–20 % in the short-run (Goodwin, 1996; Hymel et al., 2010). Other studies suggest larger short-run elasticities of 0.59 (Cervero and Hansen, 2002) and a range of 0.3–0.9 (Noland and Lem, 2002). Differences in short-run elasticities reflect fundamental differences in the methodologies underlying the studies (see Chapter 15.4 on policy evaluation). In the long-run, the elasticities of VKT with respect to road capacity are likely to be in the range 0.8–1.0 as land-use patterns adjust (Hansen and Huang, 1997; Noland, 2001; Duranton and Turner, 2011). While the links between transport infrastructure, urban form, and VKT are well studied, there are few studies that extend the analysis to estimate emissions due to transport-induced increases in VKT. One exception is a study that concludes that freezing United States highway capacity at 1996 levels would reduce emissions by 43 Mt C/yr by 2012, compared to continuing construction at historical rates (Noland, 2001).

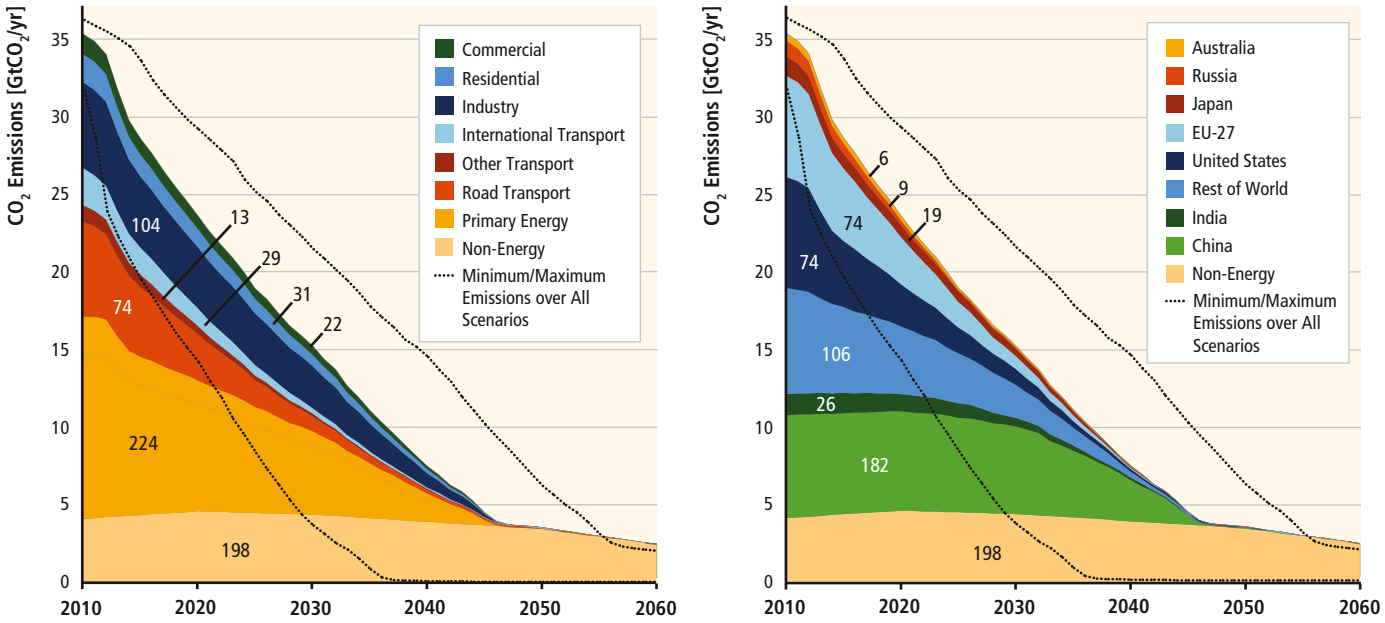


Figure 12.13 | Scenario of CO_2 emissions from existing energy and transportation infrastructure by industry sector (left) and country/region (right). Numbers in panels show the cumulated CO_2 emissions from 2010 to 2060 in Gt. Source: Davis et al. (2010).

12.4.2 Urban form

Urban form can be characterized using four key metrics: density, land use mix, connectivity, and accessibility. These dimensions are not independent from one another. Rather, they measure different aspects of urban form and structure, and each dimension impacts greenhouse gas emissions differently (Figure 12.14). The urban form drivers of GHG emissions do not work in isolation.

Impacts of changes in urban form on travel behaviour are commonly estimated using elasticities, which measure the effect of a 1 % change in an urban form metric on the percent change in vehicle kilometres travelled (see Chapter 15.4 on policy evaluation). This allows for a comparison of magnitudes across different factors and metrics. A large share of the existing evidence is limited to studies of North American cities. Moreover, much of this work is focused on larger cities (for an extensive discussion of methodological considerations see National Research Council, 2009b).

12.4.2.1 Density

Urban density is the measure of an urban unit of interest (e.g., population, employment, and housing) per area unit (e.g., block, neighbourhood, city, metro area, and nation) (Figure 12.14). There are many measures of density, and three common measures are population density (i.e., population per unit area), built-up area density (i.e., buildings or urban land cover per unit area), and employment density (i.e., jobs per unit area) (for a comprehensive review on density measures see Boyko and Cooper, 2011). Urban density affects GHG emissions in two primary ways. First, separated and low densities of employment, commerce, and housing increase the average travel distances for both work and shopping trips (Frank and Pivo, 1994; Cervero and Kockelman, 1997; Ewing and Cervero, 2001; Brownstone and Golob, 2009). These longer travel distances translate into higher VKT and emissions. Conversely, higher population densities, especially when co-located with high employment densities are strongly correlated with lower GHG emissions (Frank and Pivo, 1994; Kenworthy and Laube, 1999; Glaeser and Kahn, 2010; Clark, 2013). In the United States, households located in relatively low density areas (0–19 households/km^2) produce twice as much GHG emissions as households located in relatively high density areas (1,900–3,900 households/km^2) (U.S. Department of Transportation, 2009).

Second, low densities make it difficult to switch over to less energy intensive and alternative modes of transportation such as public transportation, walking, and cycling because the transit demand is both too dispersed and too low (Bunting et al., 2002; Saelens et al., 2003; Forsyth et al., 2007). In contrast, higher population densities at places of origin (e.g., home) and destination (e.g., work, shopping) concentrate demand that is necessary for mass transit alternatives. The density thresholds required for successful transit are not absolute, and vary by type of transit (e.g., bus, light rail, metro), their frequency, and characteristics specific to each city. One of the most comprehensive studies of density and emission estimates that a doubling of residential densities in the United States can reduce VKT by 5–12 % in the short run, and if coupled with mixed land use, higher employment densities, and improvements in transit, can reduce VKT as much as 25 % over the long run (National Research Council, 2009a). Urban density is thus a necessary—but not a sufficient—condition for low-carbon cities.

Comparable and consistent estimates of urban densities and changes in urban densities are difficult to obtain in part because of different methodologies to calculate density. However, multiple studies using multiple lines of evidence including satellite data (Deng et al., 2008;

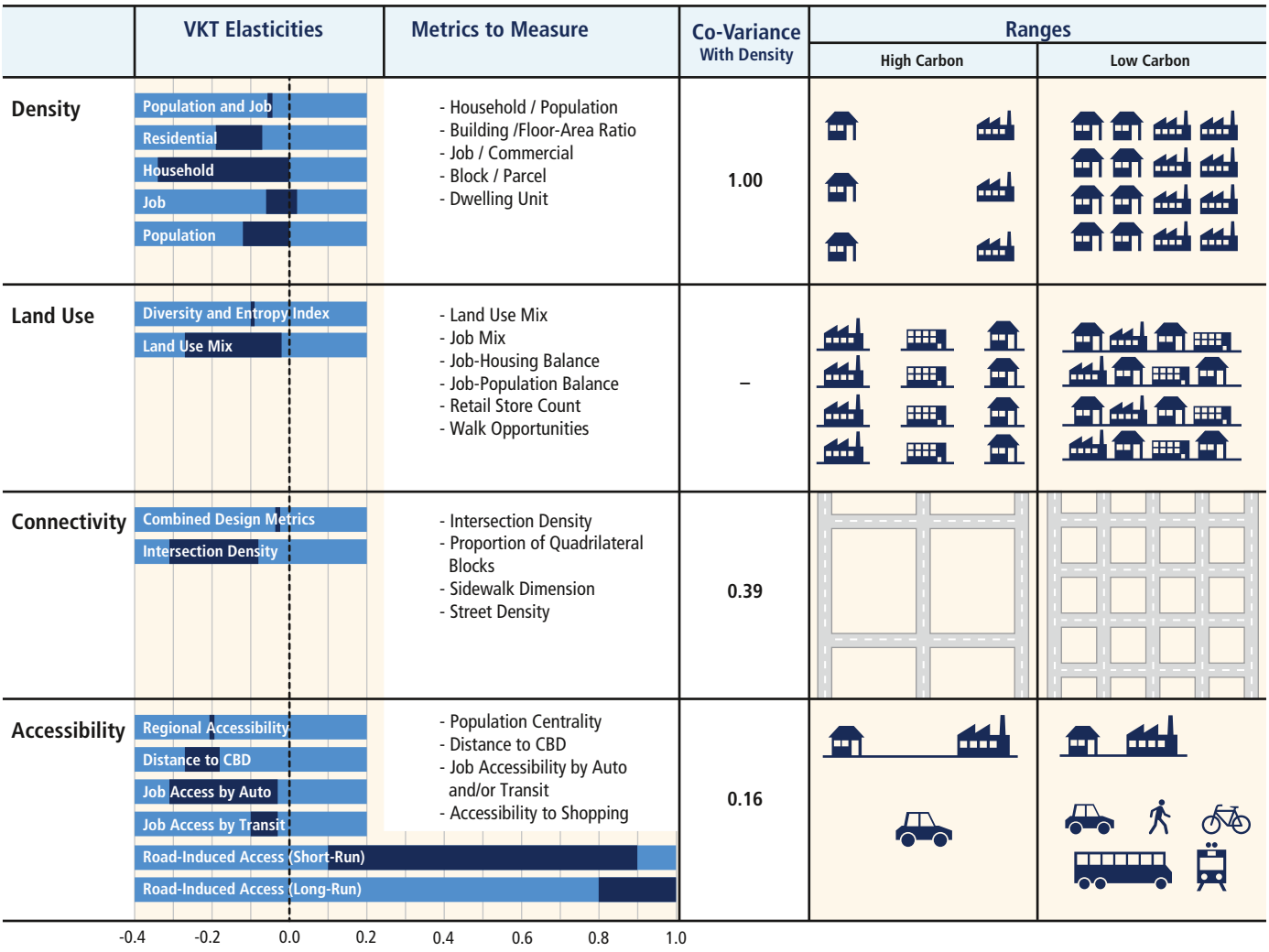


Figure 12.14 | Four key aspects of urban form and structure (density, land use mix, connectivity, and accessibility), their Vehicle Kilometre Travelled (VKT) elasticities, commonly used metrics, and stylized graphics. The dark blue row segments under the VKT elasticities column provide the range of elasticities for the studies included.

Sources: Numbers from Ewing and Cervero (2010), National Research Council (2009a), and Salon et al (2012) are based on the following original sources: **Density** (Schimek, 1996; Kockelman, 1997; Sun et al., 1998; Pickrell and Schimek, 1999; Ewing and Cervero, 2001; Holtzclaw et al., 2002; Bhatia, 2004; Boarnet et al., 2003; Bento et al., 2005; Zhou and Kockelman, 2008; Fang, 2008; Kuzmyak, 2009a; Brownstone and Golob, 2009; Ewing et al., 2009; Greenwald, 2009; Heres-Del-Valle and Niemeier, 2011); **Land Use** (Kockelman, 1997; Sun et al., 1998; Pushkar et al., 2000; Ewing and Cervero, 2001, 2010; Chapman and Frank, 2007; Frank and Engelke, 2005; Kuzmyak et al., 2006; Vance and Hedel, 2007; Brownstone and Golob, 2009; Kuzmyak, 2009b; Frank et al., 2009); **Connectivity** (Ewing and Cervero, 2001; Boarnet et al., 2003; Chapman and Frank, 2007; Frank and Engelke, 2005; Ewing et al., 2009; Greenwald, 2009; Frank et al., 2009); **Accessibility** (Goodwin, 1996; Ewing et al., 1996, 2009; Kockelman, 1997; Cervero and Kockelman, 1997; Sun et al., 1998; Pushkar et al., 2000; Ewing and Cervero, 2001, 2010; Boarnet et al., 2003; Næss, 2005; Cervero and Duncan, 2006; Zegras, 2007; Greenwald, 2009; Kuzmyak, 2009a, b; Frank et al., 2009; Zegras, 2010; Hymel et al., 2010).

Angel et al., 2010, 2011; Seto et al., 2011) and economic and census data (Burchfield et al., 2006) show that both population and built-up densities are declining across all regions around the world (see Section 12.2 for details). Although there is substantial variation in magnitudes and rates of density decline across income groups, city sizes, and regions, the overarching trend is a persistent decline in densities (Angel et al., 2010). The dominant trend is declining density, however there are some exceptions. Analyses of 100 large cities worldwide using a microwave scatterometer show significant vertical expansion of built-up areas in East Asian cities, notably those in China (see Figure 12.15 and Frolking et al., 2013).

A common misconception about density is that it can only be achieved through high-rise buildings configured in close proximity. However, the same level of density can be achieved through multiple land use configurations (Figure 12.16). Population density is strongly correlated with built density, but high population density does not necessarily imply high-rise buildings (Cheng, 2009; Salat, 2011).

Medium-rise (less than seven floors) urban areas with a high building footprint ratio can have a higher built density than high-rise urban areas with a low building footprint. These different configurations of high-density development involve important energy tradeoffs. Often, high-rise,

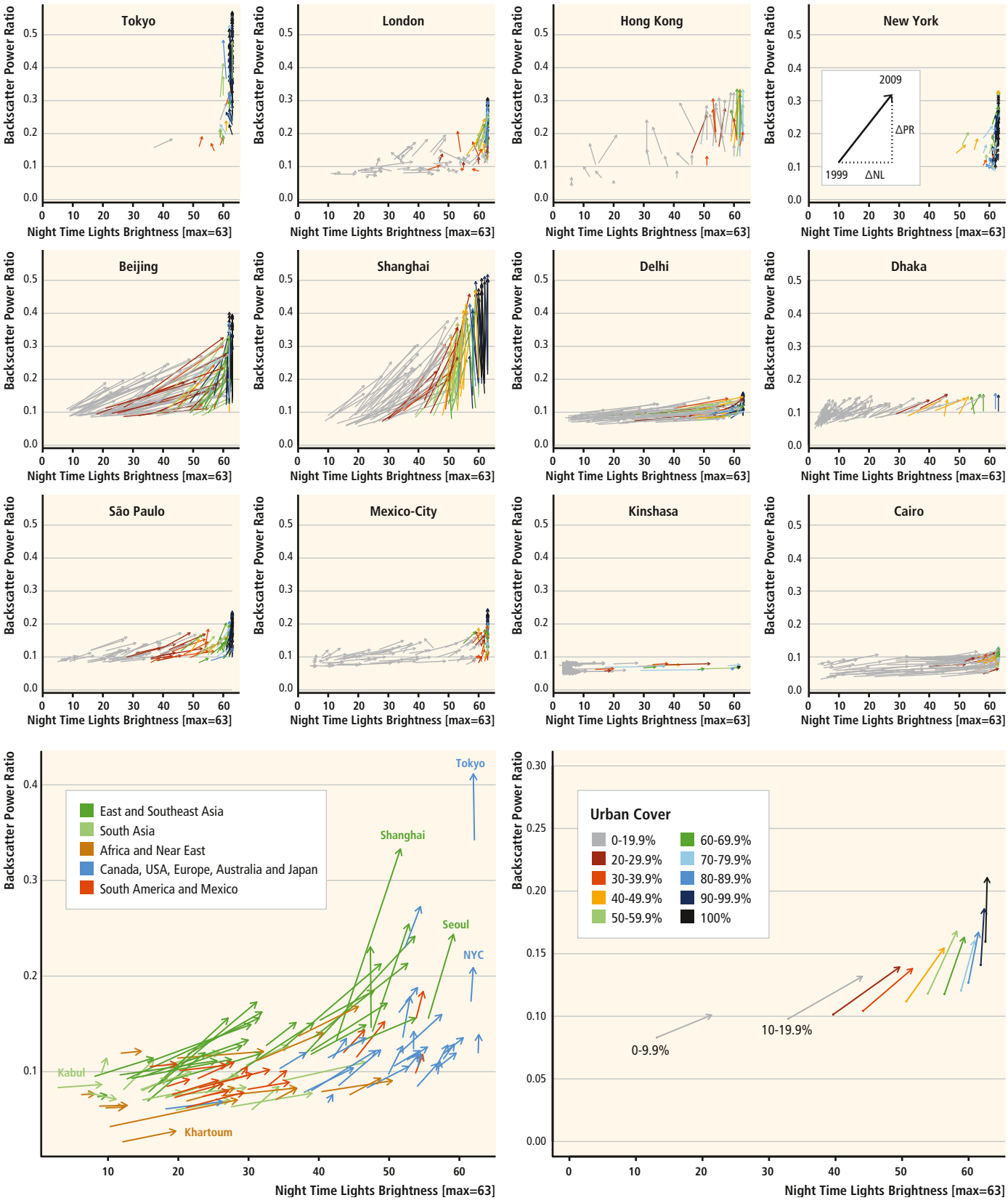


Figure 12.15 | Changes in Urban Structure, 1999–2009 using backscatter and night time lights. The top 12 panels show changes in vertical structure of major urban areas as characterized by backscatter power ratio (PR) and horizontal growth as measured by night time lights brightness (NL) for 12 large cities. Coloured arrows represent non-water, 0.05° cells in an 11x11 grid around each city's centre; tail and head are at 1999 and 2009 coordinates of cell PR and NL, respectively (see inset in top right panel). Arrow colour corresponds to percent urban cover circa 2001 (see legend in bottom right panel). Bottom right panel shows mean change of a total of 100 cities mapping into the respective urban cover categories. Bottom left panel shows change for 100 cities colour coded by world regions. Source: Frolking et al. (2013).

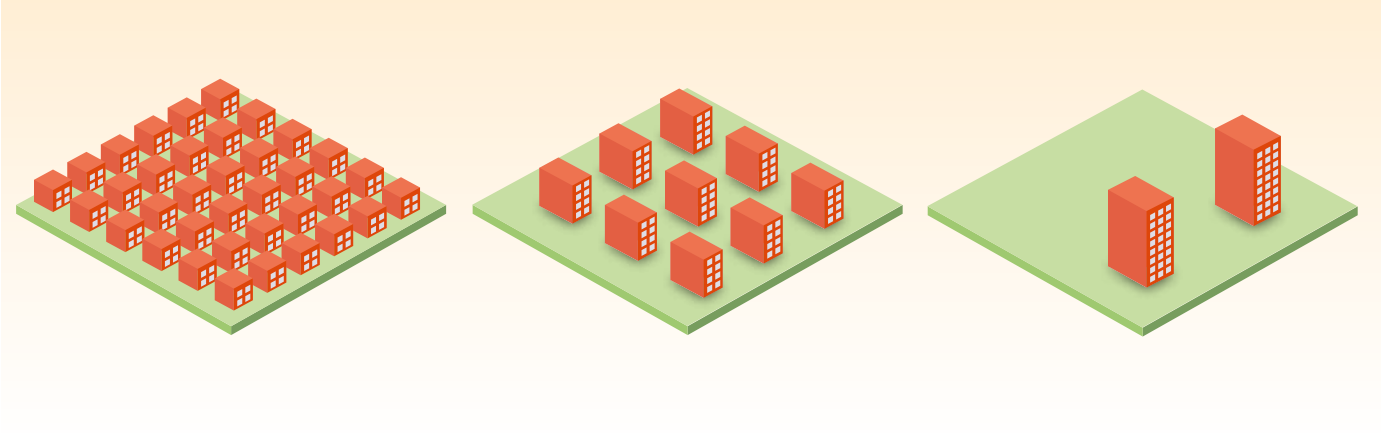


Figure 12.16 | Same densities in three different layouts: low-rise single-story homes (left); multi-story medium-rise (middle); high-rise towers (right). Adapted from Cheng (2009).

high-density urban areas involve a tradeoff between building height and spacing between buildings—higher buildings have to be more spaced out to allow light penetration. High-rise buildings imply higher energy costs in terms of vertical transport and also in heating, cooling, and lighting due to low passive volume ratios (Ratti et al., 2005; Salat, 2009). Medium-rise, high-density urban areas can achieve similar levels of density as high-rise, high density developments but require less materials and embodied energy (Picken and Ilozor, 2003; Blackman and Picken, 2010). Their building operating energy levels are lower due to high passive volume ratio (Ratti et al., 2005; Salat, 2009). Single storey, free-standing housing units are more GHG emissions intensive than multi-family, semi-detached buildings (Myors et al., 2005; Perkins et al., 2009). Thus, while the effect of building type on energy use may be relatively small, the combination of dwelling type, design, location, and orientation together can generate significant energy savings (Rickwood et al., 2008).

12.4.2.2 Land use mix

Land use mix refers to the diversity and integration of land uses (e.g., residential, park, commercial) at a given scale (Figure 12.17). As with density, there are multiple measures of land use mix, including: (1) the ratio of jobs to residents; (2) the variety and mixture of amenities and activities; and (3) the relative proportion of retail and housing. Historically, the separation of land uses, especially of residential from other uses, was motivated by the noxious uses and pollution of the industrial city. However, as cities transition from industrial to service economies, resulting in a simultaneous reduction in air pollution and other nuisances, the rationale for such separation of land uses diminishes.

In general, when land uses are separated, the distance between origin (e.g., homes) and destination (e.g., work or shopping) will be longer (Kockelman, 1997). Hence, diverse and mixed land uses can reduce travel distances and enable both walking and the use of non-motorized modes of travel (Kockelman, 1997; Permana et al., 2008), thereby reducing aggregate amounts of vehicular movement and associated greenhouse gas emissions (Lipper et al., 2010). Several meta-analyses estimate the elasticity of land use mix related VKT from –0.02 to –0.10 (Ewing and Cervero, 2010; Salon et al., 2012) while simultaneously increasing walking. The average elasticity between walking and diversity of land uses is reported to be between 0.15–0.25 (Ewing and Cervero, 2010). The effects of mixed land use on VKT and GHG emissions can applied at three spatial scales; city-regional, neighbourhood, and block.

At the city-scale, a high degree of land use mix can result in significant reductions in VKT by increasing the proximity of housing to office developments, business districts, shops, and malls (Cervero and Duncan, 2006). In service-economy cities with effective air pollution controls, mixed land use can also have a beneficial impact on citizen health and well-being by enabling walking and cycling (Saelens et al., 2003; Heath et al., 2006; Sallis et al., 2009). For cities with lower mixed land use, such as often found in North American cities and in many new urban develop-

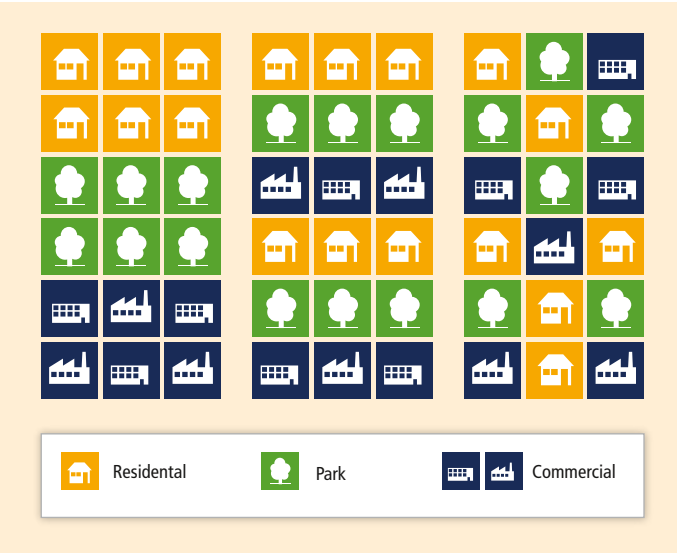


Figure 12.17 | Three different land use mixes (Manaugh and Kreider, 2013).

ments in Asia, large residential developments are separated from jobs or retail centres by long distances. A number of studies of such single-use zoning show strong tendencies for residents to travel longer overall distances and to carry out a higher proportion of their travel in private vehicles than residents who live in mixed land use areas in cities (Mogridge, 1985; Fouchier, 1998; Næss, 2005; Zhou and Kockelman, 2008).

Mixed use at the neighbourhood scale refers to a 'smart' mix of residential buildings, offices, shops, and urban amenities (Bourdic et al., 2012). Similar to the city-scale case, such mixed uses can decrease average travel distances (McCormack et al., 2001). However, on the neighbourhood scale, the reduced travel is primarily related to non-work trips, e.g., for shopping, services, and leisure. Research on US cities indicates that the presence of shops and workplaces near residential areas is associated with relatively low vehicle ownership rates (Cervero and Duncan, 2006), and can have a positive impact on transportation patterns (Ewing and Cervero, 2010). The impacts of mixed use on non-motorized commuting such as cycling and walking and the presence or absence of neighbourhood shops can be even more important than urban density (Cervero, 1996).

At the block and building scale, mixed use allows space for small-scale businesses, offices, workshops, and studios that are intermixed with housing and live-work spaces. Areas with a high mix of land uses encourages a mix of residential and retail activity and thus increases the area's vitality, aesthetic interest, and neighbourhood (Hoppenbrouwer and Louw, 2005).

12.4.2.3 Connectivity

Connectivity refers to street density and design. Common measures of connectivity include intersection density or proportion, block size, or intersections per road kilometre (Cervero and Kockelman, 1997; Pushkar et al., 2000; Chapman and Frank, 2007; Lee and Moudon, 2006; Fan, 2007). Where street connectivity is high—characterized by finer grain systems with smaller blocks that allow frequent changes in direction—there is typically a positive correlation with walking and thereby lower GHG emissions. Two main reasons for this are that distances tend to be shorter and the system of small blocks promotes convenience and walking (Gehl, 2010).

Improving connectivity in areas where it is low (and thus associated with higher GHG emissions) requires varying amounts of street reconstruction. Many street features, such as street size, four-way intersections or intersection design, sidewalk width, the number of traffic lanes (or street width) and street medians are designed at the time of the construction of the city. As the infrastructure already exists, increasing connectivity requires investment either to redevelop the site or to retrofit it to facilitate walking and biking. In larger redevelopment projects, street patterns may be redesigned for smaller blocks with high connectivity. Alternatively, retrofitting often involves widening sidewalks, constructing medians, and adding bike lanes, as well as reducing traffic speeds, improving traffic signals, and providing parking for bikes (McCann and Rynne, 2010). Other features, such as street furniture (e.g., benches, transit stops, and shelters), street trees, and traffic signals, can be added after the initial design without much disruption or large costs.

Systematic reviews show that transport network connectivity has a larger impact on VKT than density or land use mix, between –0.06 and –0.26 (Ewing and Cervero, 2010; Salon et al., 2012). For North American cities, the elasticity of walking with respect to sidewalk coverage or length is between 0.09 to 0.27 (Salon et al., 2012). There are typically higher elasticities in other OECD countries than in the United States.

12.4.2.4 Accessibility

Accessibility can be defined as access to jobs, housing, services, shopping, and in general, to people and places in cities (Hansen, 1959; Ingram, 1971; Wachs and Kumagai, 1973). It can be viewed as a combination of proximity and travel time, and is closely related to land use mix. Common measures of accessibility include population centrality, job accessibility by auto or transit, distance to the city centre or central business district (CBD), and retail accessibility. Meta-analyses show that VKT reduction is most strongly related to high accessibility to job destinations (Ewing and Cervero, 2001, 2010). Highly accessible communities (e.g., compact cities in Europe such as Copenhagen) are typically characterized by low daily commuting distances and travel times, enabled by multiple modes of transportation (Næss, 2006). Measures to increase accessibility that are accompanied by innovative technologies and alternative energies can reduce VKT and associated GHG emissions in the cities of both developed and developing countries (Salomon and Mokhtarian, 1998; Axhausen, 2008; Hankey and Marshall, 2010; Banister, 2011). However, it should be noted that at least one study has shown that in cities where motorization is already mature, changing accessibility no longer influences automobile-dependent lifestyles and travel behaviours (Kitamura et al., 2001).

Countries and regions undergoing early stages of urbanization may therefore have a unique potential to influence accessibility, particularly in cases where income levels, infrastructure, and motorization trends are rapidly changing (Kumar, 2004; Chen et al., 2008; Perkins et al., 2009; Reilly et al., 2009; Zegras, 2010; Hou and Li, 2011; Adeyinka, 2013). In Shanghai, China, new transportation projects have influenced job accessibility and have thereby reduced commute times (Cervero and Day, 2008). In Chennai, India, differences in accessibility to the city centre between low-income communities have been shown to strongly affect transport mode choice and trip frequency (Srinivasan and Rogers, 2005). In the rapidly motorizing city of Santiago de Chile, proximity to the central business district as well as metro stations has a relatively strong association with VKT (Zegras, 2010). The typical elasticity between job accessibility and VKT across

North American cities ranges from –0.10 to –0.30 (Ewing and Cervero, 2010; Salon et al., 2012).

12.4.2.5 Effects of combined options

While individual measures of urban form have relatively small effects on vehicle miles travelled, they become more effective when combined. For example, there is consistent evidence that the combination of co-location of increased population and job densities, substantial investments in public transit, higher mix of land uses, and transportation or mobility demand management strategies can reduce VKT and travel-related carbon emissions (National Research Council, 2009a; Ewing and Cervero, 2010; Salon et al., 2012). The spatial concentration of population, coupled with jobs-housing balance, have a significant impact VKT by households. At the same time, urban form and the density of transportation networks also affect VKT (Bento et al., 2005). The elasticity of VKT with respect to each of these factors is relatively small, between 0.10 and 0.20 in absolute value. However, changing several measures of form simultaneously can reduce annual VKT significantly. Moving the sample households from a city with the characteristics of a low-density, automobile-centric city to a city with high public transit, connectivity, and mixed land use reduced annual VKT by 25 %. While in practice such change is highly unlikely in a mature city, it may be more relevant when considering cities at earlier stages of development.

A growing body of literature shows that traditional neighbourhood designs are associated with reduced travel and resource conservation (Krizek, 2003; Ewing and Cervero, 2010). A US study found those living in neo-traditional neighbourhoods made as many daily trips as those in low-density, single-family suburban neighbourhoods, however the switch from driving to walking and the shortening of trip distances resulted in a 20 % less VKT per household (Khattak and Rodriguez, 2005). Empirical research shows that the design of streets have even stronger influences than urban densities on incidences of walking and reduced motorized travel in traditional neighbourhoods of Bogota, Tehran, Taipei, and Hong Kong SAR (China) (Zhang, 2004; Cervero et al., 2009; Lin and Yang, 2009; Lotfi and Koohsari, 2011). A study in Jinan, China, found the energy use of residents living in mixed-use and grid street enclaves to be one-third that of similar households in superblock, single-use developments (Calthorpe, 2013).

Box 12.3 | Urban expansion: drivers, markets, and policies

While the literature that examines the impacts of changes in urban spatial structure and infrastructure on urban GHG emissions is sparse, there is a well-established body of literature that discusses the drivers of urban development, and policies that aim to alter its pace and shape.

Drivers of Urban Expansion—The drivers of urban development can be broadly defined into the following categories: *Economic Geography, Income, Technology* (see Section 12.3.1), as well as *Market Failures* (see Chapter 15), and *Pre-Existing Conditions,* which are structured by *Policies and Regulations* (see Section 12.5.2) that in turn shape *Urban Form and Infrastructure* (see Section 12.4 and Box 12.4).

Primary drivers of urban spatial expansion unfold under the influence of economic conditions and the functioning of markets. These are however strongly affected by **Market Failures** and **Pre-Existing Policies and Regulations** that can exacerbate or alleviate the effect of the primary drivers on urban growth.

Market Failures are the result of individuals and firms ignoring the external costs and benefits they impose on others when making economic decisions (see Chapter 15). These include:

- Failure to account for the social costs of GHG (and local) emissions that result from production and consumption activities in cities.
- Failure to account for the social costs of traffic congestion (see Chapter 8).
- Failure to assign property rights and titles for land.
- Failure to account for the social benefits of spatial amenities and mix land uses (see Section 12.5.2.3).
- Failure to account for the social benefits of agglomeration that result from the interactions of individuals and firms in cities.

Although not precisely quantified in the literature, by altering the location of individuals and firms in space (and resulting travelling patterns and consumption of space), these market failures can lead to excessive growth (see Box 12.4).

For each failure, there is a policy solution, either in the form of regulations or market-based instruments (see Section 12.5.2)

Pre-Existing Policies and Regulations can also lead to excessive growth. These include:

- **Hidden Pre-Existing Subsidies**—including the failure to charge new development for the infrastructure costs it generates (see Section 12.5.3 and Box 12.4).
- **Outdated or Poorly Designed Pre-Existing Policies and Regulations**—including zoning, building codes, ordinances, and property taxes that can distort real estate markets (see Section 12.5.2 and Box 12.4).

12.5 Spatial planning and climate change mitigation

Spatial planning is a broad term that describes systematic and coordinated efforts to manage urban and regional growth in ways that promote well-defined societal objectives such as land conservation, economic development, carbon sequestration, and social justice. Growth management is a similar idea, aimed at guiding "the location, quality, and timing of development" (Porter, 1997) to minimize 'sprawl' (Nelson and Duncan, 1995), which is characterized by low density, non-contiguous, automobile-dependent development that prematurely or excessively consumes farmland, natural preserves, and other valued resources (Ewing, 1997).

This section reviews the range of spatial planning strategies that may reduce emissions through impacts on most if not all of the elements of urban form and infrastructure reviewed in Section 12.4. It begins with an assessment of key spatial planning strategies that can be implemented at the macro, meso, and micro geographic scales. It then assesses the range of regulatory, land use, and market-based policy instruments that can be employed to achieve these strategic objectives. Given evidence of the increased emissions reduction potential associated with affecting the collective set of spatial factors driving emissions (see Section 12.4), emphasis is placed on assessing the efficacy of strategies or bundles that simultaneously impact multiple spatial outcomes (see Chapter 15.4 and 15.5 on policy evaluation and assessment).

The strategies discussed below aim to reduce sprawl and automobile dependence–and thus energy consumption, VKT, and GHG emissions–to varying degrees. Evidence on the energy and emission reduction benefits of these strategies comes mainly from case studies in the developed world even though their greatest potential for reducing future emissions lies in developing countries undergoing early stages of urbanization. The existing evidence highlights the importance of an integrated infrastructure development framework that combines analysis of mitigation reduction potentials alongside the long-term public provision of services.

12.5.1 Spatial planning strategies

Spatial planning occurs at multiple geographic scales: (1) Macro—regions and metropolitan areas; (2) Meso—sub-regions, districts, and corridors; and (3) Micro—neighbourhoods, streets, blocks. At each scale, some form of comprehensive land-use and transportation planning provides a different opportunity to envision and articulate future settlement patterns, backed by zoning ordinances, subdivision regulations, and capital improvements programmes to implement the vision (Hack et al., 2009). Plans at each scale must also be harmonized and integrated to maximize effectiveness and efficiency (Hoch et al., 2000). Different strategy bundles invite different policy tools, adapted to the unique political, institutional, and cultural landscapes of cities in which they are applied (see Table 12.5). Successful implementation requires that there be in place the institutional capacity and political wherewithal to align the right policy instruments to specific spatial planning strategies.

12.5.1.1 Macro: Regions and metropolitan areas

Macro-scale strategies are regional in nature, corresponding to the territories of many economic transactions (e.g., labourseds and tradesheds) and from where natural resources are drawn (e.g., water tributaries) or externalities are experienced (e.g., air basins).

Regional Plan. A regional plan shows where and when different types of development are allowed, and where and when they are not. In polycentric plans, sub-centres often serve as building blocks for designing regional rail-transit networks (Calthorpe and Fulton, 2001). Regional strategies can minimize environmental spillovers and economize on large-scale infrastructure investments (Calthorpe and Fulton, 2001; Seltzer and Carbonell, 2011). Polycentric metropolises like Singapore, Tokyo, and Paris have successfully linked sub-centres with high-quality, synchronized metro-rail and feeder bus services (Cervero, 1998; Gakenheimer, 2011). Spatial plans might be defined less in terms of a specific urban-form vision and more with regard to core development principles. In its 'Accessible Ahmedabad' plan, the city of Ahmedabad, India, embraced the principle of creating a city designed for accessibility rather than mobility, without specific details on the siting of new growth (Suzuki et al., 2013).

Urban containment. Urban containment encourages cities and their peripheries to grow inwards and upwards, not outwards (Pendall et al., 2002). Urban containment can also contribute to climate change mitigation by creating more compact, less car-oriented built form as well as by preserving the carbon sequestration capacity of natural and agricultural areas in the surrounding areas (Daniels, 1998). The impact of development restrictions is uncertain and varies with the geographic and regulatory context (Pendall, 1999; Dawkins and Nelson, 2002; Han et al., 2009; Woo and Guldmann, 2011). In the United States, regional measures such as the Portland urban growth boundary have been more effective at containing development than local initiatives (DeGrove and Miness, 1992; Nelson and Moore, 1993; Boyle and Mohamed, 2007). In the UK, urban containment policies may have pushed growth to leapfrog the greenbelt to more distant locations and increased car commuting (Amati, 2008). In Seoul and in Swiss municipalities, greenbelts have densified the core city but made the metropolitan area as a whole less compact; in Seoul, commuting distances also increased by 5 % (Jun and Bae, 2000; Bae and Jun, 2003; Bengston and Youn, 2006; Gennaio et al., 2009).

Regional jobs-housing balance. Separation of workers from job sites creates long-haul commutes and thus worsens traffic and environmental conditions (Cervero, 1996). Jobs-housing imbalances are often a product of insufficient housing in jobs-rich cities and districts (Boarnet and Crane, 2001; Wilson, 2009; Pendall et al., 2012). One view holds that the market will eventually work around such problems–developers will build more housing near jobs because more profit can be made from such housing

Table 12.5 | Matching spatial planning strategies and policy instruments. Summary of the types of policy instruments that can be applied to different spatial planning strategies carried out at different geographic scales. Unless otherwise noted, references can be found in the relevant chapter sections.

SPATIAL STRATEGY	POLICY INSTRUMENTS/IMPLEMENTATION TOOLS					
	Government Regulations		Government Incentives		Market-Based Strategies	
	Land Regulation/Zoning (see 12.5.2.1)	Taxation/Finance Strategies (see 12.5.2.3)	Land Management (see 12.5.2.2)	Targeted Infrastructure/Services (see 12.5.1)	Pricing (see 12.5.2.3)	Public-Private Partnerships (see 12.5.2.3)
Metropolitan/Regional						
Urban containment	Development restrictions; UGBs	Sprawl taxes	Urban Service Boundaries	Park improvements; trail improvements		
Balanced growth	Affordable housing mandates	Tax-bases sharing	Extraterritorial zoning		Farm Tax Credits[1]	
Self-contained communities/new towns	Mixed-use zoning		Greenbelts	Utilities; urban services		Joint ventures[2]
Corridor/District						
Corridor growth management	Zoning	Impact fees; Exactions[3]		Service Districts[4]		
Transit-oriented corridors	Transfer of development rights			Urban rail; Bus rapid transit investments		Joint Powers Authorities
Neighbourhood/Community						
Urban Regeneration/Infill	Mix-use zoning/small lot designations	Split-Rate Property Taxes; Tax increment finance[5]	Redevelopment districts	Highway conversions; Context-sensitive design standards	Congestion charges (see Ch. 8)	
Traditional Neighbourhood Designs; New urbanism	Zoning overlays; form-based codes			Sidewalks; cycle tracks; bike stations[6]		
Transit oriented Development	Design codes; flexible parking	Impact Fees; Betterment Taxes[7]		Station siting; station access		Joint development[2]
Eco-Communities	Mixed-use zoning			District Heating/Cooling; co-generation (see Ch. 9.4)	Peak-load pricing	Joint venture[2]
Site/Streetscape						
Pedestrian Zones/Car-Free Districts	Street code revisions[8]	Special Improvement Districts[7]		Road entry restrictions; sidewalks[8]	Parking surcharges	
Traffic Calming/Context-Sensitive Design	Street code revisions[8]	Benefit Assessment[7]				Property owner self-assessments
Complete Streets	Design standards			Bike infrastructure; Pedestrian facilities		Design competitions

Additional sources referenced in table: **1:** Nelson (1992), Alterman (1997); **2:** Sagalyn (2007), Yescombe (2007); **3:** Hagman and Misczynski (1978), Bauman and Ethier (1987); **4:** Rolon (2008); **5:** Dye and Sundberg (1998), Dye and Merriman (2000), Brueckner (2001b); **6:** Sælensminde (2004), McAndrews et al. (2010); **7:** Rolon (2008); **8:** Brambilla and Longo (1977).

(Gordon et al., 1991; Downs, 2004). There is evidence of co-location in US cities like Boston and Atlanta (Weitz, 2003). Even in the developing world, co-location occurs as a means to economize on travel, such as the peri-urban zones of Dar es Salaam and Lagos where infill and densification, often in the form of informal settlements and shantytowns, occurs in lieu of extended growth along peripheral radial roads (Pirie, 2011).

Research on balanced growth strategies provides mixed signals on mobility and environmental impacts. Studies of Atlanta estimate that jobs-housing balance can reduce traffic congestion, emissions, and related externalities (Weitz, 2003; Horner and Murray, 2003). In the San Francisco Bay Area, jobs-housing balance has reduced travel more than intermixing housing and retail development (Cervero and Duncan, 2006). Other studies, however, suggest that jobs-housing balance has little impact on travel and traffic congestion since many factors besides commuting condition residential location choices (Levine, 1998).

Self-contained, 'complete' communities—wherein the jobs, retail commodities and services needed by workers and households exist within a community—is another form of balanced growth. Many master-planned new towns in the United States, France, South Korea, and the UK were designed as self-contained communities, however their physical isolation and economic dependence on major urban centres resulted in high levels of external motorized travel (Cervero, 1995b; Hall, 1996).

How new towns are designed and the kinds of transport infrastructure built, experiences show, have strongly influenced travel and environmental outcomes (Potter, 1984). In the UK, new towns designed for good transit access (e.g., Runcorn and Redditch) averaged far higher transit ridership and less VKT per capita than low-density, auto-oriented communities like Milton Keynes and Washington, UK (Dupree, 1987).

Telecommunities are a more contemporary version of self-contained communities, combining information and communication technologies (ICTs) with traditional neighbourhood designs in remote communities on the edges of cities like Washington, DC and Seattle (Slabbert, 2005; Aguilera, 2008). Until such initiatives scale up, their contributions to VKT and GHG reductions will likely remain miniscule (Choo et al., 2005; Andreev et al., 2010; Mans et al., 2012).

12.5.1.2 Meso: Sub-regions, corridors, and districts

The corridor or district scale captures the spatial context of many day-to-day activities, such as going to work or shopping for common household items. Significant challenges are often faced in coordinating transportation and land development across multiple jurisdictions along a corridor.

Corridor growth management. Corridor-level growth management plans aim to link land development to new or expanded infrastructure investments (Moore et al., 2007). Both land development and transport infrastructure need years to implement, so coordinated and strategic long-range planning is essential (Gakenheimer, 2011). Once a transport investment is committed and land use policies are adopted, the two can co-evolve over time. A good example of coordinated multi-jurisdictional management of growth is the 20 km Paris-Pike corridor outside of Lexington, Kentucky in the United States (Schneider, 2003). There, two county governments reached an agreement and created a new extra-territorial authority to zone land parcels for agricultural activities within a 0.5 km radius of a newly expanded road to preserve the corridor's rural character, prevent sprawl, and maintain the road's mobility function.

Transit-oriented corridors. Corridors also present a spatial context for designing a network of Transit Oriented Developments (TODs), traditional (e.g., compact, mixed-use, and pedestrian-friendly) development that is physically oriented to a transit station. TODs are expected to reduce the need to drive, and thus reduce VKT. Some global cities have directed land uses typically scattered throughout suburban developments (e.g., housing, offices, shops, restaurants, and strip malls) to transit-served corridors (Moore et al., 2007; Ferrell et al., 2011). Scandinavian cities like Stockholm, Helsinki, and Copenhagen have created 'necklace of pearls' built form not only to induce transit riding but also to produce balanced, bi-directional flows and thus more efficient use of infrastructure (Cervero, 1998; Suzuki et al., 2013).

Curitiba, Brazil, is often heralded as one of the world's most sustainable cities and is a successful example of the use of Transit Oriented Corridors (TOCs) to shape and direct growth (Cervero, 1998; Duarte and Ultramari, 2012). The city has evolved along well-defined radial axes (e.g., lineal corridors) that are served by dedicated busways. Along some transportation corridors, double-articulated buses transport about 16,000 passengers per hour, which is comparable to the capacity of more expensive metro-rail systems (Suzuki et al., 2013). To ensure a transit-oriented built form, Curitiba's government mandates that all medium- and large-scale urban development be sited along a Bus Rapid Transit (BRT) corridor (Cervero, 1998; Hidalgo and Gutiérrez, 2013). High transit use has appreciably shrunk the city's environmental footprint. In 2005, Curitiba's VKT per capita of 7,900 was half as much as in Brazil's national capital Brasilia, a city with a similar population size and income level but a sprawling, auto-centric built form (Santos, 2011).

12.5.1.3 Micro: communities, neighbourhoods, streetscapes

The neighbourhood scale is where activities like convenience shopping, socializing with neighbours, and walking to school usually take place, and where urban design approaches such as gridded street patterns and transit-oriented development are often targeted. While smaller scale spatial planning might not have the energy conservation or emission reduction benefits of larger scale planning strategies, development tends to occur parcel-by-parcel and urbanized areas are ultimately the products of thousands of individual site-level development and design decisions.

Urban Regeneration and Infill Development. The move to curb urban sprawl has spawned movements to revitalize and regenerate long-standing traditional urban centres (Oatley, 1995). Former industrial sites or economically stagnant urban districts are often fairly close to central business districts, offering spatial proximity advantages. However, brownfield redevelopment (e.g., tearing down and replacing older buildings, remediating contaminated sites, or upgrading worn out or obsolete underground utilities) can often be more expensive than building anew on vacant greenfield sites (Burchell et al., 2005).

In recent decades, British planners have turned away from building expensive, master-planned new towns in remote locations to creating 'new towns/in town', such as the light-rail-served Canary Wharf brownfield redevelopment in east London (Gordon, 2001). Recycling former industrial estates into mixed-use urban centres with mixed-income housing and high-quality transit services have been successful models (Foletta and Field, 2011). Vancouver and several other Canadian cities have managed to redirect successfully regional growth to their urban cores by investing heavily in pedestrian infrastructure and emphasizing an urban milieu that is attractive to families. In particular, Vancouver has invested in developing attractive and inviting urban spaces, high quality and dedicated cycling and walking facilities, multiple and reliable public transit options, and creating high-density residential areas that are integrated with public and cooperative housing (Marshall, 2008). Seoul, South Korea, has sought to regenerate its urban core through a mix of transportation infrastructure investments and de-investments, along

with urban renewal (Jun and Bae, 2000; Jun and Hur, 2001). Reclaiming valuable inner-city land in the form of tearing down an elevated freeway and expropriating roadway lanes, replaced by expanded BRT services and pedestrian infrastructure has been the centrepiece of Seoul's urban regeneration efforts (Kang and Cervero, 2009).

Traditional neighbourhood design and new urbanism. Another movement, spearheaded by reform-minded architects and environmental and sustainability planners, has been to return communities to their designs and qualities of yesteryear, before the ascendency of the private automobile (Nasar, 2003). Referred to as 'compact cities' in much of Europe and 'New Urbanism' in the United States, the movement takes on features of traditional, pre-automobile neighbourhoods that feature grid iron streets and small rectilinear city blocks well suited to walking, narrow lots and building setbacks, prominent civic spaces that draw people together (and thus help build social capital), tree-lined narrow streets with curbside parking and back-lot alleys that slow car traffic, and a mix of housing types and prices (Kunstler, 1998; Duany et al., 2000; Talen, 2005).

In the United States, more than 600 New Urbanism neighbourhoods have been built, are planned, or are under construction (Trudeau, 2013). In Europe, a number of former brownfield sites have been redeveloped since the 1980s based on traditional versus modernist design principles (Fraker, 2013). In developing countries, recent examples of neighbourhood designs and redevelopment projects that follow New Urbanism principles to varying degrees are found in Belize, Jamaica, Bhutan, and South Africa (Cervero, 2013).

Transit Oriented Development (TOD). TODs can occur at a corridor scale, as discussed earlier for cities like Curitiba and Stockholm, or as is more common, take on a nodal, neighbourhood form. Besides being the 'jumping off' point for catching a train or bus, TODs also serve other community purposes. Scandinavian TODs often feature a large civic square that functions as a community's hub and human-scale entryway to rail stations (Bernick and Cervero, 1996; Curtis et al., 2009).

In Stockholm and Copenhagen, TOD has been credited with reducing VKT per capita to among the lowest levels anywhere among high-income cities (Newman and Kenworthy, 1999). In the United States, studies show that TODs can decrease per capita use of cars by 50 %. In turn, this could save households about 20 % of their income (Arrington and Cervero, 2008). TOD residents in the United States typically commute by transit four to five times more than the average commuter in a region (Lund et al., 2006). Similar ridership bonuses have been recorded for TOD projects in Toronto, Vancouver, Singapore, and Tokyo (Chorus, 2009; Yang and Lew, 2009). In China, a recent study found smaller differentials of around 25 % in rail commuting between those living near, versus away from suburban rail stations (Day and Cervero, 2010).

Many cities in the developing world have had long histories of being transit oriented, and feature fine-grain mixes of land uses, abundant pathways that encourage and enable walking and biking, and ample transit options along major roads (Cervero, 2006; Cervero et al., 2009; Curtis et al., 2009). In Latin America, TOD is being planned or has taken form to varying degrees around BRT stations in Curitiba, Santiago, Mexico City, and Guatemala City. TOD is also being implemented in Asian cities, such as in Kaohsiung, Qingdao and Jiaxing, China, and Kuala Lumpur, Malaysia (Cervero, 2013). Green TODs that feature low-energy/low-emission buildings and the replacement of surface parking with community gardens are being built (Teriman et al., 2010; Cervero and Sullivan, 2011). A number of Chinese cities have embraced TOD for managing growth and capitalizing upon massive rail and BRT investments. For example, Beijing and Guangzhou adopted TOD as a guiding design principle in their most recent long-range master plans (Li and Huang, 2010). However, not all have succeeded. TOD efforts in many Chinese cities have been undermined by a failure to articulate densities (e.g., tapering building heights with distances from stations), the siting of stations in isolated superblocks, poor pedestrian access, and a lack of co-benefiting mixed land uses (Zhang, 2007; Zhang and Wang, 2013).

Pedestrian zones/car-restricted districts. Many European cities have elevated liveability and pedestrian safety to the top of transportation planning agendas, and have invested in programmes that reduce dependence on and use of private automobiles (Banister, 2005, 2008; Dupuy, 2011). One strategy for this is traffic calming, which uses speed humps, realigned roads, necked down intersections along with planted trees and other vegetation in the middle of streets to slow down traffic (Ewing and Brown, 2009). With these traffic calming approaches, automobile passage becomes secondary. A related concept is 'complete streets,' which—through dedicated lanes and traffic-slowing designs—provide safe passage for all users of a street, including drivers as well as pedestrians, cyclists, and transit patrons (McCann and Rynne, 2010).

An even bolder urban-design/traffic-management strategy has been the outright banning of cars from the cores of traditional neighbourhoods and districts, complemented by an upgrading and beautification of pedestrian spaces. This practice has become commonplace in many older European cities whose narrow and winding inner-city street were never designed for motorized traffic (Hass-Klau, 1993). Multi-block car-free streets and enhanced pedestrian zones are also found in cities of the developing world, including Curitiba, Buenos Aires, Guadalajara, and Beirut (Cervero, 2013).

Empirical evidence reveals a host of benefits from street redesigns and auto-restraint measures like these. The traffic-calming measures implemented in Heidelberg, Germany during the early 1990s lead to a 31 % decline in car-related accidents, 44 % fewer casualties, and less central-city traffic (Button, 2010). A study of pedestrianization in German cities recorded increases in pedestrian flows, transit ridership, land values, and retail transactions, as well as property conversions to more intensive land uses, matched by fewer traffic accidents and fatalities (Hass-Klau, 1993). Research on over 100 case studies in Europe, North America, Japan, and Australia, found that road-capacity reductions including car-free zones, creation of pedestrian streets, and street closures, results in an overall decline in motorized traffic of 25 % (Goodwin et al., 1998).

12.5.2 Policy instruments

Spatial planning strategies rely on a host of policy instruments and levers (see Chapter 15.3 for a classification of policy instruments). Some instruments intervene in markets, aimed at correcting market failures (e.g., negative externalities). Others work with markets, aimed at shaping behaviours through price signals or public-private partnerships. Interventionist strategies can discourage or restrict growth through government fiat but they can also incentivize development, such as through zoning bonuses or property tax abatements (Bengston et al., 2004). Policy instruments can be applied to different spatial planning strategies and carried out at different geographic scales (see Table 12.5). Different strategy bundles can be achieved through a mix of different policy tools, adapted to the unique political, institutional, and cultural landscapes of cities in which they are applied. Successful implementation requires institutional capacity and political wherewithal to align the right policy instruments to specific spatial planning strategies.

The effectiveness of particular instruments introduced depends on legal and political environments. For example, cities in the Global South can lack the institutional capacity to regulate land or to enforce development regulations and tax incentives may have little impact on development in the informal sector (Farvacque and McAuslan, 1992; Sivam, 2002; Bird and Slack, 2007; UN-Habitat, 2013). Infrastructure provision and market-based instruments such as fuel taxes will more likely affect development decisions in the informal sectors, although there is little direct empirical evidence. The impact of instruments on urban form and spatial outcomes can be difficult to assess since regulations like land-use zoning are often endogenous. That is, they codify land use patterns that would have occurred under the free market rather than causing changes in urban form (Pogodzinski and Sass, 1994).

12.5.2.1 Land use regulations

Land-use regulations specify the use, size, mass and other aspects of development on a particular parcel of land. They are also known as development controls or zoning regulations. In countries like the United States and India, land-use regulations usually promote low-density, single-use developments with large amounts of parking that increase car dependence and emissions (Talen 2012; Levine 2005; Glaeser, 2011). For example, densities in the United States are often lower than developers would choose under an unregulated system (Fischel, 1999; Levine and Inam, 2004). Thus, regulatory reforms that relax or eliminate overly restrictive land-use controls could contribute to climate change mitigation. In Europe, by contrast, land-use regulations have been used to promote more compact, mixed-use, transit-friendly cities (Beatley, 2000). The following are the primary land-use regulations to reduce urban form-related GHG emissions.

Use restrictions specify which land uses, such as residential, retail or office, or a mix of uses, may be built on a particular parcel. Single-use zoning regulations which rigidly separate residential and other uses are prevalent in the United States, although some cities such as Miami have recently adopted form-based codes which regulate physical form and design rather than use (Parolek et al., 2008; Talen, 2012). Use restrictions are rare in European countries such as Germany and France, where mixed-use development is permitted or encouraged (Hirt, 2007, 2012).

Density regulations specify minimum and/or maximum permissible densities in terms of the number of residential units, floor area on a parcel, or restrictions on building height or mass. Density regulations can provide incentives for open space or other public benefits by allowing higher density development in certain parts of a city. In India, densities or heights are capped in many cities, creating a pattern of mid-rise buildings horizontally spread throughout the city and failing to allow TOD to take form around BRT and urban rail stations (Glaeser, 2011; Brueckner and Sridhar, 2012; Suzuki et al., 2013). In Europe, by contrast, land-use regulations have been used to promote more compact, mixed-use, transit-friendly cities (Beatley, 2000; Parolek et al., 2008; Talen, 2012). In Curitiba, Brazil, density bonuses provide incentives for mixed-use development (Cervero, 1998; Duarte and Ultramari, 2012). A density bonus (Rubin and Seneca, 1991) is an option where an incentive is created for the developer to set aside land for open spaces or other benefits by being allowed to develop more densely, typically in CBDs. One challenge with density bonus is that individuals may have preferences for density levels (high, low) and adjust their location accordingly.

Urban containment instruments include greenbelts or urban growth boundaries and have been employed in London, Berlin, Portland, Beijing, and Singapore. In the UK and in South Korea, greenbelts delineate the edges of many built-up and rural areas (Hall, 1996; Bengston and Youn, 2006). In many European cities, after the break-up of the city walls in the 18th and 19th centuries, greenbelts were used to delineate cities (Elson, 1986; Kühn, 2003). Some US states have passed growth management laws that hem in urban sprawl through such initiatives as creating urban growth boundaries, geographically restricting utility service districts, enacting concurrency rules to pace the rate of land development and infrastructure improvements, and tying state aid to the success of local governments in controlling sprawl (DeGrove and Miness, 1992; Nelson et al., 2004). The mixed evidence on the impacts of urban containment instruments on density and compactness (decreases in some cases and increases in others) indicates the importance of instrument choice and particularities of setting.

Building codes provide a mechanism to regulate the energy efficiency of development. Building codes affect the energy efficiency of new development, and cities provide enforcement of those regulations in some countries (Chapter 9). City policies influence emissions through energy use in buildings in several other ways, which can influence purchases and leasing of commercial and residential real estate properties. Some cities participate in energy labelling programmes for buildings (see Chapter 9.10.2.6) or have financing schemes linked to property taxes (see Property Assess Clean Energy (PACE) in Chapter 9.10.3.1). Energy efficient equipment in buildings can further reduce

Box 12.4 | What drives declining densities?

The global phenomenon of declining densities (Angel et al., 2010) is the combined result of (1) fundamental processes such as population growth, rising incomes, and technological improvements in urban transportation systems (LeRoy and Sonstelie, 1983; Mieszkowski and Mills, 1993; Bertaud and Malpezzi, 2003; Glaeser and Kahn, 2004); (2) market failures that distort urban form during the process of growth (Brueckner, 2001a; Bento et al., 2006, 2011); and (3) regulatory policies that can have unintended impacts on density (Sridhar, 2007, 2010). A range of externalities can result in lower densities, such as the failure to adequately account for the cost of traffic congestion and infrastructure development and the failure to account for the social value of open space (Brueckner, 2000).

Regulatory policies, such as zoning and Floor Area Ratio (FAR) restrictions, as well as subsidies to particular types of transportation infrastructures can have large impacts on land development, which lead to leapfrog development (Mieszkowski and Mills, 1993; Baum-Snow, 2007; Brueckner and Sridhar, 2012). The emissions impacts of these interventions are often not fully understood. Finally, the spatial distribution of amenities and services can shape urban densities through housing demand (Brueckner et al., 1999). In the United States, deteriorating conditions in city centres have been an important factor in increased suburbanization (Bento et al., 2011; Brueckner and Helsley, 2011). Conversely, the continued consolidation of amenities, services, and employment opportunities in the cores of European and Chinese cities has kept households in city centres (Brueckner et al., 1999; Zheng et al., 2006, 2009).

energy consumption and associated emissions, including electronics, appliances, and equipment (see Table 9.3). Cities that operate utilities can influence energy usage directly by using smart meters and information infrastructures (see 9.4.1.3).

Parking regulations specify minimum and/or maximum numbers of parking spaces for a particular development. Minimum parking standards are ubiquitous in much of the world, including cities in the United States, Mexico, Saudi Arabia, Malaysia, China, and India (Barter, 2011; Al-Fouzan, 2012; Wang and Yuan, 2013). Where regulations require developers to provide more parking than they would have otherwise, as in place like New York and Los Angeles (McDonnell et al., 2011; Cutter and Franco, 2012), they induce car travel by reducing the cost of driving. Minimum parking requirements also have an indirect impact on emissions through land-use, as they reduce the densities that are physically or economically feasible on a site, by 30 %–40 % or more in typical cases in the United States (Willson, 1995; Talen, 2012). Maximum parking standards, in contrast, have been used in cities such as San Francisco, London, and Zurich (Kodransky and Hermann, 2011) to reduce the costs of development, use urban land efficiently, and encourage alternate transportation modes. In London, moving from minimum to maximum residential parking standards reduced parking supply by 40 %, with most of the impact coming through the elimination of parking minimums (Guo and Ren, 2013).

Design regulations can be used to promote pedestrian and bicycle travel. For example, site-design requirements may require buildings to face the street or prohibit the placement of parking between building entrances and street rights-of-way (Talen, 2012). Design regulations can also be used to increase albedo or reduce urban heat island effects, through requiring light-coloured or green roofs or regulating impervious surfaces (Stone et al., 2012), as in Montreal and Toronto (Richardson and Otero, 2012).

Affordable housing mandates can reduce the spatial mismatch between jobs and housing (Aurand, 2010). Incentives, such as floor area ratios and credits against exactions and impact fee obligations, can be arranged for developers to provide social housing units within their development packages (Cervero, 1989; Weitz, 2003).

12.5.2.2 Land management and acquisition

The previous section discussed regulatory instruments that are primarily used to shape the decisions of private landowners. Land management and acquisition include parks, lease air rights, utility corridors, transfer development rights, and urban service districts. Urban governments can also directly shape urban form through land that is publicly owned—particularly around public transport nodes, where municipalities and public transport agencies have acquired land, assembled parcels, and taken the lead on development proposals (Cervero et al., 2004; Curtis et al., 2009; Curtis, 2012). In Hong Kong SAR, China, the 'Rail + Property' development programme, which emphasizes not only density but also mixed uses and pedestrian linkages to the station, increases patronage by about 35,000 weekday passengers at the average station. In addition to supporting ridership, an important aim of many agencies is to generate revenue to fund infrastructure, as in Istanbul, Sao Paulo, and numerous Asian cities (Peterson, 2009; Sandroni, 2010).

Transfer of Development Rights (TDR) allows the voluntary transfer or sale of development from one region or parcel where less development is desired to another region or parcel where more development is desired. They can be used to protect heritage sites from redevelopment or to redistribute urban growth to transit station areas. The parcels that 'send' development are protected through restrictive covenants or permanent conservation easements. TDR effectively redirects new growth from areas where current development is to be protected (historical

sites or protected areas) to areas where more development is desired (e.g., transit station areas).

Increasing green space and urban carbon sinks can sequester carbon and reduce energy consumption for cooling. Increasing green space offers co-benefits such as increased property values, regulating stormwater, reduced air pollution, increased recreational space, provision of shade and cooling, rainwater interception and infiltration, increased biodiversity support, and enhancement of well-being (Heynen et al., 2006; Gill et al., 2007; McDonald, 2008). However, many studies show that significantly increasing urban green space would have negligible effects on offsetting total urban carbon emissions, especially when emissions generated by fuel combustion, fertilizer use, and irrigation are also considered (Pataki et al., 2009; Jim and Chen, 2009; Townsend-Small and Czimczik, 2010). Globally, urban soils could sequester 290 Mt carbon per year if designed with calcium-rich minerals (Renforth et al., 2009). Annual carbon uptake varies significantly by location and plant species. Carbon uptake per hectare for temperate urban green spaces is estimated to be 0.15–0.94 t/yr for seven cities in the United States: Atlanta, Baltimore, Boston, Jersey City, New York, Philadelphia, and Syracuse (Nowak and Crane, 2002); 0.38 t/yr in Beijing, China (Yang and Gakenheimer, 2007); and 0.53–0.8 t/yr in the South Korean cities of Chuncheon, Kangleung (Gangneung) and Seoul (Jo, 2002). United States cities in semi-tropical areas have higher levels of per hectare annual C sequestration, of 3.2 t/yr in Gainesville and 4.5 t/yr in Miami-Dade (Escobedo et al., 2010). Urban forests are estimated to sequester 1.66 t C/ha/yr in Hangzhou, China (Zhao et al., 2010). The variation in estimates across cities can be partly ascribed to differences in tree species, sizes, and densities of planting (Zhao et al., 2010), as well as land use (Whitford et al., 2001) and tree life span (Strohbach et al., 2012; Raciti et al., 2012).

12.5.2.3 Market-based instruments

Market-based instruments use taxation and pricing policies to shape urban form (see Chapter 15.5.2 for more in-depth discussion of market-based instruments). Because much low-density, single-use urban development stems from market failures or pre-existing distorted policies or regulations, a variety of market-based instruments can be introduced that correct these failures (Brueckner and Fansler, 1983; Brueckner and Kim, 2003; Brueckner, 2000; Bento et al., 2006, 2011).

Property taxes. The property tax, a local tax widely used to fund local urban services and infrastructure, typically taxes both land and structures. A variant of the property tax, a land tax or split-rate tax, levies a higher rate of tax on the value of the land, and a lower or zero rate on the value of the buildings and other improvements. This variant of the property tax can promote compact urban form through increasing the capital to land ratio, i.e., the intensity of development. There are numerous examples of the land or split-rate tax worldwide, including Jamaica, Kenya, Denmark, parts of Australia, the United States, and South Africa (Bird and Slack, 2002, 2007; Franzsen and Youngman, 2009; Banzhaf and Lavery, 2010)—although in these places, tax reform was not necessarily implemented with the aim of reducing sprawl.

In principle, moving from a standard property tax to a land or split-rate tax has ambiguous effects on urban form. The capital to land ratio could rise through an increase in dwelling size—promoting sprawl—and/or through an increase in density or units per acre—promoting compact urban form (Brueckner and Kim, 2003). In practice, however, the density effect seems to dominate. Most of the empirical evidence supporting the role of property tax reform in promoting compact urban form comes from the U.S. state of Pennsylvania, where the most thorough study found that the split-rate tax led to a 4–5 % point increase per decade in the number of housing units per hectare, with a minimal increase in unit size (for other evidence from Pennsylvania, see Oates and Schwab, 1997; Plassmann and Tideman, 2000; Banzhaf and Lavery, 2010).

Prospective or simulation studies also tend to find that land or split-rate taxes have the potential to promote compact urban form at least to some extent (many earlier studies are summarized in Roakes, 1996; Needham, 2000; for more recent work see Junge and Levinson, 2012). However, studies of land taxes in Australia have tended to find no effect on urban form (Skaburskis, 2003), although with some exceptions (e.g. Edwards, 1984; Lusht, 1992). There are several suggestions to tailor land or property taxes to explicitly support urban planning objectives. For example, the property tax could vary by use or by impervious area (Nuissl and Schroeter-Schlaack, 2009), or the tax could be on greenfield development only (Altes, 2009). However, there are few examples of these approaches in practice, and little or no empirical evidence of their impacts.

Moving from a standard property tax to a land or split-rate tax can yield efficiency and equity benefits (see Chapter 3 for definitions). The efficiency effect stems from the fact that the land tax is less distortionary than a tax on improvements, as the supply of land is fixed (Brueckner and Kim, 2003). The equity argument stems from the view that land value accrues because of the actions of the wider community, for example through infrastructure investments, rather than the actions of the landowner (Roakes, 1996). Indeed, some variants of the land tax in countries such as Colombia (Bird and Slack, 2007) take an explicit 'value capture' approach, and attempt to tax the incremental increase in land value resulting from transport projects.

Development impact fees are imposed per unit of new development to finance the marginal costs of new infrastructure required by the development, and are levied on a one-time basis. The effects of impact fees on urban form will be similar to a property tax. The main difference is that impact fees are more likely to be used by urban governments as a financing mechanism for transport infrastructure. For example, San Francisco and many British cities have impact fees dedicated to public transport (Enoch et al., 2005), and other cities such as Santiago have fees that are primarily dedicated to road infrastructure (Zegras, 2003).

Box 12.5 | Singapore: TOD and Road Pricing

The island-state of Singapore has over the years introduced a series of cross-cutting, reinforcing spatial planning and supportive strategies that promote sustainable urbanism and mobility (Suzuki et al., 2013). Guided by its visionary Constellation Plan, Singapore built a series of new master-planned towns that interact with each other because they each have different functional niches. Rather than being self-contained entities, these new towns function together (Cervero, 1998). All are interlinked by high-capacity, high-quality urban rail and bus services, and correspondingly the majority of trips between urban centres are by public transport. Congestion charges and quota controls on vehicle registrations through an auctioning system also explain why Singapore's transit services are so heavily patronized and not un-related, why new land development is occurring around rail stations (Lam and Toan, 2006).

Development taxes. To the extent that excessive urban development reflects the failure to charge developers for the full costs of infrastructure and the failure to account for the social benefits of spatially explicit amenities or open space, some economists argue that development taxes, a tax per unit of land converted to residential uses, are the most direct market-based instruments to correct for such failures (Brueckner, 2000; Bento et al., 2006). According to these studies, in contrast to urban growth boundaries, development taxes can control urban growth at lower economic costs. Urban sprawl occurs in part because the costs associated with development are not fully accounted for. Development taxes could make up for the difference between the private costs and the social costs of development, and coupled with urban growth boundaries could be effective at reducing sprawl.

Fuel prices and transportation costs. Increases in fuel taxes or transportation costs more generally have a direct effect on reducing VKT (see Chapter 8 and Chapter 15). They are also likely to have a long-run mitigation effect as households adjust their location choices to reduce travel distances, and urban form responds accordingly. An urban area that becomes more compact as households bid up the price of centrally located land is a core result from standard theoretical economic models of urban form (Romanos, 1978; Brueckner, 2001a, 2005; Bento et al., 2006).

Empirically, evidence for this relationship comes from cities in the United States, where a 10 % increase in fuel prices leads to a 10 % decrease in construction on the urban periphery (Molloy and Shan, 2013); Canada,

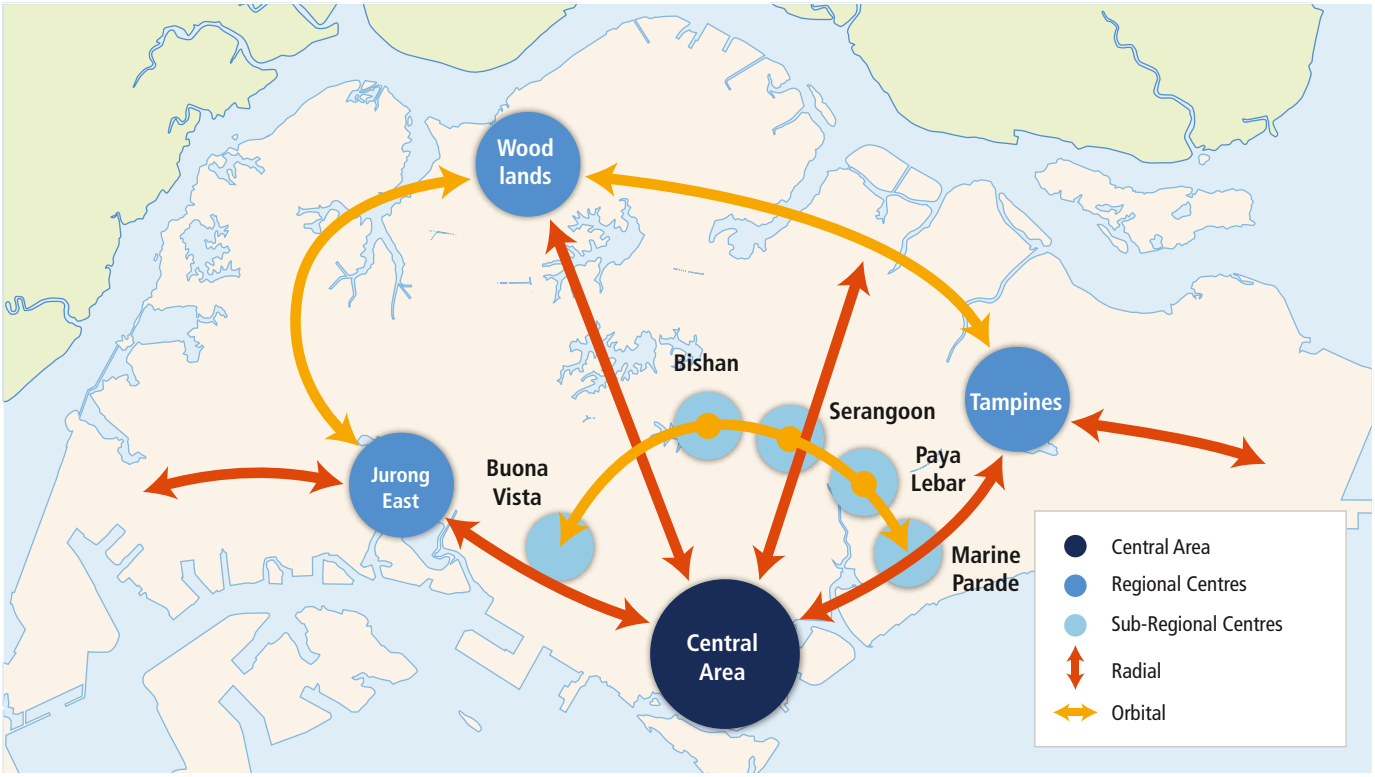


Figure 12.18 | Singapore's Constellation Plan. Source: Suzuki et al. (2013).

where a 1 % increase in gas prices is associated with a 0.32 % increase in the population living in the inner city (Tanguay and Gingras, 2012); and cross-national datasets of 35 world cities (Glaeser et al., 2001; Glaeser and Kahn, 2004). However, another cross-national study using a larger dataset found no statistically significant link, which the authors attribute to noisiness in their (national-level) fuel price data (Angel et al., 2005).

Similar impacts on urban form would be expected from other pricing instruments that increase the cost of driving. While there is clear evidence that road and parking pricing schemes reduce emissions through direct impacts on mode and travel choices (see Chapter 8.10.1), there is more limited data on the indirect impacts through land-use patterns. One of the few simulation studies found that optimum congestion pricing would reduce the radius of the Paris metropolitan area by 34 %, and the average travel distance by 15 % (De Lara et al., 2013).

12.5.3 Integrated spatial planning and implementation

A characteristic of effective spatial planning is interlinked and coordinated efforts that are synergistic, and the sum of which are greater than each individual part incrementally or individually (Porter, 1997). Relying on a single instrument or one-size-fits-all approach can be ineffective or worse, have perverse, unintended consequences. Singapore is a textbook example of successfully bundling spatial planning and supportive pricing strategies that reinforce and strengthen the influences of each other (see Box 12.5). Bundling spatial strategies in ways that produce positive synergies often requires successful institutional coordination and political leadership from higher levels of government (Gakenheimer, 2011). The U.S. state of Oregon has managed to protect farmland and restrict urban sprawl through a combination of measures, including urban growth boundaries (required for all metropolitan areas above 50,000 inhabitants), farm tax credit programmes, tax abatements for infill development, and state grants that have helped fund investments in high-quality transit, such as light rail and tramways in Portland and BRT in Eugene (Moore et al., 2007). Enabling legislation introduced by the state prompted cities like Portland to aggressively curb sprawl through a combination of urban containment, targeted infrastructure investments, aggressive expansion of pedestrian and bikeway facilities, and commercial-rate pricing of parking (Nelson et al., 2004).

Empirical evidence on the environmental benefits of policies that bundle spatial planning and market strategies continues to accumulate. A 2006 experiment in Portland, Oregon, replaced gasoline taxes with VKT charges, levied on 183 households that volunteered for the experiment. Some motorists paid a flat VKT charge while others paid considerably higher rates during the peak than non-peak. The largest VKT reductions were recorded among households in compact, mixed-use neighbourhoods that paid congestion charges matched by little change in travel among those living in lower density areas and paying flat rates (Guo et al., 2011). Another study estimated that compact development combined with technological improvements (e.g., more efficient vehicle fleets and low-carbon fuels) could reduce GHG emissions by 15 % to 20 % (Hankey and Marshall, 2010). A general equilibrium model of urban regions in the OECD concluded that "urban density policies and congestion charges reduce the overall cost of meeting GHG emissions reduction targets more than economy-wide policies, such as a carbon tax, introduced by themselves" (OECD, 2010d).

12.6 Governance, institutions, and finance

The feasibility of spatial planning instruments for climate change mitigation depends greatly upon each city's governance and financial capacities. Even if financial capacities are present, a number of other obstacles need to be surmounted. For example, many local governments are disinclined to support compact, mixed-use, and dense development. Even in cases where there is political support for low-carbon development, institutions may be ineffective in developing, implementing, or regulating land use plans. This section assesses the governance, institutional, and financial challenges and opportunities for implementing the mitigation strategies outlined in Section 12.5. It needs to be emphasized that both the demand for energy and for urban infrastructure services, as well as the efficiency of service delivery, is also influenced by behaviour and individual choices. Cultural and lifestyle norms surrounding comfort, cleanliness, and convenience structure expectations and use of energy, water, waste, and other urban infrastructure services (Miller, 1998; Shove, 2003, 2004; Bulkeley, 2013). Individual and household choices and behaviour can also strongly affect the demand for, and the delivery efficiency of, public infrastructure services, for instance by lowering or increasing load factors (utilization rates) of public transport systems (Sammer, 2013). Governance and institutions are necessary for the design and implementation of effective policy frameworks that can translate theoretical emission reduction potentials of a range of mitigation options into actual improved emission outcomes.

12.6.1 Institutional and governance constraints and opportunities

The governance and institutional requirements most relevant to changing urban form and integrated infrastructure in urban areas relate to spatial planning. The nature of spatial planning varies significantly across countries, but in most national contexts, a framework for planning is provided by state and local governments. Within these frameworks, municipal authorities have varying degrees of autonomy and authority. Furthermore, there are often divisions between land use planning, where municipalities have the authority for land regulation within their jurisdiction, and transportation planning (which is

either centrally organized or done in a cross-cutting manner), in which municipal responsibilities are often more limited. Thus, spatial planning is one area where municipalities have both the authority and the institutions to address GHG emissions.

However, the best plans for advancing sustainable urbanization and low-carbon development, especially in fast-growing parts of the world, will not become a reality unless there is both the political will and institutional capacity to implement them. The ability to manage and respond to escalating demands for urban services and infrastructure is often limited in developing country cities. Multiple institutional shortcomings exist, such as an insufficiently trained and undereducated civil service talent pool or the absence of a transparent and corruption-free procurement process for providing urban infrastructure (UN-Habitat, 2013). For example, limited experience with urban management, budgeting and accounting, urban planning, finance, and project supervision have thwarted Indonesia's decentralization of infrastructure programmes from the central to local governments over the past decade (Cervero, 2013).

Although lack of coordination among local land management and infrastructure agencies is also a common problem in cities of industrialized countries (Kennedy et al., 2005), in developing cities institutional fragmentation undermines the ability to coordinate urban services within and across sectors (Dimitriou, 2011). Separating urban sector functions into different organizations—each with its own boards, staff, budgets, and by-laws—often translates into uni-sectoral actions and missed opportunities, such as the failure to site new housing projects near public transport stations. In addition, ineffective bureaucracies are notorious for introducing waste and delays in the deployment of urban transport projects.

In rapidly urbanizing cities, limited capacities and the need to respond to everyday crises often occupy most of the available time in transportation and public utility departments, with little attention left to strategically plan for prevention of such crises in the first place. As a result, strategic planning and coordination of land use and transportation across different transport modes is practically non-existent. Institutions rarely have sufficient time or funds to expand transport infrastructure fast enough to accommodate the exponential growth in travel. Public utilities for water and sanitation face similar challenges, and most local agencies operate constantly in the catch-up mode. Water utilities in southeast Asian cities, for example, are so preoccupied with fixing leaks, removing illegal connections, and meeting water purity standards that there is little time to strategically plan ahead for expanding trunk-line capacities in line with urban population growth projections. The ability to advance sustainable transport programmes, provide clean water connections, or introduce efficient pricing schemes implies the presence of conditions that rarely exist, namely a well-managed infrastructure authority that sets clear, measurable objectives and rigorously appraises the expenditure of funds in a transparent and accountable way (Cervero, 2013). Lack of local institutional capacity among developing cities is a major barrier to achieving the full potential that such cities have to reduce GHG emissions (UN-Habitat, 2013). This highlights the urban institutional climate conundrum that rapidly urbanizing cities—cities with the greatest potential to reduce future GHG emissions—are the cities where the current lack of institutional capacity will most obstruct mitigation efforts.

Curitiba, Brazil, regarded as one of the world's most sustainable cities, is a product of not only visionary spatial planning but also strong institutions and political leadership (see Box 12.6.). Other global cities are striving to follow Curitiba's lead. Bangkok recently announced a paradigm shift in planning that emphasizes redesigning the city to eliminate or shorten trips, creating complete streets, and making the city more liveable (Bangkok Metropolitan Administration, 2013). The Amman, Jordan, Master Plan of 2008 promotes high-density, mixed-use development through the identification of growth centres, intensification along select corridors across the city, and the provision of safe and efficient public transportation (Beauregard and Marpillero-Colomina, 2011). Similar transit-oriented master plans have been prepared for Islamabad, Delhi, Kuala Lumpur, and Johannesburg in recent years. Mexico City has aggressively invested in BRT and bicycle infrastructure to promote both a culture and built form conducive to sustainable mobility (Mejía-Dugand et al., 2013).

In addition to the internal institutional challenges outlined above, cities face the problem of coordinating policies across jurisdictional boundaries as their populations grow beyond the boundaries of their jurisdictions. Effective spatial planning and infrastructure provision requires an integrated metropolitan approach that transcends traditional municipal boundaries, especially to achieve regional accessibility. The fragmented local government structure of metropolitan areas facilitates the conversion of agricultural, forested, or otherwise undeveloped land to urban uses. These expanding urban areas also exhibit fiscal weaknesses, face heightened challenges of metropolitan transportation, and deficiencies in critical physical and social infrastructures (Rusk, 1995; Norris, 2001; Orfield, 2002; McCarney and Stren, 2008; Blanco et al., 2011; McCarney et al., 2011). Several efforts to address urban climate change mitigation at a metropolitan scale are emerging. The U.S. state of California, for example, is requiring metropolitan transportation agencies to develop climate change mitigation plans in concert with municipalities in their region. California's 2008 Sustainable Communities and Climate Protection Act, or SB 375, was the first legislation in the United States to link transportation and land use planning with climate change (State of California, 2008; Barbour and Deakin, 2012).

In order for integrated planning development to be successful, it must be supported at national levels (Gakenheimer, 2011). A recent example is India's National Urban Transport Policy of 2006, which embraces integrated transport and land use planning as its top priority. In this policy, the central government covers half the costs of preparing integrated transport and land use plans in Indian cities. Another example is that for the past 25 years, Brazil has had a national urban transport policy that supports planning for sustainable transport and urban growth in BRT-served cities like Curitiba and Belo Horizonte.

Box 12.6 | Sustainable Curitiba: Visionary planning and strong institutions

Developing cities such as Curitiba, Brazil, well-known for advancing sustainable transport and urbanism, owe part of their success to strong governance and institutions (Cervero, 2013). Early in Curitiba's planning process, the Instituto de Pesquisa e Planejamento Urbano de Curitiba (IPPUC) was formed and given the responsibility of ensuring the integration of all elements of urban growth. Creative design elements, such as the trinary corridors (shown in Figure 12.19) that concentrate vertically mixed development along high-capacity dedicated busways and systematically taper densities away from transit corridors, were inventions of IPPUC's professional staff. As an independent planning and research agency with dedicated funding support, IPPUC is insulated from the whims of day-to-day politics and able to cost effectively coordinate urban expansion and infrastructure development. Sustained political commitment has been another important element of Curitiba's success. The harmonization of transport and urban development took place over 40 years, marked by a succession of progressive, forward-looking, like-minded mayors who built on the work of their predecessors. A cogent long-term vision and the presence of a politically insulated regional planning organization, IPPUC, to implement the vision have been crucial in allowing the city to chart a sustainable urban pathway.

However, urban governance of land use and transport planning is not the sole province of municipal authorities or other levels of government. Increasingly, private sector developers are creating their own strategies to govern the nature of urban development that exceed codes and established standards. These strategies can relate both to the physical infrastructure being developed (e.g., the energy rating of housing on a particular development) or take the form of requirements and guides for those who will occupy new or refurbished developments (e.g., age limits, types of home appliance that can be used, energy contracts, and education about how to reduce GHG emissions). Non-governmental organizations (NGOs) aimed at industry groups, such as the U.S. Green Building Council, the Korea Green Building Certification Criteria, and UK's Building Research Establishment Environmental Assessment Method (BREEAM) have also become important in shaping urban development, particularly in terms of regeneration and the refurbishment or retrofitting of existing buildings. For example, this is the case in terms of community-based organizations in informal settlements, as well as in the redevelopment of brownfield sites in Europe and North America.

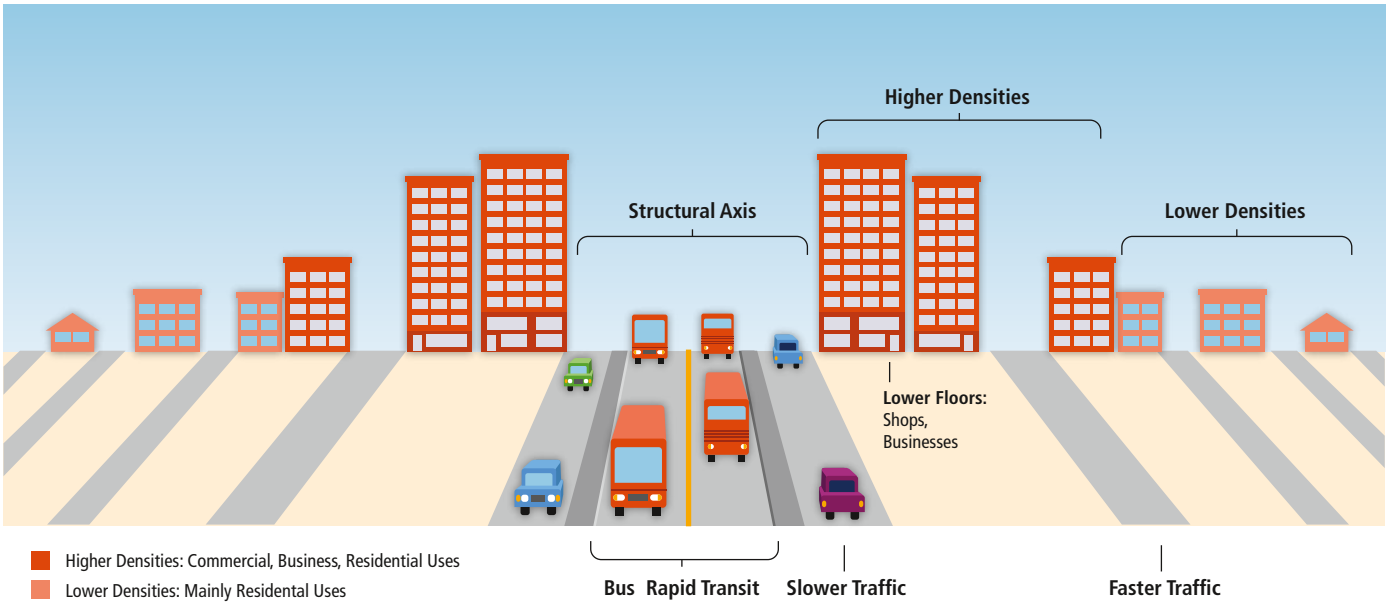


Figure 12.19 | Curitiba's stylized trinary road system. The inclusion of mixed land uses and affordable housing allows developers to increase building heights, adding density to the corridor. Source: Suzuki et al. (2013).

12.6.2 Financing urban mitigation

Urban infrastructure financing comes from a variety of sources, some of which may already be devoted to urban development. Some of these include direct central government budgetary investments, intergovernmental transfers to city and provincial governments, revenues raised by city and provincial governments, the private sector or public-private partnerships, resources drawn from the capital markets via municipal

bonds or financial intermediaries, risk management instruments, and carbon financing. Such sources provide opportunities for urban mitigation initiatives (OECD, 2010b), but access to these financial resources varies from one place to another.

In many industrialized countries, national and supra-national policies and programmes have provided cities with the additional financing and facilitations for urban climate change mitigation. Where the national commitment is lacking, state and municipal governments can influence mitigation initiatives at the city scale. Cities in emerging economies are also increasingly engaging in mitigation, but they often rely on international sources of funding. GHG abatement is generally pursued as part of the urban development efforts required to improve access to infrastructure and services in the fast-growing cities of developing countries, and to increase the liveability of largely built-out cities in industrialized countries. Incorporating mitigation into urban development has important financial implications, as many of the existing or planned urban investments can be accompanied through requirements to meet certain mitigation standards (OECD, 2010b). As decentralization has progressed worldwide (the average share of sub-national expenditure in OECD countries reached 33 % in 2005), regional and local governments increasingly manage significant resources.

Local fiscal policy itself can restrict mitigation efforts. When local budgets rely on property taxes or other taxes imposed on new development, there is a fiscal incentive to expand into rural areas or sprawl instead of pursuing more compact city strategies (Ladd, 1998; Song and Zenou, 2006). Metropolitan transportation policies and taxes also affect urban carbon emissions. Congestion charges reduce GHG emissions from transport by up to 19.5 % in London where proceeds are used to finance public transport, thus combining global and local benefits very effectively (Beevers and Carslaw, 2005). Parking charges have led to a 12 % decrease of vehicle miles of commuters in U.S. cities, a 20 % reduction in single car trips in Ottawa, and a 38 % increase of carpooling in Portland (OECD, 2010c).

Another way to think about the policy instruments available to governments for incentivizing GHG abatement is to consider each instrument's potential to generate public revenues or demand for government expenditures, and the administrative scale at which it can be applied (Figure 12.20). Here, the policy instruments discussed earlier (Table 12.5) are categorized into four groups: (1) regulation; (2) taxation/charge; (3) land-based policy; and (4) capital investment. Many of these are applicable to cities in both the developed and developing countries, but they vary in degree of implementation due to limited institutional or governance capacities. Overcoming the lack of political will, restricted technical capacities, and ineffective institutions for regulating or planning land use will be central to attaining low-carbon development at a city-scale.

Fiscal crises along with public investment, urban development, and environmental policy challenges in both developed and developing counties have sparked interest in innovative financial instruments to affect spatial development, including a variety of land-based techniques (Peterson, 2009). One of these key financial/economic mechanisms is land value capture. Land value capture consists of financing the construction of new transit infrastructures using the profits generated by the land value price increase associated with the presence of new infrastructure (Dewees, 1976; Benjamin and Sirmans, 1996; Batt, 2001; Fensham and Gleeson, 2003; Smith and Gihring, 2006). Also called windfall recapture, it is a local financing option based on recouping a portion or all of public infrastructure costs from private land betterments under the 'beneficiary' principle. In contrast, value compensation, or wipeout mitigation, is commonly viewed as a policy tool to alleviate private land worsements—the deterioration in the value or usefulness of a piece of real property—resulting from public regulatory activities (Hagman and Misczynski, 1978; Callies, 1979).

The majority of the value capture for transit literature use U.S. cities as case studies in part because of the prevalence of low-density, automobile-centred development. However, there is an emerging literature on value capture financing that focus on developing country cities, which tend to be denser than those in OECD countries, and where there are more even shares of distinct travel modes (Cervero et al., 2004). Value capture typically is used for public transit projects. There are various ways to implement value capture, including: land and property taxes, special assessment or business improvement districts, tax increment financing, development impact fees, public land leasing and development right sales, land readjustment programmes, joint developments and cost/benefit sharing, connection fees (Johnson and Hoel, 1985; Landis et al., 1991; Bahl and Linn, 1998; Enoch et al., 2005; Smith and Gihring, 2006). There is much evidence that public transit investments often increase land values around new and existing stations (Du and Mulley, 2006; Debrezion et al., 2007).

In summary, the following are key factors for successful urban climate governance: (1) institutional arrangements that facilitate the integration of mitigation with other high-priority urban agendas; (2) an enabling multilevel governance context that empowers cities to promote urban transformations; (3) spatial planning competencies and political will to support integrated land-use and transportation planning; and (4) sufficient financial flows and incentives to adequately support mitigation strategies.

12.7 Urban climate mitigation: Experiences and opportunities

This section identifies the scale and range of mitigation actions being planned by municipal governments and assesses the evidence of successful implementation of the plans as well as barriers to further implementation. The majority of studies reviewed pertain to large

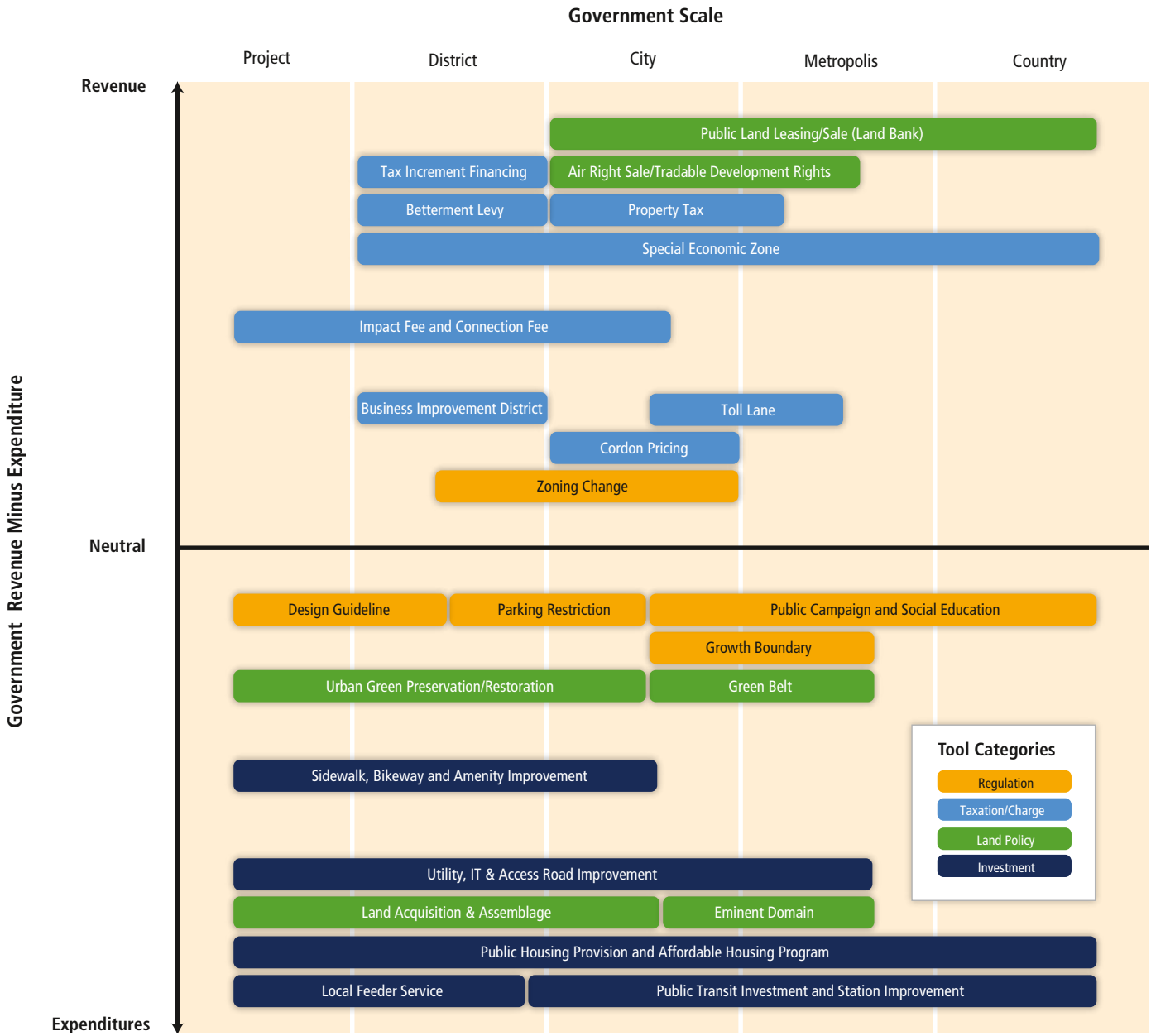


Figure 12.20 | Key spatial planning tools and effects on government revenues and expenditures across administrative scales. Figure shows four key spatial planning tools (coded in colours) and the scale of governance at which they are administered (x-axis) as well as how much public revenue or expenditure the government generates by implementing each instrument (y-axis).

Sources: Bahl and Linn (1998); Bhatt (2011); Cervero (2004); Deng (2005); Fekade (2000); Rogers (1999); Hong and Needham (2007); Peterson (2009); Peyroux (2012); Sandroni (2010); Suzuki et al. (2013); Urban LandMark (2012); U.S. EPA (2013); Weitz (2003).

cities in North America, Japan, and Europe, although there are some cross-city comparisons and case studies that include smaller cities in industrialized economies (Yalçın and Lefèvre, 2012; Dierwechter and Wessells, 2013) and cities in developing countries and emerging economies (Romero Lankao, 2007; Pitt, 2010).

Addressing climate change has become part of the policy landscape in many cities, and municipal authorities have begun to implement policies to reduce GHG emissions generated from within their administrative boundaries (Acuto, 2013; OECD, 2010a). The most visible way in which cities undertake mitigation is under the auspices of a climate action plan—a policy document created by a local government agency that sets out a programme of action to mitigate greenhouse gas emissions. Usually such plans include a GHG emissions inventory and an emissions reduction target, as well as a series of mitigation policies.

This section focuses on such climate action plans, as they provide the most comprehensive and consistent, albeit limited, evidence available regarding urban mitigation efforts. However, there is not a one-to-one correspondence between climate action plans and urban mitigation

efforts. Even when included in climate action plans, mitigation measures may well have been implemented in the plan's absence, whether for climate-related or other reasons (Millard-Ball, 2012b). Conversely, climate action plans are only one framework under which cities plan for mitigation policies, and similar recommendations may also occur as part of a municipal sustainability, land-use, or transport plan (Bulkeley and Kern, 2006; GTZ, 2009; Bassett and Shandas, 2010). In these other types of plans, climate change may be one motivation, but mitigation measures are often pursued because of co-benefits such as local air quality (Betsill, 2001; Kousky and Schneider, 2003).

12.7.1 Scale of urban mitigation efforts

The number of cities that have signed up to voluntary frameworks for GHG emission reductions has increased from fewer than 50 at the start of the 1990s to several hundred by the early 2000s (Bulkeley and Betsill, 2005), and several thousand by 2012 (Kern and Bulkeley, 2009; Pitt, 2010; Krause, 2011a). These voluntary frameworks provide technical assistance and political visibility. They include the C40 Cities Climate Leadership Group (C40), which by October 2013 counted most of the world's largest cities among its 58 affiliates (C40 Cities, 2013), the Cities for Climate Protection (CCP) Campaign, and the 2013 European Covenant of Mayors, which had over 5,200 members representing over 170 million people, or roughly one-third of the European population (The Covenant of Mayors, 2013). In the United States, nearly 1,100 municipalities, representing approximately 30 % of the country's population, have joined the U.S. Conference of Mayors Climate Protection Agreement, thus committing to reduce their local GHG emissions to below 1990 levels (Krause, 2011a).

Such estimates represent a lower bound, as cities may complete a climate action plan or undertake mitigation outside one of these voluntary frameworks. In California in 2009, 72 % of cities responding

Box 12.7 Urban climate change mitigation in less developed countries

The majority of future population growth and demand for new infrastructure will take place in urban areas in developing countries. Africa and Asia will absorb the bulk of the urban population growth, and urbanization will occur at lower levels of economic development than the urban transitions that occurred in Annex I countries. There are currently multiple urban transitions taking place in developing countries, with differences in part due to their development histories, and with different impacts on energy use and greenhouse gas emissions.

Urban areas in developing and least developed countries can have dual energy systems (Martinot et al., 2002; Berndes et al., 2003). That is, one segment of the population may have access to modern energy and associated technology for heating and cooking. Another segment of the population—mainly those living in informal settlements—may rely mainly on wood-based biomass. Such non-commercial biomass is a prominent source in the urban fuel mix in Sub-Saharan Africa (50 %) and in South Asia (23 %). In other regions, Latin America and the Caribbean (12 %), Pacific Asia (8 %) and China (7 %) traditional, non-commercial energy is not negligible but a relatively smaller proportion of overall energy portfolio (Grubler et al., 2012). The traditional energy system operates informally and inefficiently, using out-dated technology. It can be associated with significant health impacts (see Section 9.7.3 in this report as well as Chapters 2 and 9 in IPCC, 2011). The unsustainable harvesting of woodfuels to supply large urban and industrial markets is significantly contributing to forest degradation and coupled with other land-use changes to deforestation (see Chapter 11). However, recent technological advances suggest that energy production from biomass can be an opportunity for low carbon development (Zeng et al., 2007; Fargione et al., 2008; Hoekman, 2009; Azar et al., 2010). Projections of significant growth in woodfuel demand (Mwampamba, 2007; Zulu, 2010; Agyeman et al., 2012) make it vital that this sector is overhauled and modernized using new technologies, approaches, and governance mechanisms.

Additionally, informal urbanization may not result in an increase in the provision of infrastructure services. Rather, unequal access to infrastructure, especially housing and electricity, is a significant problem in many rapidly growing urban centres in developing countries and shapes patterns of urban development. Mitigation options vary by development levels and urbanization trajectories. The rapid urbanization and motorization occurring in many developing and least developed countries is constrained by limited infrastructure and deteriorating transport systems. Integrated infrastructure development in these areas can have greater effects on travel demands and low-emission modal choices than in high-income countries, where infrastructure is largely set in place (see Chapter 8.9). The scale of new building construction in developing countries follows a similar path. An estimated 3 billion people worldwide rely on highly polluting and unhealthy traditional solid fuels for household cooking and heating (Pachauri et al., 2012; IEA, 2012)and shifting their energy sources to electricity and clean fuels could strongly influence building-related emissions reductions (see Box 9.1 and Section 14.3.2.1). Thus, it is in developing and least developed country cities where opportunities for integrated infrastructure and land-use planning may be most effective at shaping development and emissions trajectories, but where a 'governance paradox' exists (see Section 12.3.1).

to a survey stated they had adopted policies and/or programmes to address climate change, but only 14 % had adopted a GHG reduction target (Wang, 2013). In some countries, climate action plans are mandatory for local governments, further adding to the total. For example, in Japan, the Global Warming Law and the Kyoto Protocol Target Achievement Plan mandate that 1,800 municipal governments and 47 Prefectures prepare climate change mitigation action plans (Sugiyama and Takeuchi, 2008). In France, climate action plans are mandatory for cities with populations larger than 50,000 (Yalçın and Lefèvre, 2012). Climate action planning has been most extensive in cities in Annex I countries, particularly those in Europe and Japan. This presents a mismatch between the places with mitigation planning efforts and the places where most urban growth will occur—and where the greatest mitigation potential exists—largely in developing countries that are rapidly urbanizing.

12.7.2 Targets and timetables

One way to assess the scale of planned mitigation is through the emission reduction targets set by cities, typically as part of their climate action plans. A central feature of municipal climate change responses is that targets and timetables have frequently exceeded national and international ambitions for emissions reduction. In Germany, nearly 75 % of cities with a GHG target established their emissions goals based on national or international metrics rather than on a local analysis of mitigation options and the average city reduction target of 1.44 % per year exceeds the national target (Sippel, 2011). In the United States, signatories to the Mayors Climate Protection Agreement have pledged to reduce GHG emissions by 7 % below 1990 levels by 2012, in line with the target agreed upon in the Kyoto Protocol for the United States (Krause, 2011b). Lutsey and Sperling (2008) find that these and other targets in 684 U.S. cities would reduce total emissions in the United States by 7 % below the 2020 business-as-usual (BAU) baseline.

In Europe and Australia, several municipalities have adopted targets of reducing GHG emissions by 20 % by 2020 and long-term targets for radically reducing GHG emissions, including 'zero-carbon' targets in the City of Melbourne and Moreland (Victoria), and a target of 80 % reduction over 1990 levels by 2050 in London (Bulkeley, 2009). This approach has not been limited to cities in developed economies. For example, the city of Cape Town has set a target of increasing energy efficiency within the municipality by 12 % by 2010 (Holgate, 2007), and Mexico City has implemented and achieved a target of reducing 7 million tons of GHG from 2008 to 2012 (Delgado-Ramos, 2013). Data compiled for this assessment, although illustrative rather than systematic, indicate an average reduction of 2.74 t CO_2eq/cap if cities were to achieve their targets, with percentage targets ranging from 10 % to 100 %. In general, percentage reduction targets are larger for more distant years and in more affluent cities. However, the absolute level of the targeted reductions depends primarily on the city's population and other determinants of baseline emissions (Figure 12.21.).

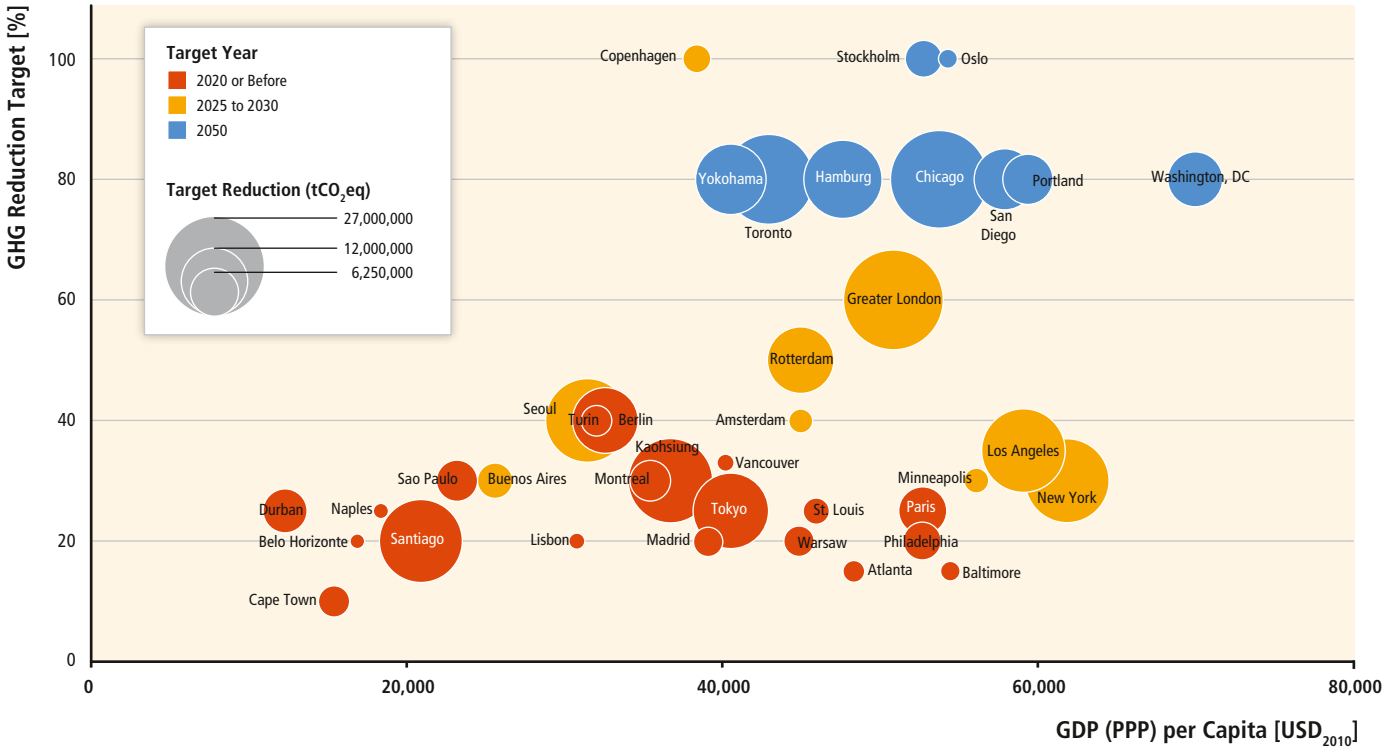


Figure 12.21 | Mitigation targets for 42 cities. Sources: Baseline emissions, reduction targets, and population from self-reported data submitted to Carbon Disclosure Project (2013). GDP data from Istrate & Nadeau (2012). Note that the figure is illustrative only; data are not representative, and physical boundaries, emissions accounting methods and baseline years vary between cities. Many cities have targets for intermediate years (not shown).

In some cases, targets may reflect patterns of potential mitigation. Targets are often arbitrary or aspirational, and reflect neither mitigation potential nor implementation. How targets translate into mitigation effort also depends on how they are quantified, e.g., whether fuel economy and similar improvements mandated at the national level are claimed by cities as part of their own reductions (Boswell et al., 2010; DeShazo and Matute, 2012). Mitigation targets are often set in absolute terms, which may be less meaningful than per-capita reductions in assessing mitigation potential at the metropolitan scale. This is a particularly important issue for central cities and inner suburbs, where population and emissions may increase within the city boundary if policies to increase density and compactness are successful (see Section 12.4; Ganson, 2008; Salon et al., 2010).

Many cities, particularly those in developing countries, do not set targets at all. For example, the Delhi Climate Change Agenda only reports Delhi's CO_2 emissions from power, transport, and domestic sectors as 22.49 $MtCO_2$ for 2007—2008 (Government of NCT of Delhi, 2010), while the contributions from commercial sectors and industries comprise a larger share of the city's total emissions. Furthermore, Delhi's climate action plan lacks clear GHG reduction targets, an analysis of the total carbon reductions projected under the plan, and a strategy for how to achieve their emissions goals. Similar limitations are apparent in mitigation plans for other global cities such as Bangkok and Jakarta (Dhakal and Poruschi, 2010). For many cities in developing countries, a reliable city GHG inventory may not exist, making the climate change actions largely symbolic. However, these city action plans provide a foundation for municipal engagement in mitigation initiatives while building momentum for collective action on a global scale.

12.7.3 Planned and implemented mitigation measures

Limited information is available on the extent to which targets are being achieved or emissions reduced. Some cities have already achieved their initial GHG reduction targets, e.g., Seattle (Boswell et al., 2011), or are on track to do so, e.g. Stockholm (City of Stock-

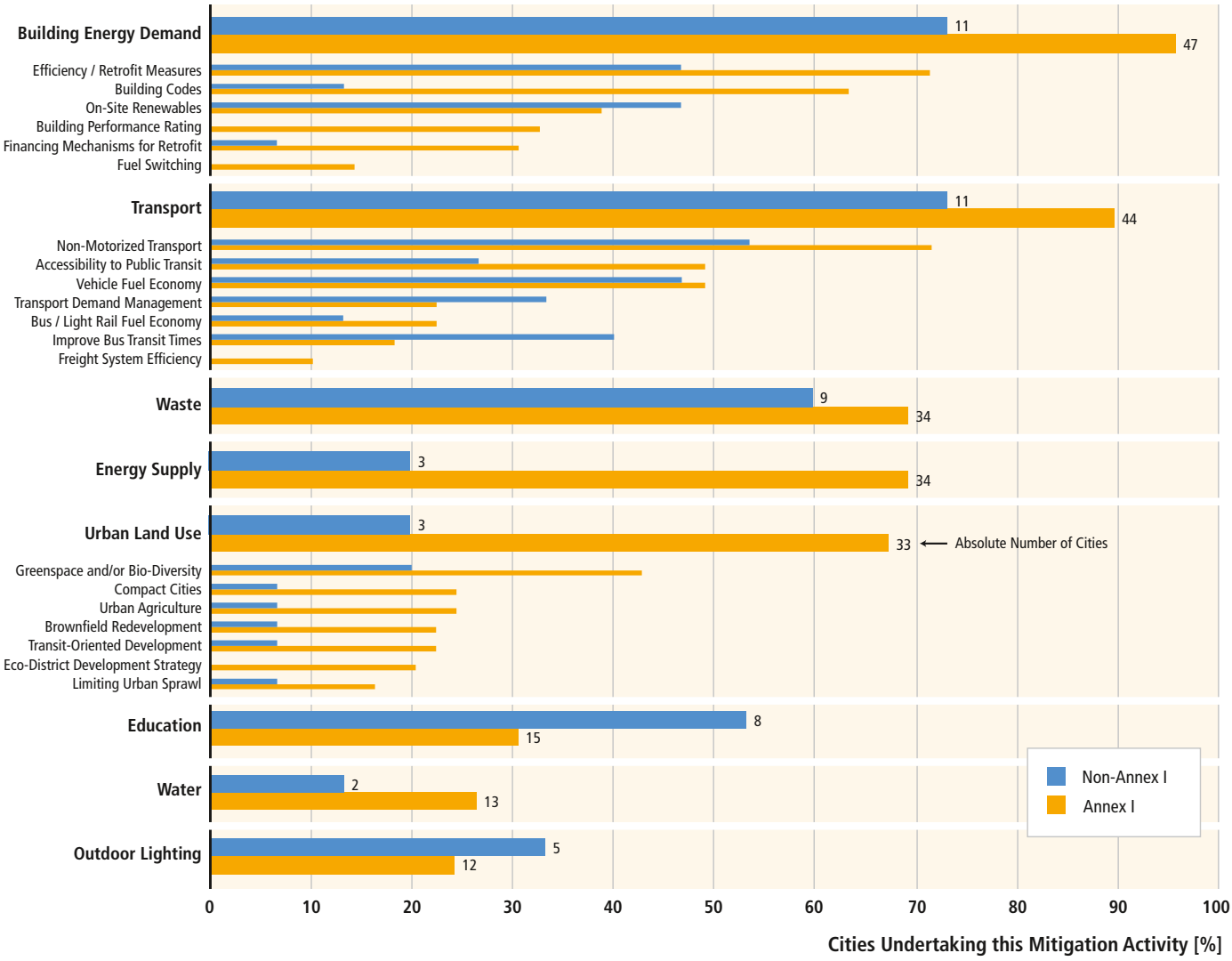


Figure 12.22 | Mitigation measures in climate action plans. Sources: Compiled for this assessment from self-reported data submitted to Carbon Disclosure Project (2013).

holm, 2013). In other places such as western Germany, few if any cities are likely to meet their targets (Sippel, 2011). Further data come from comparison of 'before' and 'after' GHG inventories. One study of six major cities found that emissions are falling by an average 0.27 t CO_2eq/cap per year (Kennedy et al., 2012). Overall, however, the available data are usually incomplete, self-reported, and subject to various biases. More fundamentally, changes in aggregate emissions do not necessarily reflect the success or failure to implement mitigation measures, because so many drivers of emissions—including the electricity generation mix and fuel taxation—are normally beyond the control of cities (DeShazo and Matute, 2012). Whether a city achieves its target has less to do with its own actions and more to do with external drivers of emissions.

An alternative way to gauge the extent of planned and implemented mitigation measures is through a bottom-up analysis of individual policies (Ramaswami et al., 2012a) or sector-specific data on green buildings, transport, or waste production (Millard-Ball, 2012a). However, there are no data from a large number of cities using these methods. Instead, available data are usually in the form of self-reported planned or implemented policies (Krause, 2011c; Castán Broto and Bulkeley, 2012; Stone et al., 2012; Bedsworth and Hanak, 2013). While these data do not reveal aggregate emission reductions, they indicate the sectoral breadth of city climate action plans and the types of measures that cities are planning. No single sector dominates mitigation plans, although transportation and building efficiency are the most common self-reported measures (Figure 12.22). Here it is worth noting that the relative contribution of sectors to total urban emissions varies greatly by city (see Section 12.3).

The types of land-use strategies discussed in Section 12.5, such as compact development, are sometimes included in municipal efforts or plans, but the popularity of such land-use measures varies considerably by context. In California, 80 % of municipal survey respondents reported that they had policies for high-density or mixed-use development in place or under consideration, and the adoption of such land-use policies rose substantially between 2008 and 2010 (Bedsworth and Hanak, 2013). In the United States, 70 % of climate action plans reviewed in one study include compact development strategies (Bassett and Shandas, 2010). In contrast, municipal climate plans in Norway and Germany focus on energy, transport and building efficiency, with little attention given to land use (Aall et al., 2007; Sippel, 2011). At a global level, self-reported data from a small sample of cities (Figure 12.22) suggests that land-use measures are relatively uncommon in climate action plans—particularly outside Annex I countries. Moreover, where land-use strategies exist, they focus on urban greenspace and/or biodiversity, rather than on the cross-sectoral measures to reduce sprawl and promote TOD that were discussed in Section 12.5.

Even if land use measures are listed in climate action plans, implementation has focused on win-win energy efficiency measures that lead to cost savings, rather than larger changes to land use, buildings or transport. This is a consistent message from qualitative studies (Kousky and Schneider, 2003; Rutland and Aylett, 2008; Kern and Bulkeley, 2009), and some larger surveys of city efforts (Wang, 2013). There has been less engagement by municipalities with sectors such as energy and water supply that often lie outside of their jurisdiction (Bulkeley and Kern, 2006; ARUP, 2011) or with the GHG emissions embodied in present patterns of urban resource use and consumption. More broadly, there is considerable variation in the nature and quality of climate change plans, particularly when it comes to specifying the detail of actions and approaches to implementation (Wheeler, 2008; Tang et al., 2011; Bulkeley and Schroeder, 2012).

Despite the implementation of comprehensive climate action plans and policies, progress for cities in developed countries is slow and the achievability of emissions targets remains uncertain. Although municipalities often highlight progress on mitigation projects, the impacts of these initiatives are not often evaluated (see Chapter 15 on policy evaluation). Cities' mitigation reduction performance is largely correlated to the national performance in mitigation reduction.

12.8 Sustainable development, co-benefits, trade-offs, and spill-over effects

Sustainable development (SD) is, and has always been, closely associated with human settlements. In fact, the very document that coined the phrase, the World Commission on Environment and Development (WCED) Report (WCED 1987), devoted a chapter to 'the urban challenge'. While averting the adverse social and environmental effects of climate change remains at the core of the urban challenge today, cities throughout the world also continue to struggle with a host of other critical challenges, including, for instance, ensuring access to clean, reliable and affordable energy services for their citizens (particularly for the urban poor); limiting congestion, noise, air and water pollution, and health and ecosystem damages; and maintaining sufficient employment opportunities and competitiveness in an increasingly globalized world.

Efforts to mitigate climate change will have important side-effects for these various policy objectives, as discussed in Sections 5.7, 6.6, 7.9, 8.7, 9.7, 10.8, 11.7 and 11.A.6. To the extent these side-effects are positive, they can be deemed 'co-benefits'; if adverse, they imply 'risks'.[3] As such side-effects are likely to materialize first in urban settings since these are the hubs of activity, commerce, and culture in

[3] Co-benefits and adverse side-effects describe co-effects without yet evaluating the net effect on overall social welfare. Please refer to the respective sections in the framing chapters as well as to the glossary in Annex I for concepts and definitions—particularly Sections 2.4, 3.6.3, and 4.8.2.

Table 12.6 | Potential co-benefits (green arrows) and adverse side-effects (orange arrows) of urban mitigation measures. Arrows pointing up/down denote a positive/negative effect on the respective objective or concern. The effects depend on local circumstances and the specific implementation strategy. For an assessment of macroeconomic, cross-sectoral effects associated with mitigation policies (e.g., on energy prices, consumption, growth, and trade), see Sections 3.9, 6.3.6, 13.2.2.3 and 14.4.2. Numbers correspond to references listed below the table.

Mitigation measures	Effect on additional objectives/concerns		
	Economic	Social (including health)	Environmental
Compact development and infrastructure	↑ Innovation and productivity[1] ↑↑ Higher rents & residential property values[2] ↑ Efficient resource use and delivery[5]	↑ Health from increased physical activity[3]	↑ Preservation of open space[4]
Increased accessibility	↑ Commute savings[6]	↑ Health from increased physical activity[3] ↑ Social interaction and mental health[7]	↑ Air quality and reduced ecosystem and health impacts[8]
Mixed land use	↑ Commute savings[6] ↑↑ Higher rents & residential property values[2]	↑ Health from increased physical activity[3] ↑ Social interaction and mental health[7]	↑ Air quality and reduced ecosystem and health impacts[8]

References: **1:** Ciccone and Hall (1996), Carlino et al. (2007); **2:** Mayer and Somerville (2000), Quigley and Raphael (2005), Glaeser et al. (2006), Koster and Rouwendal (2012); **3:** Handy et al. (2002), Frank et al. (2004, 2009), Heath et al. (2006), Forsyth et al. (2007), Owen et al. (2007); **4:** Brueckner (2000), Bengston et al. (2004), **5:** Speir and Stephenson (2002), Guhathakurta and Gober (2007); **6:** Krizek (2003), Cervero and Duncan (2006), Ma and Banister (2006), Day and Cervero (2010); **7:** Galea et al. (2005), Berke et al. (2007), Duncan et al. (2013); **8:** Campbell-Lendrum and Corvalán (2007), Creutzig and He (2009), Milner et al. (2012), Puppim de Oliveira et al. (2013).

the modern world: this section will focus on the literature specifically linked to urban settings and refer to other sections of the report where appropriate.

Action on climate change mitigation often depends on the ability to 'reframe' or 'localize' climate change with respect to the co-benefits that could be realized (Betsill, 2001). For example, in Canada "actions to reduce GHG emissions are also deeply connected to other goals and co-benefits such as human health improvements through improved air quality, cost savings, adaptability to real or potential vulnerabilities due to climate change, and overall improvements in short, medium and long-term urban sustainability" (Gore et al., 2009). Sometimes called 'localizing' or 'issue bundling' (Koehn, 2008), these reframing strategies have proven to be successful in marshalling local support and action in developing country cities, and will continue to be an important component of developing local capacity for mitigation (Puppim de Oliveira, 2009).

12.8.1 Urban air quality co-benefits

Worldwide, only 160 million people live in cities with truly clean air—that is, in compliance with World Health Organization (WHO) guidelines (Grubler et al., 2012) (Figure 12.23). Oxides of sulfur and nitrogen (SO_x and NO_x) and ozone (O_3)—i.e., outdoor air pollutants—are particularly problematic in cities because of high concentrations and exposures (Smith et al., 2012) (see Section 9.7 for a discussion of mitigation measures in the buildings sector on indoor air pollution and Section 7.9.2). Transport remains one of the biggest emitting sectors in the industrialized world. In developing countries, a wider range of sources is to blame, with vehicle emissions playing an ever increasing role also due to continuing urbanization trends (Kinney et al., 2011; Smith et al., 2012; see also Sections 5.3.5.1 and 8.2). In a study of four Indian megacities, for instance, gasoline and diesel vehicle emissions already comprise 20–50 % of fine particulate matter ($PM_{2.5}$) emissions (Chowdhury et al., 2007). The associated health burdens are particularly high in low-income communities due to high exposures and vulnerabilities (Campbell-Lendrum and Corvalán, 2007; Morello-Frosch et al., 2011).

Major air quality co-benefits can be achieved through mitigation actions in the urban context, especially in megacities in developing countries where outdoor air pollution tends to be higher than in urban centres in industrialized countries (Molina and Molina, 2004 and section 5.7). Urban planning strategies and other policies that promote cleaner fuels, transport mode shifting, energy cogeneration and waste heat recycling, buildings, transport and industry efficiency standards can all contribute to lower rates of respiratory and cardiovascular disease (improved human health) as well as decreased impacts on urban vegetation (enhanced ecosystems) via simultaneous reductions in co-emitted air pollutant species (Campbell-Lendrum and Corvalán, 2007; Creutzig and He, 2009; Milner et al., 2012; Puppim de Oliveira et al., 2013 and Sections 7.9, 8.7, 9.7, 10.8 as well as WGII AR5 Chapter 11.9).[4] Even an action like shading parking lots, which is generally thought of in the context of limiting the urban heat-island effect, can bring air pollution co-benefits through reductions in volatile organic compounds (VOC) and, thus, low-level ozone formation from parked vehicles (Scott et al., 1999).

[4] Monetized health co-benefits are found to be larger in developing countries than industrialized countries, a finding that results from the currently higher pollution levels of the former and, thus, the greater potential for improving health, particularly in the transport and household energy demand sectors (Markandya et al., 2009; Nemet et al., 2010; West et al., 2013 and Section 5.7).

In the near-term (2030), air quality co-benefits of stringent mitigation actions (i.e., in line with achieving 450 ppm CO_2eq by 2100) can be quite substantial in a highly urbanized region like Europe; decarbonization and energy efficiency (largely in transport) could reduce aggregate NO_x emissions by a further 38 % relative to a baseline scenario that includes current and planned air quality legislation by 2030 but does not consider climate policies (Colette et al., 2012). Similar co-benefits have been reported for other pollutants in other regions (Rao et al., 2013), particularly in developing Asia (Doll and Balaban, 2013; Puppim de Oliveira et al., 2013) (see Section 6.6). The potential for realizing these co-benefits depends on institutional frameworks and policy agendas at both the local and national level, as well as the interplay between the two (see Doll et al., 2013, and Jiang et al., 2013, for reviews of India and China). At the same time, the increasing role of decentralized power generation could lead to adverse air quality side-effects if this trend is not coupled with a more intensive use of low-carbon energy supply (Milner et al., 2012).

12.8.2 Energy security side-effects for urban energy systems

Mitigating climate change could have important side-effects for urban energy security (sufficient resources and resilient supply)—concerns that have re-emerged in many cities throughout the world in recent years (see Sections 6.6.2.1 and 7.9.1 for a broader discussion of energy security concerns). Perhaps the greatest energy-related vulnerability in this context is the fact that urban transport systems are at present almost entirely dependent on oil (Cherp et al., 2012). This is especially true in low-density areas where reliance on private vehicles is high (Levinson and Kumar, 1997). Therefore, any mitigation activities leading to a diversification of the transport sector away from oil could potentially also contribute to a security co-benefit (see Jewell et al., 2013 and other references in Chapter 8.7.1). Such measures might range from technology standards (e.g., for vehicles and their fuels) to integrated infrastructure, spatial planning, and mass transit policies (Sections 12.5 and 8.10). Energy efficiency regulations for buildings and industrial facilities (both existing and new) can also help to enhance the resilience of fuel and electricity distribution networks (see Chapters 9.7 and 10.8).

12.8.3 Health and socioeconomic co-benefits

Spatial planning and TOD can yield other positive side-effects that may enhance a city's liveability. For example, mass transit requires considerably less physical space than private automobiles (transit: 0.75–2.5 m^2/cap; auto: 21–28 m^2/cap) and generally emits less noise (Grubler et al., 2012), with health co-benefits in terms of cardiovascular disease and sleep disturbance (Kawada, 2011; Ndrepepa and Twardella, 2011 see also 8.7; Milner et al., 2012).

Neighbourhoods with walkable characteristics such as connectivity and proximity of destinations are correlated with higher frequency of physical activity among residents (Frank et al., 2004; Owen et al., 2007), which is correlated with lower symptoms and incidences of depression (Galea et al., 2005; Berke et al., 2007; Duncan et al., 2013).

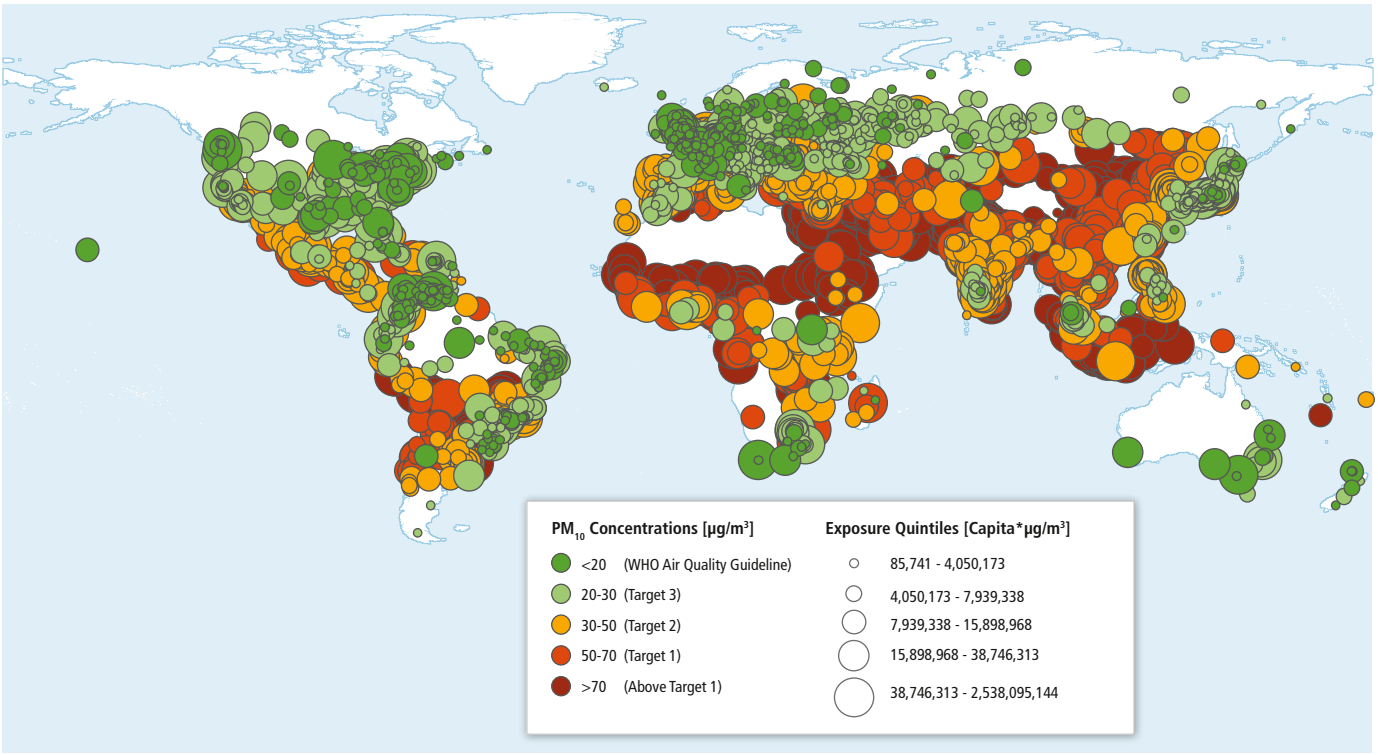


Figure 12.23 | Human risk exposure to PM_{10} pollution in 3200 cities worldwide. Source: Grubler et al.(2012) based on Doll (2009) and Doll and Pachauri (2010).

Compact neighbourhoods with more diversified land uses are correlated with higher housing prices and rents (Mayer and Somerville, 2000; Quigley and Raphael, 2005; Glaeser et al., 2006; Koster and Rouwendal, 2012). In a study of the Netherlands, neighbourhoods with more diverse land uses had a 2.5 % higher housing prices (Koster and Rouwendal, 2012).

12.8.4 Co-benefits of reducing the urban heat island effect

The urban heat island (UHI) effect presents a major challenge to urban sustainability (see WG II AR5 Chapter 8). Not only does UHI increase the use of energy for cooling buildings (and thus increasing the mitigation challenge) and thermal discomfort in urban areas, but UHI also increases smoggy days in urban areas, with smog health effects present above 32 °C (Akbari et al., 2001; O'Neill and Ebi, 2009; Mavrogianni et al., 2011; Rydin et al., 2012). Proven methods for cooling the urban environment include urban greening, increasing openness to allow cooling winds (Smith and Levermore, 2008), and using more 'cool' or reflective materials that absorb less solar radiation, i.e., increasing the albedo of the surfaces (Akbari et al, 2008; Akbari and Matthews, 2012). Reducing UHI is most effective when considered in conjunction with other environmental aspects of urban design, including solar/daylight control, ventilation and indoor environment, and streetscape (Yang et al., 2010). On a global scale, increasing albedos of urban roofs and paved surfaces is estimated to induce a negative radiative forcing equivalent to offsetting about 44 Gt of CO_2 emissions (Akbari et al., 2008).

Reducing summer heat in urban areas has several co-benefits. Electricity use in cities increases 2–4 % for each 1 °C increase in temperature, due to air conditioning use (Akbari et al., 2001). Lower temperatures reduce energy requirements for air conditioning (which may result in decreasing GHG emissions from electricity generation, depending upon the sources of electricity), reduce smog levels (Rosenfeld et al., 1998), and reduce the risk of morbidity and mortality due to heat and poor air quality (Harlan and Ruddell, 2011). Cool materials decrease the temperature of surfaces and increase the lifespan of building materials and pavements (Santero and Horvath, 2009; Synnefa et al., 2011).

The projected global mean surface temperature increases under climate change will disproportionally impact cities already affected by UHI, thereby increasing the energy requirements for cooling buildings and increasing urban carbon emissions, as well as air pollution (Mickley et al., 2004; Jacob and Winner, 2009). In addition, it is likely that cities will experience an increase in UHI as a result of projected increases in global mean surface temperature under climate change, which will result in additional global urban energy use, GHG emissions, and local air pollution. As reviewed here, studies indicate that several strategies are effective for decreasing the UHI. An effective strategy to mitigate UHI through increasing green spaces, however, can potentially conflict with a major urban climate change mitigation strategy, which is increasing densities to create more compact cities (Milner et al., 2012). This conflict illustrates the complexity of developing integrated and effective climate change policies for urban areas.

More generally, reducing UHI effects—either through mitigation measures (e.g., improved waste heat recycling, co-generation, use of reflective building materials, increased vegetation) or through mitigation—can have co-benefits for urban water supplies (e.g., cooling water for thermal or industrial plants, drinking water), given that evaporation losses rise as water bodies warm (Grubler et al., 2012).

12.9 Gaps in knowledge and data

This assessment highlights a number of key knowledge gaps:

- **Lack of consistent and comparable emissions data at local scales.** Although some emissions data collection efforts are underway, they have been undertaken primarily in large cities in developed countries. The lack of baseline data makes it particularly challenging to assess the urban share of global GHG emissions as well as develop urbanization and typologies and their emission pathways. Given the small number of city based estimates, more city data and research are needed, especially an urban emissions data system.

- **Little scientific understanding of the magnitude of the emissions reduction from altering urban form, and the emissions savings from integrated infrastructure and land use planning.** Furthermore, there is little understanding of how different aspects of urban form interact and affect emissions. The existing research on the impact of policies designed to achieve emissions reductions through urban form do not conform to the standards of policy evaluation and assessment defined in Chapter 15.

- **Lack of consistency and thus comparability on local emissions accounting methods.** Different accounting protocols yield significantly different results, making cross-city comparisons of emissions or climate action plans difficult. There is a need for standardized methodologies for local- or urban-level carbon accounting.

- **Few evaluations of urban climate action plans and their effectiveness.** There is no systematic accounting to evaluate the efficacy of city climate action plans (Zimmerman and Faris, 2011). Studies that have examined city climate action plans conclude that they are unlikely to have significant impact on reducing overall emissions (Stone et al., 2012; Millard-Ball, 2012a). Another major limitation to local or city climate action plans is their limited

coordination across city sectors and administrative/hierarchical levels of governance and lack of explicitly incorporating land-based mitigation strategies. Successful local climate action plans will require coordination, integration, and partnerships among community organizations, local government, state and federal agencies, and international organizations (Yalçın and Lefèvre, 2012; Zeemering, 2012).

- **Lack of scientific understanding of how cities can prioritize climate change mitigation strategies, local actions, investments, and policy responses that are locally relevant.** Some cities will be facing critical vulnerability challenges, while other will be in the 'red zone' for their high levels of emissions. Local decision-makers need clarity on where to focus their actions, and to avoid spending resources and efforts on policies and investments that are not essential. There is little scientific basis for identifying the right mix of policy responses to address local and urban level mitigation and adaptation. Policy packages will be determined based on the characteristics of individual cities and their urbanization and development pathways, as well as on forecasts of future climate and urbanization. They will be aimed at flexing the urban- and settlement-related 'drivers' of emissions and vulnerability in order to ensure a less carbon-intensive and more resilient future for cities.

- **Large uncertainties as to how cities will develop in the future.** There is robust scientific evidence that emissions vary across cities and that urban form and infrastructure play large roles in determining the relationship between urbanization and emissions.

12.10 Frequently Asked Questions

FAQ 12.1 Why is the IPCC including a new chapter on human settlements and spatial planning? Isn't this covered in the individual sectoral chapters?

Urbanization is a global megatrend that is transforming societies. Today, more than 50 % of the world population lives in urban areas. By 2050, the global urban population is expected to increase by between 2.5 to 3 billion, corresponding to 64 % to 69 % of the world population. By mid-century, more urban areas and infrastructure will be built than currently exist. The kinds of towns, cities, and urban agglomerations that ultimately emerge over the coming decades will have a critical impact on energy use and carbon emissions. The Fourth Assessment Report (AR4) of the IPCC did not have a chapter on human settlements or urban areas. Urban areas were addressed through the lens of individual sector chapters. Since the publication of AR4, there has been a growing recognition of the significant contribution of urban areas to GHG emissions, their potential role in mitigating them, and a multifold increase in the corresponding scientific literature.

FAQ 12.2 What is the urban share of global energy and GHG emissions?

The exact share of urban energy and GHG emissions varies with emission accounting frameworks and definitions. Urban areas account for 67–76 % of global energy use and 71–76 % of global energy-related CO_2 emissions. Using Scope1 accounting, urban share of global CO_2 emissions is about 44 %.

Urban areas account for between 53 % and 87 % (central estimate, 76 %) of CO_2 emissions from global final energy use and between 30 % and 56 % (central estimate, 43 %) of global primary energy related CO_2 emissions.

FAQ 12.3 What is the potential of human settlements to mitigate climate change?

Drivers of urban GHG emissions can be categorized into four major groups: economic geography and income, socio-demographic factors, technology, and infrastructure and urban form. Of these, the first three groups have been examined in greatest detail, and income is consistently shown to exert a high influence on urban GHG emissions. Socio-demographic drivers are of medium importance in rapidly growing cities, technology is a driver of high importance, and infrastructure and urban form are of medium to high importance as drivers of emissions. Key urban form drivers of GHG emissions are density, land use mix, connectivity, and accessibility. These factors are interrelated and interdependent. As such, none of them in isolation are sufficient for lower emissions.

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Amy Harvey

From: Jeanette Coffin
Sent: Wednesday, May 26, 2021 9:36 AM
To: Karen Hurka Richardson
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: AURA

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Karen Hurka Richardson [mailto:karenhurka@hotmail.com]
Sent: Wednesday, May 26, 2021 8:46 AM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: AURA

Dear Mayor Hemminger and Town Council,

As UNC alumni, long-term CH residents, former business owners on Franklin St., and lovers of this beautiful town, we write to express our strong disapproval of the AURA development proposed for the corner of Estes and MLK. It is clear that this development will have multiple negative impacts on our community, most obviously increasing traffic congestion and contributing to environmental degradation. We realize you are under pressure to create economic growth in Chapel Hill, but this must be balanced with protecting not only

the charm and scale of the town but also the environment. We are in the midst of a global environmental crisis, and we encourage the town to adopt more progressive approaches to this issue. One compromise that might be considered in this case is to require this developer to build green. This will not solve the traffic issues, but at least might be one way forward.

If you continue to allow building construction at the current rate, CH will lose its character - the very reason people want to live here - and people will eventually choose other places to live.

Please consider the sincere concerns your residents have about this proposed development. The negatives seem to outweigh the positives.

Sincerely,
Ryan and Karen Richardson

Amy Harvey

From: Jeanette Coffin
Sent: Wednesday, May 26, 2021 9:36 AM
To: Estes Neighbors
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: AURA and what we neighbors can do

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
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Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

-----Original Message-----
From: Estes Neighbors [mailto:info@estesneighbors.org]
Sent: Tuesday, May 25, 2021 9:14 PM
To: Lynn Wilson <lynnswildhearth@gmail.com>
Cc: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Re: AURA and what we neighbors can do

Hi Lynn

Parents drive their kids to Estes and Phillips on the way to work, commuters from Carrboro use Estes to get on I- 40, and a hundred other reasons. Because Aura has supplied so many parking places residents won't be encouraged to use a bike or a bus. The G bus no longer runs on Estes. Roads need to remain uncongested so emergency vehicles can administer to people with a health crisis and get them to a hospital.

Neighborhood residents participated in a huge planning process in 2013 - 14 to plan for this area called the Central West Plan. We recommended a multi use bike path that will be built this summer. We also recommended more turning lanes at the Estes/MLK intersection to relieve existing congestion. However Aura's extra 3000 trips per day will cancel all those gains out and when more development is added traffic will be worse again.

It would be nice to walk everywhere but it won't happen when people live miles from school or miles from work. Estes remains one of the few cross connectors in town and one that we want to remain mobile and safe.

Estes Neighbors

> On May 18, 2021, at 11:15 AM, Lynn Wilson <lynnswildhearth@gmail.com> wrote:
>
> I'm wondering what we neighbors can do to reduce traffic on Estes Drive … and whether the new development can include services that make walking or biking easier for us… possibly including walking-biking options safe for the school kids … and the elders moving in to Azalea. I'd love to be able to walk to a grocery store there … or eat out at a community-focused place (like Weaver Street Market is in Carrboro)! A Community Pharmacy and a bank would be an asset too. I'm SUPER glad to hear that a new bike-way is planned for the MLK-Estes intersection. Thank you!
>
> WHY are we doing so much driving up and down Estes?
>
> Lynn Wilson
> 208 Justice Street
>

Amy Harvey

From: Jeanette Coffin
Sent: Wednesday, May 26, 2021 9:43 AM
To: Dan Levine
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: OCAHC Provisional Support of AURA (to Council and the Housing Advisory Board)

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Dan Levine [mailto:Dan.Levine@self-help.org]
Sent: Tuesday, May 25, 2021 7:25 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>; Advisory Boards <advisoryboards@townofchapelhill.org>; Manager <manager@townofchapelhill.org>
Cc: Jennifer Player <jplayer@orangehabitat.org>
Subject: RE: OCAHC Provisional Support of AURA (to Council and the Housing Advisory Board)

Dear Mayor Hemminger, Town Council, Housing Advisory Board, and Manager Jones,

Jennifer (Ccd) and I received a summary table showing the new AURA affordable housing proposal today. We have not had a chance to review the proposal with the full OCAHC membership, nor will we be able to before Wednesday's public meeting, so we cannot formally endorse the plan on behalf of the Coalition. That said, Jennifer and I believe that the proposal—especially Option 2 that includes 36 total affordable units on site, including 20 rentals at 65% AMI plus 9 at

80% AMI and 7 townhomes for sale at 80% AMI—is consistent with OCAHC's position that affordable housing be provided on site and that affordable rentals be targeted primarily to lower-income households such as those at/below 65% AMI.

We note that the total affordable rental unit count (47 previously) and the number of 65% AMI rentals (previously ~24, or half of the total) has decreased in this latest proposal compared to the most recent proposal of which we were aware. We do not know the context for this proposed reduction in affordable units, but we recognize that providing affordable housing has a significant financial impact to the developer-owner and that doing so on site may be an additional challenge. Thus, based on the summary information we have seen, Jennifer and I think the current AURA proposal represents a reasonable and meaningful commitment to affordable housing. We trust that the Town will conduct appropriate due diligence on this proposal, including understanding the developer's rationale for the reduced affordable unit count. We also trust that the Town will ensure that units for low-income households are made available at truly affordable rates (e.g., recognizing utility allowances for rentals), income-restricted for the long-term through legally enforceable mechanisms, made available only to non-student households, allow portable rental vouchers, and so forth as we previously described in our May 10, 2021 advocacy letter.

In short, we look forward to seeing AURA move forward with a detailed, binding affordable housing plan that includes a level of affordability such as that currently proposed by AURA's development team.

Sincerely,

Dan Levine & Jennifer Player (2021 OCAHC Co-Chairs)

From: Dan Levine
Sent: Monday, May 10, 2021 3:15 PM
To: mayorandcouncil@townofchapelhill.org; advisoryboards@townofchapelhill.org; manager@townofchapelhill.org
Cc: Jennifer Player <jplayer@orangehabitat.org>
Subject: OCAHC Provisional Support of AURA (to Council and the Housing Advisory Board)

Dear Mayor Hemminger, Town Council, and Housing Advisory Board (Cc Manager Jones),

Please forward this email and the attached Orange County Affordable Housing Coalition letter related to the housing development proposed at AURA to all Council members and members of the Housing Advisory Board.

As detailed in the attachment, our support is contingent on the developer's housing plan including both affordable homeownership on site and affordable rental/ownership commitments being enforceable to address the key points we've identified, such as excluding full-time student households and ensuring that rental prices reflect utility allowances.

On behalf of the OCAHC, with best regards,

Dan Levine & Jennifer Player (2021 OCAHC Co-Chairs)

Amy Harvey

From: Jeanette Coffin
Sent: Wednesday, May 26, 2021 11:47 AM
To: Carolyn Leith
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Turn down the Aura development!!

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Carolyn Leith [mailto:carolyn.i.leith@gmail.com]
Sent: Wednesday, May 26, 2021 11:28 AM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Turn down the Aura development!!

Dear Mayor and Town Councillors,

I am counting on you to develop a vision for the entire Estes/MLK area that will enhance the town and not further degrade it. There are so many reasons to turn down Aura. We need reduced traffic—not more—on Estes Drive!!!(1) We need to encourage bus and SAFE bike travel.(2) We need reduced hard surfaces to protect existing structures, and Bolin and Booker creeks from flooding and erosion (3). We need a smaller development with affordable housing and condos.(4) We need services to walk to in this area!(5)

And the proposed Aura Development fails on all these community needs. Vote it down! Below you will see my supporting evidence for my statements above.

Sincerely,
Carolyn Leith
1601 Halifax Road

(1) I live on a small private road off Estes Drive and getting to Franklin Street is a left turn for us. At times, this means waiting many minutes and making a quick left turn with a prayer that the oncoming traffic will see us and slow down.
(2) Whatever happened to the planned bike path on Estes? Will the G bus route partially on Estes continue to run? Why isn't there an East/West bus route that runs the entire length of Estes all the way to Carrboro?
(3) On our road, debris carried by heavy rainfall regularly blocks the drain. When this happens, the water has no place to go but to wash down our dirt road and erode it. I have noticed that other drains on Estes Drive are similarly blocked. The water has to go somewhere—the town needs to limit hard surfaces and prevent flooding.
(4) With this bus plan for MLK, we need affordable units there, on site, so that it is possible for those residents to live without the need of a car. To cut down parking, could Zip Cars be made available for use in this area?
(5) Services we can walk, bike, or ride a bus to are needed in the area—consider how well Southern Village functions. How about some Loft apartments over businesses? We need community gathering spaces with trees and gardens, and restaurants on MLK.

Amy Harvey

From: Jeanette Coffin
Sent: Wednesday, May 26, 2021 1:32 PM
To: Kimberly Sanchez
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: CHT comments regarding Aura's updated affordable housing proposal

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Kimberly Sanchez [mailto:ksanchez@communityhometrust.org]
Sent: Wednesday, May 26, 2021 12:49 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Cc: Susana Dancy <sdancy@rockwood.llc>; Loryn Clark <lclark@townofchapelhill.org>
Subject: CHT comments regarding Aura's updated affordable housing proposal

Good afternoon

Community Home Trust has reviewed Aura's updated affordable housing plan and is pleased to see the proposal of seven (7) townhomes built on site. With this inclusion, we are supportive of the plan. We have not yet received any specific information related to the size or makeup of the townhomes, where they will be placed on site, and other logistics related to homeowner's experience and CHT would ask Council to consider asking the developer to make a few of the townhomes accessible to persons at 65% AMI. CHT supports either

proposal that includes more rentals at 60% than 80%. On behalf of CHT and its homeowners who have benefited from this Council's tireless consideration of increasing homes in new developments as affordable to this community's workforce, we are grateful and appreciative for your hard work.

KIMBERLY SANCHEZ, JD
Executive Director
919.967.1545 x307
ksanchez@communityhometrust.org

PO Box 2315
Chapel Hill, NC 27515

communityhometrust.org

Amy Harvey

From: Jeanette Coffin
Sent: Wednesday, May 26, 2021 2:15 PM
To: Charles Humble
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Residual concerns re Aura approval

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Charles Humble [mailto:chashumble@gmail.com]
Sent: Wednesday, May 26, 2021 2:13 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Residual concerns re Aura approval

Dear Mayor and Council Members:

On the May 12th Council Meeting call I was taken aback by the remarks of Commenter #2, a supporter of Aura and neighbor but not a fan of The Estes Neighbors' alliance. He rents in the Estes area and dismissed Aura opponents as "anti-renters and NIMBY's". These comments get old, but I don't want to hold # 2's youth and inexperience against him. Instead, let's focus on the problems he and others do not want to address: stormwater and traffic, 2 issues too often given short shrift by our local deciders.

I am not an Estes Neighbor. I live downhill in Briarcliff close to the junction of Booker and Bolin Creeks. Just before my wife and I closed on our house in 1993 we learned the 100 Year Flood Plain had been redrawn to include the lower tip of our property. Multiple "100 Year Floods" since 1993 have damaged 5 homes close to where we live. At our last call I learned that owners of properties down slope from the proposed Aura site are already having to deal with substantial flooding from the original clear cut. I find it hard to discount their remarks, worry about added runoff from the current plan for Aura and worry again for my neighbors in Briarcliff. Please insist that everything that can be done to lessen runoff from so much new impervious surface at the top of this watershed is done.

I find it even harder to discount the concerns re increased traffic along Estes. We have all watched these problems grow over the decades. Driving my daughter to Phillips 25 years ago was hard; it must be nuts now even without the proposed developments nearby. I worked for years in Public Health where all students are required to take Biostatistics because data are supposed to drive decisions. Let's use them for town-altering decisions, too. The long-requested town-wide Traffic Impact Model does not yet have enough data for firm conclusions re any disruptions that could flow from construction of Aura as proposed. Sadly, not all our town staff are concerned by this. I hope the calls for a more complete TIA can convince you to wait before approving the Aura application in its present form.

Thank you for your time,

Charles Humble
910 Emory Drive
Chapel Hill, NC 27517
919-423-5355

Amy Harvey

From: Jeanette Coffin
Sent: Thursday, May 27, 2021 10:38 AM
To: ritamarie.may@gmail.com
Cc: Colleen Willger; Dwight Bassett; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: FW: Response to Aura proposal

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Rita Marie May <ritamarie.may@gmail.com>
Sent: Thursday, May 27, 2021 9:54 AM
To: Amy Harvey <aharvey@townofchapelhill.org>
Subject: Response to Aura proposal

Dear Ms Harvey,
I submit the following for Chapel Hill records.

Since February, the local representatives of Texas-based Trinsic, have put forward a marketing campaign that does not hold up to examination.

Among the marketing ploys these property managers and real estate brokers, who have already brought the Council the Sheetz and Storage company project just up the street from the proposed Aura project, have spun to portray the proposed Aura project include:

1. A Transit Oriented Development (TOD)
Not with 650 parking spaces. Short term or paid for by residents, parking slots are room for cars which, at this level Aura will not fulfill the Federal definition as TOD. Additionally, from Aura, there would be only one direction a bus passenger might go, north and south on Martin Luther King Blvd.

2. A "Third Place" where folks would want to go and hang out.
In order to make this a reality, I would suggest a Microbrewery, which might be crowded into the 12500 sq ft of retail space allotted by the developer.

Otherwise Aura will be a concrete jungle, a heat sink in summer, a wind tunnel in winter. However, one cannot deny they plan a nice dog run.

3. A student-free zone with floor plans that will discourage student renters.
As long as UNC continues to sidestep its housing crisis, nothing will or should discourage student renters.

Students in need of housing, with the credit ratings and wherewithal to afford the luxury rates sharing with similar students should not be discriminated against because of their parent's residency status.

4. Aura's office/municipal set-backs, when completed, will be **safe** for pedestrians, cyclists and drivers. We know because the TIA told us so.
Chapel Hill is home to a great University -- and also the **NC Highway Safety Research Center**. Why was this esteemed organization not brought in by Council to evaluate this new computerized model?

Regarding Pedestrian Safety… The TIA told us nothing regarding pedestrians, crossing guards, or cyclists. Each Council member must remember just **who the travelers on N. Estes are**.

With an Estes Elementary school and a Phillips Middle School, a Daycare, the YMCA and the Library on this short corridor, children and young families clearly use this road more than any other crosstown artery in Town.

By relying now for this important decision at a critical crossroads, on a new, unvalidated computer model with obvious "bugs" that may just need time to be corrected to reflect reality accurately, the Council does a disservice to the community. The TIA model, its accuracy and limitations, should be calmly addressed before any final decision to add 2,960 motor trips in/out of the proposed Aura project. Rushing this process corrupts the model's ultimate validity and is indefensible.

The NC DOT has pointed out that the current data is inadequate at this time to warrant stop light additions or changes on N. Estes and Somerset. This alone should cause Council to hesitate in order to get more relevant data and validate the TIA.

If Council decides to believe in a nascent TIA to determine the safety of this project, it is gambling with the lives of our young families, and the lives of our children.

But overall, I would ask what or who is behind this rush to approval of this project that benefits a few and not our local community?

Respectfully submitted,
Rita M May

Amy Harvey

From: Jeanette Coffin
Sent: Thursday, May 27, 2021 10:39 AM
To: Erin Pearson
Cc: Colleen Willger; Dwight Bassett; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Aura Project: Retail and Affordable Housing Distribution

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Erin Pearson [mailto:erin.pearson@gmail.com]
Sent: Thursday, May 27, 2021 9:13 AM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Aura Project: Retail and Affordable Housing Distribution

Dear Mayor and Councilmembers,

Thank you for working hard to ensure the Aura project meets the needs of a growing and changing Chapel Hill. At the meeting last night it was clear that you are listening to resident feedback and (even more encouragingly) that the developer is listening to you. As someone who is new to participating in city government, I feel encouraged by the sense that residents are truly heard.

I left last night's meeting with two key concerns, and I urge you to take them into account as you move to final

consideration of the Aura project.

1) Retail Space and the Neighborhood's "Urban" Future

When I first got my job at Elon University, my husband and I had a difficult time deciding where to move. For the preceding five years, we had prioritized walkability in our housing choices—seeking mixed use neighborhoods where we could eat, drink, and shop without getting in our cars. We hoped to find similar walkability when we moved to North Carolina, and that focus led us to choose Greensboro over Chapel Hill because we thought we'd be able to find a house within walking distance of its downtown, which featured great restaurants, interesting bars, and a fantastic bookstore. We couldn't escape the draw of Chapel Hill, however—its schools, public library, and biking trails in particular—and after a year renting in Greensboro, we ended up buying a house in Coker Hills in 2018.

The prospect of having a truly mixed use development—one that is thoughtfully designed to include the kind of retail that my family would walk or bike to—is thrilling. I love living in and raising my family in Chapel Hill, but I dearly miss that kind of urban walkability. Aura represents an opportunity to thoughtfully develop this neighborhood into the kind of place that attracts those who love to walk, bike, and support local businesses. Currently, if we want to walk to a restaurant or store, we have to walk to a strip mall (or hotel). I believe Aura could be a smaller scale Southern Village (as so many have pointed out), where the retail is thoughtfully integrated into an inviting environment, rather than an afterthought.

Unfortunately, I fear that the new focus on retail "flexibility" in the Aura project is a fig leaf to cover the developer's refusal to create the kind of retail space that would meaningfully transform the development (and surrounding neighborhoods) into a vibrant, truly mixed use space. It sounds like a compromise, but I am hard pressed to imagine any landlord with lucrative residential rents in hand choosing to convert them to retail space. I urge you to either require the 30,000 square feet of retail space up front as a condition for approval, or to set clear, mandatory, and independently verifiable conditions under which the additional retail space would be triggered for conversion, with specific consequences if the developer or subsequent owner fails to comply.

2) Affordable Housing

I am gratified that your efforts have resulted in increased affordable housing on site. In listening to Susana Dancy's comments last night, however, I became concerned that there was a plan to keep all those units in the same section of the development ("near the bus station.") I urge you to insist that affordable housing units be distributed evenly throughout the development. You were right to ask that they be indistinguishable from the outside; it is also imperative that their location doesn't become de facto segregation.

Thank you for your consideration, and for everything you do for the city.

Sincerely,
Erin Pearson
1712 Michaux Road
617-407-9174

Amy Harvey

From: Jeanette Coffin
Sent: Thursday, May 27, 2021 10:40 AM
To: Wamiq Chowdhury
Cc: Colleen Willger; Dwight Bassett; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: In support of Aura

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Wamiq Chowdhury [mailto:wamiq.chowdhury@gmail.com]
Sent: Wednesday, May 26, 2021 10:51 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>; All Agenda Materials <allclerk@townofchapelhill.org>
Subject: In support of Aura

Dear Town Council members,

I listened to tonight's portion of the meeting on Aura with great interest. I am a millennial renter who is deeply invested in increasing rental stock in the area, as I love it here and want to stay here, but am quickly getting priced out. I moved here from Long Beach, CA almost 3 years ago, and my rent for my next lease will be higher than what I paid in Long Beach. It's a problem if rents in our area are lagging only three years behind urban Southern California. I spoke at the last meeting, focusing mostly on the environmental benefits of the Aura project as I see it. I was not able to speak tonight, but wanted to reiterate my thoughts and respond to some of

the arguments I heard tonight.

First of all, on the environmental points - I certainly agree that the project could be better. That said, I can't see how this project doesn't reduce Chapel Hill's reliance on cars. The argument about the reduction in the tree canopy discourages walking and biking doesn't make sense to me - the site has already been cleared. We know trees will be planted as part of the project. We all are well aware of how the Aura development will contribute to vital walking and biking paths in the area, especially the crucial Estes Drive Connectivity project. As the North South BRT line is implemented, we know there will be commercial development, which will give people something to walk, bike, or bus to, and we know that Aura will help encourage progress on the bus line. This is the kind of development that people like me who want to reduce our reliance on cars have been hoping for.

On the affordability point - I am very grateful that the council has pushed for improvements on this front. I agree that Aura could be much more affordable. I really wish there were options for more affordable units. I would strongly urge the Council to choose the option with the most units at 65%, as the 80% level is really not affordable at all considering our high AMI. I encourage much more aggressive approaches to affordable housing in general (which I know is easier said than done). For me to really be satisfied with the affordability of a project of this size, I would need to see at least 50 units at 50% AMI. That said, having any affordable units at all is an improvement on our current situation, and Aura plainly has that. Each affordable unit we add helps alleviate the pressures faced by potential low income residents of Chapel Hill, and if I heard correctly tonight, we now will have affordable units that will be available for sale onsite. On these points alone I think Aura is vital for Chapel Hill.

I have to say on a personal note, it's quite difficult to listen to arguments that renters don't contribute to our economy and that we need to increase the proportion of homeowners in Chapel Hill. What we need more than anything right now is dense housing development. The demand is clearly there. The supply is not. I am absolutely all for encouraging pathways to home ownership - I hope to be able to buy a home here within a few years. I would strongly recommend that we explore additional community land trust developments as a way to give renters an ownership interest in their homes while helping prepare us for home ownership - the research on the effectiveness of this model is very strong, and we obviously have successful local examples of the model as well. Of course I don't wish to censor anyone's views, but I think it's important to take note that hearing these relentless arguments against renters in these meetings likely contributes to renters' willingness to participate in these kinds of processes.

I trust that the council has in mind that the folks opposing Aura are the same folks who always have their views very loudly represented in these meetings, while younger, lower income, diverse folks like myself who share my views are not as loud (for myriad reasons - as a local organizer I am trying to address this among my people, but it's an uphill battle - though you may have noticed that more of us are regularly showing up to Town Council and Planning Commission meetings lately). I hope that you will listen to us, as relatively younger people who deeply hope to make this area our forever home.

I appreciate your public service. I know these are always contentious processes, and I admire your dedication to careful consideration of these important issues for Chapel Hill's future.

Best,
Wamiq Chowdhury

Amy Harvey

From: Jeanette Coffin
Sent: Thursday, May 27, 2021 10:40 AM
To: Carr, Tim
Cc: Colleen Willger; Dwight Bassett; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: YMCA Perspective on Aura

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

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Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Carr, Tim [mailto:Tim.Carr@YMCATriangle.org]
Sent: Wednesday, May 26, 2021 10:14 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Cc: Perry, Forrest <Forrest.Perry@YMCATriangle.org>; Dan Jewell <djewell@cjtpa.com>
Subject: YMCA Perspective on Aura

Mayor and Council, apologies for running long tonight. Included below is what was intended to be conveyed.

The pandemic brought challenges to our communities, our schools, our friends and neighbors, and for our Y, forcing us to make incredibly difficult decisions. And while we still feel the ramifications of the pandemic throughout our community - in our personal lives and our YMCA – our service to each other, our community and those who need us most, in many ways, is stronger than ever. We call this "**Mission Strong**" as we seek to build community where our services are needed most.

Consistent with this philosophy, we have participated in the various meetings and public hearings about the Aura development. We've also been engaged with community organizers to better understand all aspects of the development impacts. These are many of the folks who are loyal members of the Y, and who stayed with us even when their use of our facilities was significantly diminished. Certainly, after traversing the pandemic we know that growth depends on our willingness to pivot and embrace change.

The Chapel Hill-Carrboro YMCA also participated in the development of the Central West Plan. After participating in recent discussions about the Town-wide Traffic Model, we are encouraged by the proposed implementation of the transportation planning component of the Central West Plan that adds a new connector street from the back of our property to align with the new Aura driveway at Estes.

The Y of the Triangle determined in 2017 after an extensive site review process considering multiple locations throughout the Town and led by local volunteers and Y staff, that our services are best provided to the Chapel Hill-Carrboro community at our current location at 980 MLK. **This commitment is somewhat based on the potential of the Central West Plan and the vibrancy of the Town's plans for this area, including the proposed Aura development.**

A SUP put in place for our property in 2000 directed the CHCY to address traffic flow across our site with a connection to Estes as necessary to meet Town planning requirements. Land was acquired to do this, which runs parallel with the Duke Energy easement. Our site master plan, finalized in 2017, reflects this access point and as we understand, the Central West Plan moves that connection as part of a connector street to align with the Aura driveway at Estes.

We encourage the Town to consider building this connector street sooner than later. We also recognize that the Y of the Triangle may be the developer that initiates that process when we (hopefully) commence a facility rebuild in the next few years as part of our master plan implementation. Until that time, we conclude that the traffic improvements made by the Town and Aura appear to relieve much of the current congestion and any that the Y might contribute as it grows.

If I might add one comment from the earlier discussion. The pandemic has strengthened the Y's aptitude to pivot wellness programs like moving group exercise outside. In fact, our DT Durham Y has and will continue to program Durham's Central Park for this use. The Y could be a collaborator to similarly program the green space in the Aura development, as we know outdoor fitness is here to stay.

On behalf of the CHCY, thank you again for the opportunity to speak tonight!

Tim Carr, CFM
Senior Vice President
Real Estate Development & Facility Management

YMCA OF THE TRIANGLE
ASSOCIATION RESOURCE CENTER
801 Corporate Center Drive, Suite 200, Raleigh, NC 27607
919-345-5596 | Tim.Carr@YMCATriangle.org
YMCATriangle.org | @YMCATriangle

The Y. For a Better Us.

Amy Harvey

From: Jeanette Coffin
Sent: Thursday, May 27, 2021 12:49 PM
To: Rudy Juliano
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Kumar Neppalli; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Estes traffic safety

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

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Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Rudy Juliano [mailto:rudyjuliano@hotmail.com]
Sent: Thursday, May 27, 2021 12:22 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Estes traffic safety

Dear Mayor and Council Members,

At the May 26 Public Hearing I was shocked to learn that several council members seem willing to move ahead with the Aura project even though the safety issues at the Aura /Estes driveway have not been addressed. At the hearing the DOT representative made it very clear that there will be no new stoplight on Estes. Council seems unwilling to consider the right turn only option, so now

there is no real mitigation in sight for the issue of dangerous left turns from the Aura driveway. Does Council really have such a cavalier attitude about public safety?

If I understand it correctly the only feeble attempt at safety at the site is a signalized pedestrian crossing. However, what will be the impact of that crossing on traffic flow on Estes? The traffic consultant paints a glowing picture of smooth movement on Estes after the street improvements are made. But did the consultant factor in pedestrian crossings? I think not. Auto traffic and pedestrian traffic are likely to peak at the same rush hour times. Picture the impact of multiple pedestrians crossing the street on westbound Estes traffic at 6PM- the queues will back up all the way to Franklin Street.

I believe that it would be highly irresponsible for Council to approve the Aura project unless there is a realistic solution to the traffic safety problems on Estes. Please do not put your constituent's safety at risk for the sake of a project that has some virtues but many flaws as well.

RL Juliano

Chapel Hill

Amy Harvey

From: Jeanette Coffin
Sent: Thursday, May 27, 2021 12:49 PM
To: Spencer
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Aura Development

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

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Jeanette Coffin

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Office Assistant
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405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Spencer [mailto:spencer321@protonmail.com]
Sent: Thursday, May 27, 2021 12:16 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Aura Development

Dear Town Council,

We are writing to express our concern about the Aura plan to build a large apartment complex at the corner of Estes and MLK. We drive by that intersection multiple times each day — taking our children to/from school at Estes Hills Elementary and Phillips Middle School, commuting to work at the UNC School of Medicine, and simply moving about town.

The intersection is already quite busy, especially during “rush hours” when cars backup on both MLK and Estes. We imagine that adding a large complex like Aura will severely exacerbate the situation, not to mention it will also adversely affect the local environment (runoff, noise, etc.).

We hope you seriously consider feedback from those of us who live, work, and attend school in this section of Town.

Thank you for all you do to help make Chapel Hill such a wonderful place.

Spencer & Emily Dorn

Amy Harvey

From: Jeanette Coffin
Sent: Thursday, May 27, 2021 1:29 PM
To: Carol Krucoff
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Comments on Aura -- Public Safety Hazard!

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

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Office Assistant
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405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Carol Krucoff [mailto:ckrucoff@gmail.com]
Sent: Thursday, May 27, 2021 1:06 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Comments on Aura -- Public Safety Hazard!

Dear Mayor and Council Members,

We've lived in Coker Hills (off Somerset Drive) since 1988 and have seen the traffic on Estes become increasingly congested. With the construction of Azalea Estes, turning left out of our neighborhood--from Somerset drive onto Estes--has become even more difficult, like taking your life into your hands! Sometimes it's so bad that, even though I'm headed east (a left turn), I'll turn right and go west--then take a circuitous route to get to the Post Office or Bank or University Place rather than risk my life by trying a left turn. . .

I've attended several of the Aura-related meetings Via Zoom -- and even though experts have said the traffic would be even worse (giving our intersection a failing grade of "F") I'm stunned that it appears this project will get approval.

This project offers NOTHING to our family and our neighbors, but headaches. PLEASE DO NOT APPROVE IT!!!

Thank you,

Carol Krucoff

Carol Krucoff, C-IAYT, E-RYT 500
Author, *Yoga Sparks: 108 Easy Practices for Stress Relief in a Minute or Less*
Co-Author, *Relax into Yoga for Seniors: A Six-Week Program for Strength, Balance, Flexibility and Pain Relief*
(919) 260-4374 cell
www.healingmoves.com

Amy Harvey

From: Jeanette Coffin
Sent: Thursday, May 27, 2021 2:56 PM
To: magritte88@yahoo.com
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: FW: Public comment - 5-26-21 Town Council meeting
Attachments: 5-26 Council Wrapup 3 mins.docx

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

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Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Steve Fleck <magritte88@yahoo.com>
Sent: Thursday, May 27, 2021 7:28 AM
To: Amy Harvey <aharvey@townofchapelhill.org>
Cc: EstesNeighbors1 <estesneighbors@gaggle.email>
Subject: Public comment - 5-26-21 Town Council meeting

Dear Ms. Harvey,

Would you please be so kind as to add the attached document to public comments on the Aura rezoning proposal discussion from yesterday evening? It is a slightly enlarged version of what I could squeeze into 2 minutes.

On behalf of Estes Neighbors, thank you in advance,

Steve Fleck (Mt. Bolus)

To Mayor Hemminger and Town Council
May 27, 2021
Public comment on the Aura development proposal on behalf of the Estes Neighbors group

1. The Town's stormwater runoff analysis has been done by Trinsic's very own conditional zoning applicant of record, McAdams. Dr. Scott Buck has indicated manifest shortcomings in their stormwater analysis, already reflected in the real experiences of neighbors to north, northeast, and south of this property since it was clearcut. Trinsic has not remotely planned for the '500 year storms' we've seen twice in the last few years but only 25, until just before yesterday's Council meeting, also for a 50 year stormwater runoff – and simply mentioning, but still far from fully meeting the ESAB's 100 year stipulation. Are we really that amnesiac, that backward-looking?

Also: extensive blasting would be needed (like for Azalea Estates, but far of far greater extent) if 419 housing units and an underground garage with stormwater reservoir are to be sunk where granitic formations lie about ten feet or less sub-surface (Phil Bradley, NC Geographic Survey). Neighboring building foundations already attained by increased stormwater runoffs could be further endangered – but is anyone paying attention to the recorded geology of the site? It appears not.

2. Traffic safety and congestion concerns and the townwide model's preliminary state have been detailed by distinguished researchers — specialists of using statistical modeling. Our town engineer has been handicapped here by inadequate support, thus necessitating manual data entry that has obviated obtaining the thousands of iterations necessary for fully valid model testing.

Furthermore, vehicles filling Trinsic's proposed 650 parking spaces, claimed to be necessary for financing, would only aggravate these problems and in fact bely the developer's claim to being transit oriented – and probably reducing BRT financing likelihood.

3. The proposed density entails two problems: first, the need for more luxury apartments is far from clear. In February David Laube of Noell Consulting found fully a third of such units vacant. Trinsic would surely make up any shortage in rentals with affluent students. In any case, despite the town's mantra of affordable housing, the "forgotten middle" remains forgotten by this overwhelmingly rental project, which would do almost nothing to foster homeownership, the most necessary basis for developing intergenerational prosperity.

4. This town's historic charm has been seriously disfigured in recent years by so many cookiecutter, downright ugly apartment buildings put up all over town. Trinsic's design is of a piece with such buildings — and in scale and design, completely out of place in this neighborhood. Yet in this covid time of staff shortages, delays and overwork, various Trinsic representatives have noted how helpful Town staff have been in aiding their quest for rezoning to OI-3. Indeed, this project has clearly been fast-tracked toward approval with substantial support from the Town. Why is this?

5. Overall, the Aura proposal looks like a giant riverboat gamble, and its safety, environmental, social and infrastructure costs would be borne by citizens for many years to come.

We therefore respectfully call on the Council to reject Trinsic's application as it stands, *unless* it significantly reduces its

impermeable surface and scale, *and* meets in reality, not just in promises, the tough conditions that the various boards and commissions have voted. Failure to do so would put one developer's interests above those of the town.

Respectfully submitted,

Steve Fleck on behalf of Estes Neighbors

Amy Harvey

From: Jeanette Coffin
Sent: Thursday, May 27, 2021 3:25 PM
To: Megan Foureman
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Another vote against Aura!

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Again, thank you for your message.

Sincerely,

Jeanette Coffin

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Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

-----Original Message-----
From: Megan Foureman [mailto:meganfoureman@gmail.com]
Sent: Thursday, May 27, 2021 3:08 PM
To: Pam Hemminger <phemminger@townofchapelhill.org>; Michael Parker <mparker@townofchapelhill.org>; Karen Stegman <kstegman@townofchapelhill.org>; Hongbin Gu <hgu@townofchapelhill.org>; Amy Ryan <aryan@townofchapelhill.org>; tai.tr.huynh@gmail.com; pshemminger@gmail.com; jcooperanderson@gmail.com; Hongbin Gu <hongbin.gu@gmail.com>; allenbuansi23@gmail.com; Maurice Jones <mjones@townofchapelhill.org>; Colleen Willger <cwillger@townofchapelhill.org>; Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Another vote against Aura!

External email: Don't click links or attachments from unknown senders. To check or report forward to reportspam@townofchapelhill.org

Hello. I spoke at the council meeting last evening and wanted to also follow up with you today.

Last night, I shared with you my perceptions of the safety issues on Estes Drive over the past 10+ years that I have lived on that road. I recalled the time I invested during the Central West planning process as well as my continued disappointment over the ensuing years as the promised road improvements just keep getting pushed back and pushed aside again and again.

And then appeared Azalea Estates BEFORE the road improvements even though that was promised not to happen. And now, there is the prospect of Aura….the development that is poised to obliterate any and all improvements in traffic flow and safety just at the moment when we might have started to see improvements.

Last night, I was disappointed and even embarrassed at the tone of the conversation between the developers and the council members. So deferential. So meek. So apologetic. Almost as if it is US who must please THEM. Almost as if council does not realize what an asset their own town is. Why is council seemingly willing to serve this area of town up on a silver platter? I have never witnessed such feeble negotiations!

A few examples:
1) Any number of times when true data-driven concerns were brought forth. Then Jewell says that it's not actually the case and that we needn't worry. And council says: OK, thank you very much.
2) Any number of times when Jewell 'gives' little gifts to the town…things that were clearly built into the negotiation process and meant to be bargained over. And council says: OK, thank you very much.
3) Concern over seemingly incorrect number of "affordable" units included. This was a matter of simple math. And yet the council member is so apologetic in her presentation that her voice actually increases in pitch and trails off before the end of sentence to such an extent that she can barely even be heard in her apologies.
4) Concern over lack of shading on roof of parking garage. Jewell replies that there will be planters. Council says, OK, thank you very much. Have planters on a rooftop ever provided shade? Can any reasonable person accept that as a response?

This is NOT the sort of council that I want representing me. I want a council that defends our very reasonable zoning laws. I want a council that is reasonably skeptical over data presented to them by the developer. I want a council who will stand up for our local environment and demand that any newcomers show respect for this beautiful natural area that many of us have worked so tirelessly to upkeep. I want a council who acts as if they themselves are the experts on their town rather than letting some out-of-state developer tell them what is best for their town. I want a council that STANDS BY THEIR COMMITMENT TO DO THE BARE MINIMUM TO KEEP MY CHILDREN SAFE AS THEY TRAVEL TO & FROM SCHOOL. BARE MINIMUM!

I have spoken respectfully on these topics for many years. But honestly, after the behavior that I witnessed last night, I am losing respect for this council.

We deserve better from you. This developer deserves NOTHING from you. You all seem to keep getting these facts backwards.

Come on, council and mayor. It is high time that you did the right thing for your town here.

Megan Foureman
Estes Drive homeowner, frontline healthcare worker, voter, mother, small business owner, trail runner, resident of Chapel Hill who used to be proud of her town

Amy Harvey

From: Jeanette Coffin
Sent: Thursday, May 27, 2021 4:05 PM
To: D Corea
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Question re Aura water discharge to the North at Town Council meeting (5/26)

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: D Corea [mailto:dccorea@gmail.com]
Sent: Thursday, May 27, 2021 3:26 PM
To: Alisha Goldstein <agoldstein@townofchapelhill.org>
Cc: Sean Gleason <gleason@mcadamsco.com>; Judy Johnson <jjohnson@townofchapelhill.org>; Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Question re Aura water discharge to the North at Town Council meeting (5/26)

Hi Alisha

We live in the Coker Woods subdivision which is North of the proposed Aura development.
We have a question re the Points Of Analysis, specifically POA #5 and POA #6, that you referred to during the Aura presentation yesterday (5/26 7pm). In your presentation, you mentioned that POA 5 and POA 6 would discharge to the North.

As you are aware, in an earlier meeting that we had with you, Judy and Sean, we discussed the flooding problems with the water coming to our foundation and entering our crawl space after the trees were harvested. Sean showed us and explained the proposed regrading and assured us that the discharge from Aura to the North would be less than the discharge prior to the harvesting of the trees from the lot.

Can you please clarify that this is still the case and that the water discharge from POA 5 and POA 6 will not be flowing toward Coker Woods or our foundation?

We look forward to hearing from you.

Thanks!

Dileeni & Gehan Corea

Amy Harvey

From: Jeanette Coffin
Sent: Friday, May 28, 2021 9:07 AM
To: Megan Foureman
Cc: Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Our Estes crossing guards

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

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Jeanette Coffin

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Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Megan Foureman [mailto:meganfoureman@gmail.com]
Sent: Thursday, May 27, 2021 10:24 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Our Estes crossing guards

Greetings, mayor and council.

I have reached out to two of the crossing guards who have worked in front of the Estes Drive schools for many years. These two deserve the admiration and respect of our entire community. They certainly have mine.

Please access the links to hear their very heartfelt messages spoken directly to council regarding the Aura proposal. It will only take you a few moments. They were eager for the opportunity to be heard.

https://share.icloud.com/photos/0eKU3YGrfq-aCdjeU1fn2KTPg

https://share.icloud.com/photos/0YSbfVyawhd9HxCEEETN-zlfg

Megan

Amy Harvey

From: Jeanette Coffin
Sent: Friday, May 28, 2021 9:09 AM
To: info@estesneighbors.org
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Flo Miller; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: FW: For public record - AUR public hearing
Attachments: signatures-109020.pdf

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Estes Neighbors [mailto:info@estesneighbors.org]
Sent: Thursday, May 27, 2021 10:11 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: For public record - AUR public hearing

Mayor and Town Council

Estes Neighbors is proud to deliver to you a petition - 460 signatures so far - that asks you to keep Estes Drive moving by rejecting the AURA plan.

Keep Estes Drive Moving — Vote Against Aura Rezoning

Published by Julie McClintock on 30th Jan 2021

Here are our major concerns with this rezoning request:

• Estes Drive is a major east-west local and regional connector that is presently operating beyond capacity;
• Residents, library users, church goers, commuters, neighbors, students, and teachers depend on Estes Drive mobility;
• These high residential densities contribute to the traffic and the number of cars at a major busy intersection;
• Using Bus Rapid Transit along MLK Jr Blvd., one of Town's goals, is undermined by proposing 650 new parking spots;
• Proposing 3% retail/commercial component won't enhance a walkable and vibrant destination or bring community benefits;
• The tree canopy so necessary to air quality and prized by Chapel Hill residents will disappear.;
• Permitting 60% of the lot to be impervious will cause flooding to neighboring properties.

We the undersigned call on the Chapel Hill Mayor and Town Council to reject the conditional zoning request for the property located at Estes Drive and MLK Jr. Blvd. Future applications must meet the density numbers and Town traffic mobility standards as recommended in the Central West Small Area Plan.

#	First name	Last name	Address	City	State	Date
1	Rita	May	102 Sycamore Dr	Chapel hill	North Carolina	Jan 30, 2021
2	Betsey	Wu	122 Woodshire Ln.	Chapel Hill	NC	Jan 30, 2021
3	Yue	Wu		Chapel Hill	North Carolina	Jan 30, 2021
4	Hong	Zhan		Chapel Hill	NC	Jan 30, 2021
5	Xiaodong	Wang		Chapel Hill	NC	Jan 31, 2021
6	Jill and Dick	Blackburn		Chapel Hill	NC	Jan 31, 2021
7	Julie	McClintock		Chapel Hill		Jan 31, 2021
8	Fred	Lampe	1710 Michaux	Chapel Hill	NC	Jan 31, 2021
9	Amy	Gladfelter		Chapel Hill	NC	Feb 01, 2021
10	Joey	Sinreich	55 Cedar Street	Chapel Hill	NC	Feb 01, 2021
11	Diantha	Pinner	12 Mt Bolus Rd	Chapel Hill	North Carolina	Feb 01, 2021
12	Jane	Chang	123 Woodshire Ln, Chapel Hill, NC 27514	Chapel Hill	NC	Feb 01, 2021
	Also concern for our safety, privacy, noise and light pollution.					
13	Michael	Lazarus	235 Mount Bolus road	Chapel Hill	US	Feb 01, 2021
	This will basically cut off Estes as a route for us to go antwhere. I am totally opposed to a large apartment complex on the corners of MLK and Estes.					
14	Karen	Lazarus	235 Mount Bolus road	Chapel Hill	US	Feb 01, 2021
	Estes drive is overloaded now. The town is out of control with building, cutting down trees, and covering all grounds with concrete. And with the new bus line why do they need 600 new parking spaces. You are ruining our town.					
15	Kathy	Rogers	110 Woodshire Lane	Chapel Hill	NC	Feb 01, 2021
	I oppose this development given its size and impact on the MLK/Estes Drive traffic.					
16	Erin	Jackson	1712 Michaux Rd.	Chapel Hill	NC	Feb 01, 2021
17	Ian	Jackson	1712 Michaux Rd.	Chapel Hill	NC	Feb 01, 2021
18	Judith	Bergman	11 Mount Bolus Rd	Chapel Hill	NC	Feb 01, 2021
	This looks as ugly as the student housing on Hillsborough and the Eubanks Road city. MLK Road is one of the nicer parts of town, but will soon become just another highway.					
19	Roger	Shumate	105 Pointe Place	Hillsborough	NC	Feb 02, 2021
20	Susan	Balog	1160 Pinehurst dr	Chapel Hill	NC	Feb 03, 2021
21	Rebecca	Margolese-Malin	5 Balsam Court	Chapel Hill	North Carolina	Feb 03, 2021
	Estes Drive is a narrow street with no room for expansion. We use it to get to the library, to friends living in the neighborhoods off Estes Dr. and to get to Franklin Street from our house in the Timberlyne neighborhood. It can not handle more traffic. And there are other places to build.					
22	Julieq	Daniels	212 huntington drive	Chapel Hill	North Carolina	Feb 03, 2021
23	Jane S.	Gabin	118;Standish Drive	Chapel Hill	North Carolina	Feb 03, 2021
	Too much of Chapel Hill has become overcrowded and impassable. A development like this belongs at the EDGE of town, not in a residential district! I object to this use of the available parcel.					
24	James	Lutz	609 Long Leaf Dr	Chapel Hill	NC	Feb 03, 2021
25	joel	bulkley	311 granville rd.	chapel hill	NC	Feb 05, 2021
26	Joan	Guilkey	246 Glandon Dr	Chapel Hill	NC	Feb 06, 2021
27	Charles	Berlin		Chapel Hill	NC	Feb 06, 2021
28	Molly	McConnell		Chapel Hill	NC	Feb 06, 2021
	the last thing Estes Drive needs is 423 residential units and 658 parking spaces needing to enter & travel on Estes! It defies both common sense and public safety!					
29	Carol	Verner	120 taylor st	Chapel Hill	NC	Feb 06, 2021
	The impact on our already congested intersection is part of my objection, but the true issue is safety, followed by disruption of school and residential needs at MLK and Estes. The proposed mega-unit building could easily be built further from this inside belt of Chapel Hill. Reject this proposal! Many thanks!					
30	Lynda	Haake	2519 Buxton ct	Chapel Hill	North Carolina	Feb 06, 2021
	We the undersigned call on the Chapel Hill Mayor and Town Council to reject the conditional zoning request for the property located at Estes Drive and MLK Jr. Blvd. Future applications must meet the density numbers and Town traffic mobility standards as recommended in the Central West Small Area Plan.					

#	First name	Last name	Address	City	State	Date
31	Ellen	Boylan	1306 Willow Drive	Chapel Hill		Feb 07, 2021
32	Adrienne	Madry	133 Brookberry Circle	Chapel Hill	North Carolina	Feb 07, 2021
33	Amanda	Fox	209 Hickory Forest Rd	Chapel Hill	NC	Feb 07, 2021
34	Jordynn	Jack	505 Weaver Mine Trail	Chapel Hill	North Carolina	Feb 08, 2021
	Estes Drive is already a busy street with multiple city destinations. In addition to the places mentioned here, we rely on Estes to get to and from swim team practices at the YMCA. More traffic on this corner would make this commute difficult. We don't need another high density development right in town.					
35	David	Adams	1700 Ferrell Rd	Chapel Hill	Orange County, NC	Feb 08, 2021
	As a resident affected by Blue Hill development, I can attest that traffic congestion, stormwater control and lack of affordable housing are all community costs that are being ignored.					
36	Paula	Gildner	804 Ward street	Chapel Hill	NC	Feb 08, 2021
37	Gary	Baum	105 Windsor Circle	Chapel Hill	NC	Feb 08, 2021
	It is requested that this project be denied permitting. This project will restrict mobility along an already congested main cross town artery. Estes travels from Fordham Blvd, crosses Franklin Street all the way to Carrboro. Estes as well as MLK will be burdened with additional traffic. Points of congestion already include the schools on Estes, the intersections at Estes and MLK, the public library on Estes and the Franklin Street intersection. Congestion is a public safety hazard, Recognize that there is only one lane in each direction on Estes thus preventing emergency vehicle from getting to residences along the Estes Corridor. Congestion creates economic / transportation hardship. In addition this project reduces the Chapel Hill tree canopy and is a visual blight in our town, among other concerns. In short it negatively affects the quality of life for all of Chapel Hill residents and visitors. It is requested that this project be rejected by the Town Council and the Mayor. Thank you in advance for heading this request.					
38	Jordan	Rosado	29 Rogerson Dr	Chapel Hill	NC	Feb 08, 2021
39	Ellen	Parker	113 mill run drIve	Chapel Hill	NC	Feb 08, 2021
40	Susan	Gerard	337 Burlage cir	Chapel hill	North carolina	Feb 10, 2021
41	Kip	Gerard	337 Burlage circle	Chapel hill	North carolina	Feb 10, 2021
42	Carol	Krucoff	237 Huntington Drive	Chapel Hill	North Carolina	Feb 10, 2021
	It's already dangerous to try and go left out of Somerset onto Estes--more cars will intensify this problem!					
43	Betty	Bouldin	203 Huntington Drive	Chapel Hill	North Carolina	Feb 10, 2021
44	Bill and Anne	Brashear	1606 Ferrell Rd	Chapel Hill	NC	Feb 10, 2021
45	Thomas	Bouldin	203 Huntington Drive	Chapel Hill	North Carolina	Feb 10, 2021
46	Scott	Buck	208 Huntington Dr.	Chapel Hill	NC	Feb 10, 2021
47	Mike	Gabriel	12 Mount Bolus Road	Chapel Hill	NC	Feb 10, 2021
	The traffic study does not inspire confidence. There also impacts of noise, pollution that do not appear to have been assessed. Does the town leadership really believe increasing population density along the MLK corrider is a 'good idea?' If so, why?					
48	M.	Rees	750 Weaver Dairy Rd Apt 170	Chapel Hill	North Carolina	Feb 11, 2021
	We need more affordable housing which this does not seem to include. Also there is too much density.					
49	Robert	Epting	410 MLK Jr. Blvd	Chapel Hill	NC	Feb 11, 2021
50	Mary Frances	Vogler	17 Rogerson Drive	Chapel Hill	NC	Feb 11, 2021
	The impact on traffic alone would be catastrophic. Ditto for the visual impact. Wasn’t a similar proposal recently voted down by Council for many of the right reasons?					
51	Lindsay	Garrison	Kirkwood Drive	Chapel Hill	NC	Feb 11, 2021
	Another overblown development that will add too much traffic, too much density, and, not providing sufficient affordable housing.					
52	Tom	Henkel	3 Mount Bolus Rd.	Chapel Hill	NC	Feb 11, 2021
	I believe that this property should be developed in accordance with the original Small Area Plan which was devised several years ago with much neighborhood input.					
53	toby	galinkin	112 Justice St	Chapel Hill	NC	Feb 11, 2021
	WE DO NOTNEED THIS..STOP THE BUILDING MADNESS AND START THINKING ABOUT THE PRESENT RESIDENTS OF CHAPEL HILL RATHER THAN THE DEVELOPERS WHO ARE ROBBING THIS TOWN OF LAND AND CHARM.					
54	Judith	Shaver	245 Indian Trail Road	Chapel Hill	NC	Feb 11, 2021
55	Catherine	Lavau	605 shady lawn road	chapel hill		Feb 11, 2021
56	Holly	Grant	265 Severin St	Chapel Hill	NC	Feb 11, 2021
	Please vote against this development. We can and must do better.					
57	Nancy	Lane	786 Weiner	Chapel Hill	North Carolina	Feb 11, 2021

#	First name	Last name	Address	City	State	Date
58	Celia	Baitinger	706 Williams Circle	Chapel Hill		Feb 11, 2021
	A development of this size is a very bad idea for a corner that already has high traffic and a limited left turn waiting line for traffic heading toward downtown Chapel Hill. It is also very close to Phillips Middle School and Estes Hills Elementary, both of which generate high traffic in the mornings and afternoons.					
59	Michael	McVaugh	379 Tenney Circle	Chapel Hill	North Carolina	Feb 11, 2021
60	Leslie	Gura	2441 Springview Trail	Chapel Hill	NC	Feb 11, 2021
	Please do not make a mockery of the prior community work on this parcel. Traffic study required, too much parking. No low income units, little non-residential interest, Environmental and aesthetic damage. None of this is what most of us want for our community.					
61	Julia	McVaugh	379 Tenney Cir	Chapel Hill	NC	Feb 11, 2021
62	Diane	Willis	411 Landerwood Ln.	Chapel Hill	NC	Feb 12, 2021
	Follow the approved Small Area Plan for Central West. Require many fewer parking spaces since this development is on the BRT route. Require (incentivize) affordable units in this complex. Estes Drive is overly used as is, and this development will overwhelmingly increase the traffic problems on Estes.					
63	Kevin	O'Donnell	808 Ward St	Chapel Hill	NC	Feb 12, 2021
	This development would exacerbate the current traffic problem at the MLK Jr Blvd and Estes Dr intersection. It would also cause more potential flooding because of impervious parking lot installation, to nearby areas, which are already flood-prone. Instead, please consider the installation of a thoughtfully-designed roundabout at this intersection.					
64	Amanda	Kyser	404 Laurel Hill Rd.	Chapel Hill	N.C.	Feb 12, 2021
65	Suzanne	Hack	1033 Arborgate Circle	Chapel Hill	NC	Feb 13, 2021
	Major traffic concerns					
66	David	Tuttle	200 N. Estes Dr.	Chapel Hill	North Carolina	Feb 15, 2021
67	RL	Juliano	408 Lyons Road	Chapel Hill	NC	Feb 15, 2021
68	Kim	Williams	407 Tramore Dr	Carrboro (but Chapel Hill mailing address)	North Carolina	Feb 18, 2021
69	Linda	Houseman	2004 Fireside Drive	Chapel Hill	NC	Feb 18, 2021
70	Isabel	Calingaert	39 Clover Drive	Chapel Hill	North Carolina	Feb 19, 2021
71	Helen	Tauchen	107 HUNTINGTON DRIVE	Chapel Hill	North Carolina	Feb 19, 2021
72	Robert	Clark	3 Maple Drive	Chapel Hill		Feb 19, 2021
73	Megan	Foureman		Chapel Hill		Feb 19, 2021
74	Jason	Foureman		Chapel Hill		Feb 19, 2021
75	Chris	Lynch	315 Burlage Circle	Chapel Hill	NC	Feb 19, 2021
76	Randall	Roden	501 E Franklin Street	Chapel Hill	NC	Feb 19, 2021
77	Glen	Elder	219 Huntington Drive	Chapel HIll	North Carolina	Feb 20, 2021
78	Sandy	Turbeville	219 Huntington Drive	Chapel Hill	North Carolina	Feb 20, 2021
79	Kristin	Webb	105 Deerwood Court	Chapel Hill	NC	Feb 20, 2021
	I work at the corner of Franklin & Estes. Traffic is already a nightmare at Estes & MLK. This plan is insulting, and the developer is being wilfully blind to the realities of life in our town.					
80	Nikolai	Skiba	115 Bolinwood Dr	Chapel Hill	North Carolina	Feb 21, 2021
	it is absolutely obvious that Aura development in this place will throw traffic at this place in a chaos. I totally oppose construction of Aura development at the corner of ML:K BLVD and N.Estes Dr.					
81	Juliet	Holland	103 Shelton Street	Carrboro	NC	Feb 22, 2021
82	Thomas	Shea	1 Buttons Rd	Chapel Hill	NC	Feb 22, 2021
	Density on Estes Drive needs to be minimized to allow a busy intersection and conduit between East Chapel Hill and North Chapel Hill to continue to be functional.					
83	Elise	Fradin	204 Huntington Drive	Chapel Hill	North Carolina	Feb 23, 2021
84	Mark	Fradin	204 Huntington Drive	Chapel Hill	North Carolina	Feb 23, 2021
85	Gwendolyn	Lamb	2 Wysteria Way	Chapel Hill	NC	Feb 23, 2021
86	Patrick	Nagle	304 Clayton Road	Chapel Hill	NC	Feb 25, 2021
87	Bill	Langston	400 N. Elliott Rd.	Chapel Hill	NC	Feb 25, 2021
88	Jessica	Beardsley	209 Wood Cir	Chapel Hill	NC	Feb 25, 2021

#	First name	Last name	Address	City	State	Date
89	Eugene	Bozymski	407 Lyons Rd.	Chapel Hill	NC	Feb 25, 2021
	Do you ever travel on Estes Drive ?					
90	Theresa	Raphael-Grimm	234 Huntington Dr.	Chapel Hill	NC	Mar 01, 2021
	This proposal is an outrageous violation of the Central West Area Plan. Approving such an oversized, nothingbutprofit-driven plan for over-development is also a violation of the public's trust in our elected officials. We need increased commercial space, decreased density, decreased parking, and strict alignment with the Central West Plan. How many times will we need to tell the town council the same thing?					
91	S	Viswanathan		Chapel Hill		Mar 01, 2021
92	Clara	Hess	104 Huntington Drive	Chapel Hill	NC	Mar 01, 2021
	Please do not allow this rezoning to go forward. The city and community does not need this type of development and it would increase the already burdened traffic on Estes @MLK.					
93	Floyd	Wike	207 Huntington Dr	Chapel Hill	NC	Mar 01, 2021
	Please maintain the integrity of the Central West Small Area Plan by rejecting the rezoning application for the proposed development of the northeast corner of Estes and MLK.					
94	James	Bettman	213 Huntington Drive	Chapel Hill	North Carolina	Mar 01, 2021
95	Victoria	Wike	207 Huntington Drive	Chapel Hill	NC	Mar 01, 2021
96	Robin	Damsky	120 Maple Drive	Chapel Hill	North Carolina	Mar 01, 2021
97	Samuel	Horiwitz	100 Huntington Drive	Chapel Hil	NC	Mar 01, 2021
	My concerns about traffic on Estes Drive were not adequately addressed by the recent traffic study. Among other shortcomings, that study did not address safe access from Somerset. In addition, the current plan does not address potential flooding as forested area is replaced with impervious surfaces					
98	George	Tauchen	107 Huntington	Chapel HIll	North Carolina	Mar 01, 2021
99	Bethany	Maynard	1307 Maxeben Way	Chapel Hill	NC	Mar 01, 2021
	Too much impact on an already strained infrastructure. Also, we cannot afford to keep losing tree canopy! We need more green space, not massive developments					
100	Marcia	Vaughn	206 Somerset Drive, 27514	Chapel Hill	NC	Mar 01, 2021
101	robert	vaughn	206 SOMERSET DR	CHAPEL HILL	NC	Mar 02, 2021
102	Michael	Greenwald	120 Maple Drive	Chapel Hill	NC	Mar 02, 2021
103	Betsey	Fortlouis	306 N. Elliott Road	Chapel Hill	NC	Mar 02, 2021
104	Holly	Cartner	224 Huntington Drive	Chapel Hill	NC	Mar 02, 2021
	We the undersigned call on the Chapel Hill Mayor and Town Council to reject the conditional zoning request for the property located at Estes Drive and MLK Jr. Blvd. Future applications must meet the density numbers and Town traffic mobility standards as recommended in the Central West Small Area Plan. We live very close to this proposed development and already have a very difficult time exiting out of our neighborhood at certain times of the day. It is dangerous to make left turns onto Estes (crossing both lanes of traffic) during rush hour. We need you to take the traffic and environmental concerns more seriously and to address them BEFORE approving any rezoning request.					
105	James	Cundiff	222 Huntington Dr	Chapel Hill	NC	Mar 02, 2021
	The traffic problem on Estes Drive would need to be completely resolved before I would ever be in favor of supporting the addition of population density to that area.					
106	Linda	Brown	116 Woodbridge Ln	Chapel Hill	NC	Mar 02, 2021
107	Howard	Zellman	108 Porter Place	Chapel Hill	NC	Mar 02, 2021
108	Michael	Kline	235 Huntington Dr	Chapel Hill	NC	Mar 03, 2021
	Traffic on Estes Drive has already been problematic for years between Franklin St and MLK Blvd. Traffic patterns during the pandemic are not reflective of normal congestion. Flooding is also problematic and already well understood as an issue in the town.					
109	Debra	Gold	103 Huntington Dr.	Chapel Hill	North Carolina	Mar 03, 2021
110	Avram	Gold	103 Huntington Dr.	Chapel Hill	North Carolina	Mar 03, 2021
111	Sara	Roscoe	6 Timberlyne Rd	Chapel Hill	NC	Mar 03, 2021
112	Susan	Zeisel	644 Rock Creek Rd	Chapel Hill	North Carolina	Mar 04, 2021
	This project meets no goals of local planning. Traffic is already a nightmare on Estes drive - backed up from Franklin Street all the way to MLK during busy times. I see no plans to widen Estes Drive to meet traffic needs. It is too dense and has no community benefits such as parks. I strongly object to this project.					
113	FARZIN	BARAZANDEH	311 BURLAGE CIRCLE	CHAPEL HILL	NC	Mar 04, 2021
	We live off of Estes Drive. My children go to schools on Estes Drive. We certainly oppose this development and whoever votes for it.					
114	David	Lanier	411 Clayton Road	Chapel Hill	NC	Mar 04, 2021
115	Kathleen	Clarke-Pearson	105 Porter Place	Chapel Hill	North Carolina	Mar 04, 2021

#	First name	Last name	Address	City	State	Date
	Please reject the conditional zoning request for the Estes Hill/MLK Jr. property. This is already such a HIGH traffic density area. Come on, Town Council, we don't have to develop so many areas....Leave some green space at that area.....Many of us would pay a bit more tax to preserve some natural beauty in CH.					
116	Ed	Blount	411 Clayton Rd	Chapel Hill	NC	Mar 05, 2021
	We already have a large complex that was recently built on Estes near MLK Dr.. There are 2 schools that would be effected by this new project. Mayor Hemminger and The Town Council school not allow more development.					
117	Linze	Cerese	Barclay Road	Chapel Hill		Mar 06, 2021
	I totally disagree with this project. It will produce more traffic more pollution and the rentals will be totally unaffordable. There is too much building already going on. I say no to this project					
118	Joan	Bettman	213 Huntington Drive	Chapel Hill	North Carolina	Mar 06, 2021
119	Alicia	Vila	731 Williams Circle	Chapel Hill	NC	Mar 06, 2021
	I have lived in this areas for 30 years, and I am very concerned about the traffic on Estes Dr, Also, as an educator of the CHCCS I am concerned about the state of the adjacent schools, EHES and Phillips Middle, and their already crowded classrooms in those very outdated buildings. A plan needs to be drawn for those Elementary and Middle schools. What would those students' numbers look like when such huge apartment and condo buildings would be erected? What plan is there for our schools, students and families? Why hasn't the city purchased that land for more space for our students? A green space with trees and walk ways, protecting the adjacent neighborhoods from flooding, for the community of all ages to benefit, a green space right in town as it has been provided in many huge cities around the world, a great example Central Park in NYC.					
120	Hui	Ding	125 Woodshire Ln	CHAPEL HILL	NC	Mar 07, 2021
	The development did not consider all the negative impacts of the proposal to the neighboring communities and environment.					
121	Mike	Schaefer		Chapel Hill	NC	Mar 07, 2021
122	Stacy	Hewitt	804 Ward street	Chapel hill	Nc	Mar 07, 2021
	Signature for stopping Aura development.					
123	Stella	Waugh	116 Meadowbrook Drive	Chapel Hill	NC	Mar 08, 2021
124	Frederick	Brooks	413 Granville Road	Chapel HIll	NC	Mar 08, 2021
	I can scarcely imagine the ruinous impact of Aura traffic on our area. This project has no place in this part of CH. Loss of trees, loss of natural land will be terrible.					
125	Tao	Li	123 Woodshire Ln	Chapel Hill	NC	Mar 08, 2021
	North area buffer should match Coker Woods community buffer 25 feet.					
126	Claudia	Liuzza	611 Rock Creek Rd	Chapel Hill	NC	Mar 08, 2021
127	Watson	Bowes	211 Huntington Drive	Chapel Hill	North Carolina	Mar 08, 2021
128	Jonathan	Cope	207 Justice St	Chapel Hill	NC	Mar 08, 2021
129	jianbin	li	119 Woodshire Lane	Chapel Hill	NC	Mar 08, 2021
130	Firoz	Mistry	113 HAMPSHIRE PL	CHAPEL HILL	NC	Mar 08, 2021
131	Firoza	Mistry	113 Hampshire Place	Chapel Hill	North Carolina	Mar 08, 2021
132	Dan	Bruce	719 Caswell Rd	Chapel Hill	NC, Orange County	Mar 09, 2021
	Say No to Aura					
133	Sarah	Greene	222 HUNTINGTON DR, --	CHAPEL HILL	NC	Mar 09, 2021
134	Tyler	Felgenhauer	325 Ridgecrest Drive	Chapel Hill	NC	Mar 10, 2021
135	Lorene	Perry	324 Woodhaven Rd	Chapel Hill	NC	Mar 10, 2021
	These multi use several story buildings are ruining the landscape of Chapel Hill. Estes Drive is already so congested it has to be dangerous to the two schools on the road.					
136	Dave	Sidor	109 Hanover Place	Chapel Hill	NC	Mar 10, 2021
	The proposed retail component is disgracefully low.					
137	Mae	Henderson	124 Ironwoods Drive	Chapel Hill	NC	Mar 10, 2021
138	Daphne	Shafer-Repass	101 BURLWOOD PL	CHAPEL HILL	N. Carolina	Mar 10, 2021
139	Phoebe	Simon	221 Ironwoods Dr	Chapel Hill	NC	Mar 10, 2021
	This is a huge concern for the strain it will put on traffic, schools, and the overall community feel of this area.					
140	Jay	Morton	114 Meadowbrook Dr.	Chapel Hill		Mar 10, 2021
141	Diane	Pozefsky	2100 Tadley Dr.	Chapel Hill	NC	Mar 10, 2021

#	First name	Last name	Address	City	State	Date
142	gary	marks	1905 S Lakeshore Dr	Chapel Hill	NC	Mar 10, 2021
	please think about the effects of this development on the quality of life for those living in Chapel Hill					
143	Mark	Pozefsky	2100 Tadley Drive	Chapel Hill	North Carolina	Mar 10, 2021
	traffic already a problem in that area, this project will drastically increase congestion. major impact to appearance and nature already; additional building will exacerbate.					
144	Mary	Kaiser	2112 Markham Drive	Chapel Hill	North Carolina	Mar 11, 2021
145	Arden	Kane	1908 s lakeshore dr	Chapel hill	Nc	Mar 11, 2021
146	Winston	Blake	203 B Justice Street	Chapel Hill	North Carolina	Mar 11, 2021
	While I recognize that there's an affordable housing crisis in Chapel Hill, this doesn't strike me as the sort of development that would be accessible to lower-income families.					
147	Laura	Shadburn	107 MEADOWBROOK DR	Chapel Hill		Mar 11, 2021
	I appeal very strongly against this proposed development that will seriously impact traffic, high flooding potential and congestion. Thoughts on a nice park instead?					
148	Paul L	Shadburn	107 MEADOWBROOK DR	Chapel Hill		Mar 11, 2021
	I strongly appeal this proposal to build yet another development that CH does not need. Parks, trees, trails would bring more vitality to this town than another development.					
149	Amey	Miller	2020 S. Lakeshore	Chapel Hill	NC	Mar 12, 2021
150	David	Kiel	2020 South Lakeshore Drive	Chapel Hill	North Carolina	Mar 13, 2021
	It's perplexing and disturbing that the Town is not following through on commitments made for studies and is ignoring its own plan for the area adopted with citizen input. There is such a history of Council and staff disregard for commitments made to citizens. Please change this pattern by rejecting this zoning request.					
151	Craig	Anderson	247 Severin St	Chapel Hill	Nc	Mar 13, 2021
152	Janet	Lack	829 Shady Lawn Rd	Chapel Hill	NC	Mar 13, 2021
153	Cynthia	Kastner	925 Shady Lawn Road Ext. , Unit B	Chapel Hill	NC	Mar 13, 2021
154	Adrianne	Gibilisco	2113 N LAKESHORE DR	Chapel Hill	NY	Mar 13, 2021
	Allowing this rezoning request will destroy the integrity of our neighborhood, cause irreversible damage to our infrastructure, increase traffic, and add to pollution. It would be IRRESPONSIBLE to allow this to take place.					
155	Sherry	Jones	109 Emerywood Place	Chapel Hill	NC	Mar 13, 2021
156	Margaret	Bentley	817 Shady Lawn Rd	Chapel Hill	North Carolina	Mar 13, 2021
	This is ugly! There is no architectural merit to this, plan. There is very very minimal green space, buildings right up to the the two streets, and the traffic will be a nightmare.					
157	Neil	Rifenbark		Chapel Hill		Mar 14, 2021
158	Rowena	Mason	864 Shady Lawn Dr.	Chapel Hill	NC	Mar 14, 2021
	This housing is too dense for our environment. Compare to Shadow Wood next door. Apartments that are too dense easily turn into slums.					
159	Nick	Strange	510 Caswell Rd.	Chapel Hill	NC	Mar 14, 2021
160	Rosemary	Resler	301 St Thomas Dr	Chapel Hill	NC	Mar 14, 2021
	T					
161	Debbie	LaMay	303 Hoot Owl Lane	Chapel Hill	North Carolina	Mar 14, 2021
	I live along Bolin Creek, and my yard floods constantly, without this additional development. Aura will make flooding much worse.					
162	Roshna	Keen	312 Burlage Circle	Chapel Hill	NC	Mar 15, 2021
163	Elsa	Liner	331 Burlage Circle	Chapel Hill	Orange County NC	Mar 15, 2021
164	Michael	Sollins	121 Meadowbrook Dr.	Chapel Hill	NC	Mar 15, 2021
	Traffic on Estes is already too heavy. The Aura development would make this even worse.					
165	Rami	Abdo	115A, Meadowbrook Dr	Chapel Hill	NC	Mar 15, 2021
166	Milada	Vachudova	100 HOOT OWL LN	CHAPEL HILL	NC	Mar 15, 2021
	The flooding is a huge concern along with erosion: Have you noticed how incredibly degraded Bolin Creek is compared to just ten years ago? The banks are dramatically eroding and the water quality is terrible. Also, removing so much of the tree canopy at a time when you and I fully understand how severe are the climate and extinction crises would be a very sad reflection on our town. Finally, as you know, traffic on Estes is already a real challenge for everyone in the area.					
167	Roland	Zapfe	1600 Curtis Rd	Chapel hill	NC	Mar 15, 2021
168	Natallia	Sredava	121 Dixie drive	Chapel hill	NC	Mar 16, 2021

#	First name	Last name	Address	City	State	Date
	We do not need crazy traffic on Estes					
169	David	Pemberton-Smith	408 Ridgecrest Dr	Chapel Hill	NC	Mar 16, 2021
170	Eric	Klett	201 WOODLEAF DRIVE	CHAPEL HILL	NC	Mar 16, 2021
171	Nicole	Klett	201 WOODLEAF DR	CHAPEL HILL	NC	Mar 16, 2021
172	Sandy	Douglass	613 Kensington Drive	NC	Chapel Hill	Mar 16, 2021
173	Randy	Ehrler	1006 Brendan Ct	Chapel Hill	NC	Mar 16, 2021
174	richard	dworsky	812 shady lawn rd	chapel hill	NC	Mar 16, 2021
	too much traffic already!					
175	Margaret	Widener	305 Oakland lane	Chapel W	Nc	Mar 17, 2021
	I have to drive Estes every day to go to work, the library dance classes for my kids the grocery store, it’s already terrible and I’m walkable, no new ugly apartments, I was already sad about the trees getting cut down!					
176	John	Morrison	612 Concordia Court	CHAPEL HILL	NC	Mar 17, 2021
	All we need is hundreds of new car trips on already clogged Estes Drive every day. This is ridiculous.					
177	Jonathan	Drake	104 Bridle Run	Chapel Hill	NC	Mar 18, 2021
178	Diane	Pettifor	729 Kenmore Road	Chapel Hill	NORTH Carolina	Mar 18, 2021
	This project is an unnecessary eyesore in a town already glutted with vacant apartments.					
179	Tim	Griffin	2016 S. Lakeshore Dr.	Chapel Hill	NC	Mar 18, 2021
180	Chris	Limerick	100 Emerywood Place	Chapel Hill	North Carolina	Mar 18, 2021
181	Philip	Tester	141 Dixie Dr	Chapel Hill	North Carolina	Mar 18, 2021
182	Ann	Erickson	1703 Audubon Road	Chapel Hill	NC	Mar 19, 2021
	When estimating traffic on Estes, shouldn't the town also consider the large number of apartments being built in the Ephesus area? Rather than drive thru campus, occupants will use Estes to reach downtown CH. A bad situation will get much worse when these apartments are full.					
183	Evie	Aksel	1018 Tallyho Trail	Chapel Hill	NC	Mar 19, 2021
	There has been way too much development in our beloved Chapel Hill. The charm of the town is falling away. DO NOT BUILD this monstrosity on Estes. We do not have the infrastructure for it.					
184	Andrew	Pettifor	729 Kenmore Road	Chapel Hill	North Carolina	Mar 20, 2021
185	Catherine	Canzanella	8 Sedgewood Road	Chapel Hill	North Carolina	Mar 21, 2021
	We call on the Town Council to reject the proposed development at Estes Drive and MLK Blvd. This will create congestion and an increase in pollution . The size of this planned development is ridiculous .					
186	Kathleen	Clissold	1916 Tryon Court	Chapel Hill	North Carolina	Mar 21, 2021
187	John	Canzanella	8 Sedgewood Road	Chapel Hill	North Carolina	Mar 21, 2021
	Estes Drive is a major link and cannot hold the increased volume of auto traffic . Stop the planning and building now ! Our small town has already lost its character due to the greed of developers !					
188	Cary	Moskovitz	200 Ridgecrest Dr,	chapel hill	nc	Mar 22, 2021
	My kids grew up in this neighborhood and went to Estes Hills and Phillips. The traffic was already becoming a safety problem then. Please follow the plans our own already made and DO NOT allow this zoning!					
189	Rebecca	Breazeale	875 Martin Luther King Jr Blvd #2	Chapel Hill	North Carolina	Mar 22, 2021
	I'm glad I found this petition! I was dismayed when I saw the signs because I didn't remember the project being approved. I am totally against it.					
190	Matthew	Edwards	121 Ginkgo Trl	Chapel Hill	NC	Mar 22, 2021
	Too much growth too fast. Also, what's with the fast tracking of the rezoning?					
191	Manisha	Reck	100, North Haven Drive	Chapel Hill	NC	Mar 22, 2021
192	Kim	Talikoff	700 Kensington Drive	Chapel Hill	NC	Mar 24, 2021
193	John	Morris		Chapel Hill		Mar 24, 2021
	This project must be evaluated by at up-to- date town wide traffic model!					
194	Lynne	Jaffe	3228 Wood Duck Lane	Hillsborough	Orange County, NC	Mar 24, 2021

#	First name	Last name	Address	City	State	Date
	Living closer to Chapel Hill and doing most of my living here, the development plan for this corner is of great concern. To even consider such an impact as this will generate, requires the most sincere and astute assessment. Once this development is in place, there will be no reversing the serious consequences of this. The town of Chapel Hill, that I have lived with for over 40 years, has been utterly destroyed in the name of "progress/$$$$$." Where does it end?! The complete obliteration of the very attributes that have made Chapel Hill such a wonderful town, now being turned into a soulless city landscape. It is incumbent on the powers that be, that we not continue on the old trajectory of urban development at all costs....The same as with the Earth itself. When will we ever learn??? May it be here and now! Before further disruption to life overtakes our community.					
195	Catherine	DeMaere	220 Huntington Drive	Chapel Hill	Orange	Mar 24, 2021
196	Ashwin	Machanavajjhala		Chapel Hill	NC	Mar 24, 2021
197	Lavanya	Vasudevan		Chapel Hill	NC	Mar 24, 2021
198	Sandra	Jova	668 Brookview Dr	Chapel Hill	North Carolina	Mar 25, 2021
	I am very concerned about the increased traffic adjacent to an elementary and a middle school campus. Children should be able to walk to school safely and buses should be able to enter and exit the area without traffic congestion.					
199	Patricia	Langelier	1821 N Lakeshore Dr	Chapel Hill	NC	Mar 25, 2021
	Please reduce the size of this project by half. This project will create too much traffic congestion for this area.					
200	Max	Owre	1502 Cumberland Road	Chapel Hill	North Carolina	Mar 25, 2021
	Giving up this space to an outsider developer is insanity. How many more half-occupied crashed cruise ship developments do we need blighting our town. We've already failed at downtown, so more? What a disgrace and failure of public planning Chapel Hill's 40 year history has been.					
201	David	Schwartz	604 Sugarberry Rd.	Chapel Hill	NC	Mar 28, 2021
202	Dwight	Rogers	1707 Audubon Road	Chapel Hill	Orange County NC	Mar 28, 2021
203	Dorothy	Gerard	614 Arlington St	Chapel Hill	North Carolina	Mar 28, 2021
	This development will add a tremendously negative burden on the community and the established neighborhoods surrounding the area. A huge retirement center has already been built in that immediate area, and more development will continue to degrade the quality of life for the citizens who will have to deal with this excess on a daily basis.					
204	sally	brown	3701 Sweeten Creek Rd	Chapel Hill	NC	Mar 29, 2021
	Before March 2020 my daily commute to work was from Weaver Dairy road to Carr Mill Mall . Coming home after 4 pm on most days I would sit at the traffic light at N. Estes and MLK sometimes for 3 light changes to make a left onto MLK. Traffic increased tremendously in the 5 years of my commute. How can what is being proposed be good for the neighborhoods surrounded by this development? The beauty of all the trees along these roads is slowly disappearing.					
205	Louise	Henderson	2307 Honeysuckle Rd	Chapel Hill	NC	Mar 30, 2021
206	Rene	Lorenz	1909 S. Lakeshore Dr	Chapel Hill	NC	Mar 30, 2021
	We have serious concerns about the size of this project, and how it will impact traffic congestion and flooding to surrounding areas.					
207	elin	slavick	1709 Curtis Road	Chapel Hill	NC	Mar 30, 2021
208	Daniel	Costa	311 Avalon Ct	Chapel Hill	NC	Mar 30, 2021
	These complexes are springing up everywhere in town with little realistic consideration of traffic and road use patterns. Already Estes-MLK is a nightmare in the early eve during commuting times and will be choke point for cross MLK access to CHHS and downtown atop the concerns about Phillips and Estes Hills. Float a bond vote to buy it and use it as greenspace. This town is rich enough to do that via a graded take on upper end residences.					
209	Julie	Breschi		Chapel hill	Usa	Mar 31, 2021
210	Jane C	Smith	117 Summerlin Drive	Chapel Hill	NC	Mar 31, 2021
	ESTES DR AND MLK BLVD WILL BE OVERWHELMED WITH TRAFFIC IF THIS DEVELOPMENT IS BUILT. ESTES DR IS THE MAJOR EAST WEST CORRIDOR AND BETWEEN 4 PM AND 7 PM IN THE AFTERNOONS IT IS ALREADY SLAMMED. MLK IS MAJOR NORTH SOUTH ARTERY WITH HEAVY BUS TRAFFIC EVERY DAY/ALL DAY TRANSPORTING STUDENTS, STAFF, FACULTY TO/FROM CAMPUS.					
211	THERESE	TRIUMPH	1003 BLACKWOOD MTN RD	CHAPEL HILL	North Carolina	Mar 31, 2021
	The traffic at MLK & Estes Dr. is over capacity; we need affordable housing; we need to encourage people to use buses/walk not use cars; keep the trees!!					
212	Thomas	Triumph	1003 BLACKWOOD MOUNTAIN RD	CHAPEL HILL	NC	Mar 31, 2021
	Stop with the poor planning and over building. The Chapel Hill governance is rapidly turning a wonderful town into another generic overly-congested and commercialized area. This myopic thinking is is morphing Chapel Hill towards another nondescript and characterless town (like Cary) but with even more congestion.					
213	Allison	Zoller	1702 Audubon Road	Chapel Hill	NORTH CAROLINA	Mar 31, 2021
214	Sara	Fitch	134 Milton Ave	Chapel Hill	North Carolina	Apr 01, 2021
215	Lyle	Bradshaw	2025 Markham Drive	Chapel Hill	North Carolina	Apr 01, 2021
	Put an end to this never ending cycle of over growth. The traffic is going to be overwhelming and it’s already bad enough!!! Stop!!!					

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216	Savannah	Corbell	101 Quail Roost Drive	Carrboro	North Carolina	Apr 02, 2021
	This would be a mess. Please stop gentrifying Chapel Hill and just make it into a park. We have ZERO need for what you are planning on building, and it will increase traffic which hurts the kids who walk to the school next door.					
217	Julia	Lawrence	304 North Estes Drive	Chapel Hill	North Carolina	Apr 03, 2021
218	Patrick	Thompson	702 Caswell Rd	Chapel Hill	NC	Apr 04, 2021
	The proposed development is a disastrous idea. This un-needed development will cause dangerous increased traffic on Estes Rd.					
219	Jonathan	Riehl	2 Mt. Bolus Rd.	Chapel Hill	NC	Apr 04, 2021
220	john	Chambers	1831 N Lakeshore Dr	Chapel Hill	NC	Apr 04, 2021
221	Erin	Langston		Chapel Hill	NC	Apr 04, 2021
222	M. Alan	Brookhart	1825 S Lakeshore Dr	Chapel Hill	NC	Apr 04, 2021
223	Erin	Pearson		Chapel Hill		Apr 04, 2021
224	Elizabeth	Harris	615 Rock Creek Road	Chapel Hill	NC	Apr 04, 2021
225	Scott	Burian	615 Rock Creek Road	Chapel Hill	NC	Apr 04, 2021
226	Elizabeth	Stringer		Chapel Hill	NC	Apr 04, 2021
227	Qinfeng	Guo	111 Mendel Dr.	Chapel Hill	NC	Apr 05, 2021
	Strong objection. The one lane N. Estes Drive is already hard to drive - too crowded with several schools (slowed traffic) and new apartment buildings.					
228	CHRISTOPHER	PARKER	826 Shady Lawn Rd	Chapel Hill	NC	Apr 05, 2021
229	Jon	Mitchell	216 Huntington Dr	Chapel Hill	NC	Apr 05, 2021
230	Bruce	Boehm	1921 S. Lakeshore Dr., North Carolina, USA	Chapel Hill	NC	Apr 05, 2021
231	Gail	McGuinness	607 Kensington Drive	Chapel Hill	NC	Apr 05, 2021
232	Mark	Braford	401 Wesley Drive	CHAPEL HILL	North Carolina	Apr 05, 2021
233	Patrick	Oglesby	1830 N LAKESHORE	CHAPEL HILL	NC	Apr 06, 2021
234	William	Turnier	1909 Rolling Road	Chapel Hill	NC	Apr 06, 2021
235	Lauren	Schiff	5 Whisper Lane	Chapel Hill	NC	Apr 07, 2021
236	Greta	Wayland	710 Caswell Rd	Chapel Hill	NC	Apr 07, 2021
237	Dina	Kinner		Chapel Hill	Nc	Apr 07, 2021
238	Deirdre	Collins-Caraher		Chapel Hill	NC	Apr 07, 2021
239	April	Scharfenberg	613 Yorktown Dr	Chapel Hill	NC	Apr 07, 2021
240	Eileen	Anderson	104 magnolia cr	Chapel Hill	nc	Apr 07, 2021
241	Nicole	Bartreau-Murray	409 Holly Ln	Chapel hill	NC	Apr 07, 2021
242	Michael	Dyess	251 Seminole Dr	Chapel Hill	NC	Apr 07, 2021
	We don't need more luxury apartments and massive parking lots smack dab in the middle of our town (and right up against two primary schools no less), but need smaller plans for affordable living and local businesses that service the community. The traffic is bad enough and more extensive traffic surveying is needed, especially taking school traffic into consideration (which can't be properly sampled under COVID). This project needs to at least be postponed until COVID-19 has passed, but ideally the town should stay true to it's zoning plan to keep Chapel Hill safe, clean and aware of its community needs.					
243	Maria	Lapetina	403 Tramore Drive	Chapel Hill	NC	Apr 07, 2021
244	Lindsay	Bedford	103 Whispering Oak Ct.	Chapel Hill	NC	Apr 07, 2021
245	Susan	Caskie	100 Kelly Ct	Chapel Hill	NC	Apr 07, 2021
	We need much more affordable housing, please. And given our recent flooding issues and climate change, all new development must be designed with water drainage as a priority.					
246	Michelle	Kaiser		Carrboro	North Carolina	Apr 08, 2021
247	Bailey	Marrero		Chapel Hill	NC	Apr 08, 2021
248	Patty	Kohler	319 OLD FOREST CREEK DR	CHAPEL HILL	North Carolina	Apr 09, 2021
249	Kimberly	Livingston	526 Caswell Rd	Chapel Hill	NC	Apr 09, 2021
250	William S	Byassee	637 Brookview Drive	Chapel Hill	NC	Apr 12, 2021

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	Comprehensive Plan for Estes Drive is essential, including bicycle/pedestrian traffic, before any further development is permitted. In fact, such plan should be implemented before additional development. The longer the wait, the more difficult the project.					
251	James	Williams	132 Ironwoods Dr	Chapel Hill	NC	Apr 12, 2021
	I never saw anything like this proposed when Central West was discussed.					
252	Barbara	Silver	104 Karin Court	Chapel Hill		Apr 12, 2021
253	Jane	KIM	107 Grainger Ln	CHAPEL HILL	NC	Apr 12, 2021
254	Craig	DeAlmeida	2029 Markham Dr	Chapel Hill	NC	Apr 13, 2021
255	John	Curry	1716 Allard Rd	Chapel Hill		Apr 13, 2021
256	Deborah	Bender	1716 Allard Rd	Chapel Hill		Apr 13, 2021
257	Bruce	Boehm	1921 S. Lakeshore Dr.	Chapel Hill	NC	Apr 13, 2021
258	Pamela	Holbert	5255 E. 29th St., Apt 73	Tucson	Arizona	Apr 13, 2021
259	Thomas	Lehman		Chapel Hill		Apr 13, 2021
	My biggest concern is that the developers are from Texas. Once the rental cash starts flowing into their account they will consider Chapel Hill to be on another continent, if not another planet. Developers from Raleigh or Greensboro would be more sensitive to concerns here.					
260	Asher	Scott	812 Ward Street	Chapel Hill	NC	Apr 13, 2021
261	Katie	Solovij	209 Forbush Mountain Dr	Chapel Hill	NC	Apr 13, 2021
	Please DO NOT allow this to happen. What if an emergency vehicle needs to get through and the congestion prevents it, if it is my family member I would hold the town responsible for allowing such congestion. What about the air quality for the pediatric students and residents in the area? This is a no go on every environmental and public safety issue. Please say NO!					
262	Kristen	Boekelheide		Chapel Hill	404 Holly Ln	Apr 14, 2021
	Don't rush to develop!! Do a full impact analysis and think carefully about traffic solutions before moving forward!					
263	Davin	Stewart	404 holly lane	Chapel hill	NC	Apr 14, 2021
264	Moira	Killoran	118 Cynthia Dr	Chapel Hill	NC	Apr 14, 2021
265	Alain	Laederach	351 Wesley Dr	Chapel Hill	North Carolina	Apr 14, 2021
	Stop AURA development without further study and decrease its size, we need more green space here, not more huge buildings.					
266	Meredith	Blue		Chapel Hill		Apr 14, 2021
267	Scott	Starr	2004 S Lakeshore Dr	Chapel Hill	NC	Apr 14, 2021
	traffic studies and significant diligence should be performed; this would be a HUGE impact to the currently stressed Estes Road corridor					
268	David	Howell	323 Burris Pl	Chapel Hill	North Carolina	Apr 14, 2021
	Just a glance at the “concept views” tells me this is so out of scale and character that it should be denied on these parameters alone. Add in impervious surface, the existing mess of the MLK/Estes intersection, the presence of numerous seniors and children in and out of the Y all day long, two schools, one new senior care facility, and my still-persistent rage over the 15 acres having been bushwhacked years ago to try to conjure an argument in favor of AURA. I keep coming up short.					
269	Christian	Douglas	604 Surry Rd	Chapel Hill	NC	Apr 14, 2021
270	Nancy	Phifer		Chapel Hill	NC	Apr 14, 2021
271	W. Dale	Osborne	631 Tinkerbell Rd.	Chapel Hill	NC	Apr 15, 2021
	Yipes! Please do not approve the Aura development project. It reeks of asphalt and dangerous congestion. Looks like the new Azalea Estates retirement community could be hit hard by storm water runoff as well. We can do better. Peace, Dale					
272	LEONARD	ROGOFF	329 BURLAGE CIR,	Chapel Hill	NC	Apr 15, 2021
273	Chuck	Mauro	8 Ellen Place	Chapel Hill	NC	Apr 15, 2021
	This type of development will destroy everything that makes Chapel Hill unique and a special place to live.					
274	Abby	Poms	307 Clayton Rd	Chapel Hill	NC	Apr 15, 2021
275	Charles	Fiore	Caswell Road	Chapel Hill	NC	Apr 15, 2021
276	Laurie	Goldwasser	210 Old Franklin Grove Dr 5897	Chapel Hill	NC	Apr 15, 2021
277	Albrecht	Bruckner	1804 Rolling Road	Chapel Hill	NC	Apr 15, 2021
278	Emily	Wilson	161 Windsor Circle	Chapel Hill	NC	Apr 15, 2021

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279	Rachel	Myers	108 Timber Hollow Ct.	Chapel Hill	NC	Apr 16, 2021
280	Hillary	Tester	141 Dixie Dr	Chapel Hill	Orange	Apr 16, 2021
	I do not support this proposed development. We live down the street and often encounter significant traffic at this intersection. As a mother I worry about the increased traffic particularly with the walk zone for estes elementary School.					
281	Elizabeth	Collins	100 Hanna Street, Apt. B	Carrboro	NC	Apr 16, 2021
282	Rohan	Maythe	251 Seminole Drive	Chapel Hill	North Carolina	Apr 16, 2021
283	Fred	Ho	309 N ELLIOTT RD	Chapel Hill	NC Orange	Apr 16, 2021
284	Peter	Witt	112 Cardiff Pl	Chapel Hill	NC	Apr 17, 2021
285	Felix	Bloch	7 Mount Bolus Road	Chapel Hill	NC	Apr 18, 2021
286	Scarlet	Cardwell	223 Old Forest Creek Drive	Chapel Hill	NC	Apr 18, 2021
287	Floyd	Cogley	223 Old Forest Creek Drive	Chapel Hill	NC	Apr 18, 2021
288	Steven	Yova	415 N Elliott Rd	Chapel Hill	NC	Apr 19, 2021
	As a concerned citizen and parent with children at both Estes Hills Elem. and Phillips Middle, I see the Aura project as a concern for the traffic on Estes Dr. and the issues that may present in the event of an emergency. In addition, I see the Aura proposal as too dense and providing too much runoff. It simply doesn't add to the sense of community that drew our family to Chapel Hill nearly ten years ago.					
289	tom	williams	102 burlwood place	chapel hill	North Carolina	Apr 20, 2021
	The traffic on Estes has grown exponentially. A full traffic study w/ the resulting impact this development would bring, at a minimum, is needed before any approval should be granted.					
290	David	Ambaras	605 Surry Rd	Chapel Hill	North Carolina	Apr 21, 2021
291	Valerie	Tyson	108 CHEROKEE CIR	CHAPEL HILL	North Carolina	Apr 24, 2021
292	Joseph	Curl	31 Bluff Trail	Chapel Hill	North Carolina	Apr 24, 2021
	Don't Californicate Carolina !					
293	Catharine	Carter	705 Kensington Drive	Chapel Hill	North Carolina	Apr 24, 2021
	Traffic and safety must be addressed before anything can move forward. Estes Drive is already a nightmare during peak times of the day.					
294	Klaus	Hahn	1502 Michaux Road	Chapel Hill	North Carolina	May 01, 2021
	The impact on traffic, and the fact that this is not a multi-use community (even if the builder bills it as such) compel me to sign this petition. Our whole area is filling with massive apartment complex that contain at best 2 or 3 small restaurants. They tower over everything, do not fit with the architecture and neighborhood feel that make Chapel Hill so charming, and are not supported by the necessary infrastructure. Town planners please wake up!					
295	Robin	Gao		Chapel Hill	NC	May 02, 2021
296	John	Quinterno	108-D Weatherstone Drive	Chapel Hill	North Carolina	May 03, 2021
297	Harmony	Chi		Chapel Hill	NC	May 03, 2021
298	Anna	Lynch	315 Burlage Circle	Chapel Hill	NC	May 04, 2021
299	John	Jenkins	825 Tinkerbell Rd.	Chapel Hill	NC	May 06, 2021
	To the town government, Please plan responsibly. Our community is counting on you. John J.					
300	Charles	Humble	910 Emory Drive	Chapel Hill	NC	May 10, 2021
301	Charles	Harris	813 Churchill Drive	Chapel Hill	North Carolina	May 10, 2021
	The size of the development is too large and will have a negative impact on traffic.					
302	Ann	Baker		Chapel Hill		May 10, 2021
303	Richard	Boylan	1306 Willow Dr	Chapel Hill	NC	May 10, 2021
304	Thomas	Grizzle	XXX	Chapel Hill	NC	May 10, 2021
305	Betsy	Dain	408 Holly Lane	Chapel Hill	North Carolina	May 10, 2021
306	Wes	Dain	408 Holly Ln	Chapel Hill	NC	May 10, 2021
307	Sharlene	Meisner	904 Emory Dr	Chapel Hill	NC	May 10, 2021
308	Gordon	Whitaker	750 Weaver Dairy Road #166	Chapel Hill		May 11, 2021
309	Jane	Provan	905 Grove St.	Chapel Hill	NC	May 11, 2021
310	Pamela	Schultz		Chapel Hill	NC	May 11, 2021

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311	David	Adalsteinsson		Chapel Hill	NC	May 11, 2021
312	Terry and Bob	Vance	1419 Gray Bluff Trail	Chapel Hill	ORANGE	May 11, 2021
	That this request is even being considered is worrisome in terms of traffic, density, flooding,,losing more trees,, air quality becoming worse and for no real communify benefit. Approving this misguided request is like the worst kind of climate change denier and for what? This would add more toxicity to an important Chapel Hill location. Enough is enough.					
313	Deborah and Arthur	Finn	750 Weaver Dairy Road #229	Chapel Hill, NC	Orange	May 11, 2021
	Estes Drive is a high traffic area already. We do not need more apartments in Chapel Hill. See the petition for additional reasons to reject this plan.					
314	Katherine	Leith	36 Clover Dr	Chapel Hill	North Carolina	May 11, 2021
	This whole proposal is terrible - and in the wrong location. It was turned down by the transportation committee and it should not be ignored.					
315	Yuehping	Chen	217 Huntington Drive	Chapel Hill	North Carolina	May 12, 2021
316	Carolyn	Cole	2120 N Lakeshore Dr	Chapel Hill	NC	May 12, 2021
	This project is proposed in the wrong place. It should conform to the current zoning.					
317	robert	willis	411 landerwood lane	chapel hill	NC	May 12, 2021
318	Tom	Denham	107 Eastwood Lake	Chapel Hill	NC	May 12, 2021
319	Lizabeth	Lotz	119 Maple Dr	Chapel Hill	NC	May 12, 2021
320	Daniel	Lotz	119 Maple Dr	Chapel Hill	NC	May 12, 2021
321	Daniel	Head	629 Kensington Drive	Chapel Hill	NC	May 12, 2021
322	Heidi	Chapman	28 Mount Bolus Rd	Chapel Hill	NC	May 12, 2021
	Please reject the conditional zoning request. Aura will cause a complete traffic bottleneck at our most vulnerable intersection. Once paved, Aura will cause a taking of the neighbors' land due to flooding. I am a daily commuter on Estes Drive.					
323	Hanna	Sanoff	212 Commons way	Chapel Hill	NC	May 12, 2021
324	Kari	Castleberry	201 Huntington Drive	Chapel Hill	North Carolina	May 12, 2021
325	Rody (me)	Spivey	1826 N Lakeshore Dr	Chapel Hill	NC	May 12, 2021
326	Christian	Matthaeus	2408 HONEYSUCKLE RD	CHAPEL HILL	NC	May 12, 2021
	Instead of building developments a driving distance from downtown, we need to build more mixed use in downtown, and relocate auto repair shops out of downtown. Let's create a win-win situation where we have people living in a community that is less car-dependent and more desirable.					
327	Hui	Ding	125 Woodshire Ln	Chapel Hill	NC	May 12, 2021
	Traffic is very big concern for this project.					
328	William	Perreault	2104 N Lakeshore Dr	Chapel Hill	North carolina	May 12, 2021
329	Lauren	Jarvis		Chapel Hill	NC	May 12, 2021
330	Amy	Witsil	115 Woodshire Lane	Chapel Hill	NC	May 12, 2021
	Excessive Impervious surface impacts drainage. Plan not aligned with the real state of transit here.					
331	Daniel	Lotz	119 Maple dr	Chapel hill	Nc	May 12, 2021
332	Alyanna	Ridimann	103A Dixie Lane	Chapel Hill	NC	May 12, 2021
	Mayor Hemminger and Town Council, I'm disappointed and angry. Chapel Hill is already so expensive, with not enough affordable housing. Cutting down trees and further developing a residential area where long-standing community members live will not only skyrocket already extremely high property taxes (looking at you, Northside), lead to increases in rent in an already-expensive area, and it won't help make Chapel Hill any more beautiful, commutable, or green. I have lived here my entire life, and this oversight of real community needs in favor of more cars, development, and disregard for the community in pursuit of pure profit sickens me. Do better. Reject the conditional zoning request for the property located at Estes Drive and MLK Jr. Blvd.					
333	Benjamin	Alschuler	5 Whisper Lane	Chapel Hill	North Carolina	May 12, 2021
	Adding this level of density to Estes Dr. will make an already congested main thoroughfare completely unusable between 2-7pm every day. You cannot add a project of this scale without either: a) widening Estes to become a 4-lane road, or; b) creating an additional cut-through between MLK and Franklin Street (and no one would ever propose that). Let's also be honest: the bike lane proposal is pure catnip to try to distract from the broader, obvious negative environmental impact of this project.					
334	Chris	Civalier	1703 Curtis Rd	Chapel Hill	NC	May 12, 2021
335	Josh	Garcia		Chapel Hill	NC	May 13, 2021
336	sarah	schroth	113 Hanover Place	Chapel Hill	NC	May 13, 2021

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	Chapel Hill is a wonderful college town, charming. Each time a development like this goes up, it destroys the town's character. It adds undistinguished architecture crowded on a small lot. Moreover, I live on off Estes, where the traffic is frequently backed up on this corner, especially between 3pm-6pm. Please look into your hearts and see this is an ill-advised action to impose on our lovely town.					
337	Danielle	Dean	250 S Estes Dr, Unit 41	Chapel Hill	NC	May 13, 2021
338	Maggie	Conger	421 Whitehead Circle	Chapel Hill	North Carolina	May 13, 2021
	Further reducing the tree canopy is detrimental to the quality of life that chapel hill is supposed to be known for					
339	Lynn	Patterson	1217 E FRANKLIN ST	Chapel Hill	NC	May 14, 2021
	I had sent the following to Judy Johnson.... Thanks for forwarding this info. I think the idea of this development is a HORRIBLE idea and will cluster an area that is already a nightmare in non-pandemic times. I have a big issue with all the development Chapel Hill and Orange Co are allowing to take place. Yeah- I get it...supply and demand and supposed tax benefits to working class people(which I have yet to see) and a bunch of other blah blah blah's. The problem with all of this is there is no way to widen ANY of the main thoroughfares. Where do all these cars go that come with all this development? Traffic in Chapel Hill has become hellish in the last five years and it is only going to get worse. From what I am seeing, the traffic counts that have been calculated for this project are based on 2020 traffic. DURING A PANDEMIC!!!! These calculated numbers need to be multiplied x's four. The one saving grace of Covid was the decrease in traffic. Moving here in 1990, I remember when Chapel Hill was this cool little hippy town and traffic was a non-issue. Real numbers need to be used in the boards decision on this project. I have to travel Estes to get to my place of business between the hours of 7:30 and 8:00 am seven days a week. Before the pandemic, with the two schools, there were days it would take me 15-20 minutes just on Estes between MLK JR and Franklin St. What is that? Less than two miles? How is this acceptable? If I wanted to deal with city traffic...I would have moved to a big city. I vote a big NO to this project and I know A LOT of other people do too. Please forward this to the appropriate people. I am in hopes that this project hasn't already been approved and that citizens chains aren't just being yanked in the process. Thanks-Lynn Patterson					
340	Shirsten	Alm	101 Hanford Rd	Chapel Hill	NC	May 14, 2021
341	Michael	Hackley	104 Highland Drive	Chapel Hill	NC	May 14, 2021
	This is a terrible idea. Traffic is already a nightmare and this will make it worse.					
342	Alexa	Brogna	114 E Longview St	Chapel Hill	NC	May 16, 2021
343	Rogelio	Garcia	109 Brighton Ct	Chapel Hill	North Carolina	May 18, 2021
	I am against Aura development as this project impacts the ecosystem and will collapse traffic					
344	Cynthia	Bucy		Chapel hill	nc	May 23, 2021
345	Jake	Davis	204 Forest Ridge Dr	Chapel Hill	NC	May 24, 2021
346	Craig	Anderson	247 SEVERIN ST	CHAPEL HILL	NC	May 25, 2021
	Too many apartment complexes already under construction. We don't even know if they will be filled, and you can't unbuild it. Additionally, none of this really addresses any housing inequities. The developer may donate to low income housing but mostly lip service and they never seem to actually build low income units.					
347	Rif	Riddick	103 Village Gate Dr	Chapel Hill	NC	May 25, 2021
348	Annette	Litzenberger	114 Turnberry Lane	Chapel Hill	NC	May 25, 2021
349	Carolyn	Leith	1601 Halifax Rd	Chapel Hill	NC	May 26, 2021
	There are so many reasons to turn down Aura. We need reduced traffic on Estes Drive!!! We need to encourage bus and bike travel. We need reduced hard surfaces to protect existing structures, and Bolin and Booker creeks from flooding and erosion. We need a smaller development with affordable housing and condos. We need services to walk to in this area!					
350	Martin	Schweitzer	113 Brighton Court	Chapel Hill	NC	May 26, 2021

Amy Harvey

From: Jeanette Coffin
Sent: Friday, May 28, 2021 9:51 AM
To: buckhouse4@nc.rr.com
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: AURA Site Tour with Neighbors

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: buckhouse4@nc.rr.com [mailto:buckhouse4@nc.rr.com]
Sent: Thursday, May 27, 2021 9:42 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Cc: 'jridkyb@gmail.com' <jridkyb@gmail.com>; 'jchendricksonsmith@gmail.com' <jchendricksonsmith@gmail.com>
Subject: AURA Site Tour with Neighbors

Good Evening Mayor and Council:

This letter is an invitation to view the proposed Aura site in person before voting on the project on June 16th. We feel it is necessary for Council Members to see the physical landscape from the viewpoint of its neighbors and their experience. We want to start our short tour at Amity Church and proceed across the street to view the discharge points as the stormwater exit the property in the Resource Conservation District. This short visit will help Council Members understand the stormwater and flooding concerns better.

Requiring stormwater management sufficient to mitigate flooding from the Aura site remains a challenge. I've spoken several times to you about my concern and last night Roger Shumate gave you a real world example about flooding and damage to the Amity Church Daycare School. Many other examples of flooding incidents have happened at Phillips Middle School and homes in Huntington-Somerset and Coker Woods.

We appreciate the dialogue about increased stormwater storage capacity offered by Trinsic but note that the most important factor in stormwater volumes is the amount of pervious surfaces available. We've not seen any changes made in the large number of hard surfaces in the AURA plan that will improve those numbers. Even the reduction in parking places suggested last night along the park will remain paved.

We will schedule three - four meeting times in the week of May 30th and June 6th for this brief tour. We will follow up with invitation to each individual Council Member to ascertain the most convenient time for this short 20 minute visit.

We may seek the Mayor's assistance in obtaining the owner's permission to walk a small portion of the property but most can be viewed from Estes Drive.

Thank you!

Scott Buck, Huntington- Somerset

Jill Blackburn, Coker Hills

Jan Hendrickson-Smith, Estes Hills

Amy Harvey

From: Jeanette Coffin
Sent: Friday, May 28, 2021 9:51 AM
To: buckhouse4@nc.rr.com
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Aura Comments at May 26 Meeting: Deception and Greed

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: buckhouse4@nc.rr.com [mailto:buckhouse4@nc.rr.com]
Sent: Thursday, May 27, 2021 9:28 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Aura Comments at May 26 Meeting: Deception and Greed

Thank you Mayor and Council for your tour de force last night managing with perseverance to endure technical challenges and hold the meeting.

Deception RE: Stormwater. Council is being played.

Mr. Jewell realizes you are well-meaning and motivated to do what is right for the community. He manipulated these attributes of yours in proposing, although as pointed out by Alisha Goldstein "we have no new plans," that the water vaults will have 100 year storm capacity. At risk of repeating myself, THIS IS HOGWASH! He is not telling you the whole story. THE DETENTION VAULTS CAPACITY IS NO WHERE CLOSE TO THE VOLUME OF A 100-YEAR STORM EVENT. THIS IS DECEPTIVE ENGINEERING MATH HAND-WAVING. For the vaults to hold entire 100-year rain storm volume, they would literally have to be twice their current volume, but that's not what he's really meaning. It's all about rates of water coming in, and rates of water going out of the vaults (and then heading off the property). He's banking on you thinking of it as a fixed number, but in the engineering world, it's a dynamic flux of water in and water out. Even the current vault size can "accommodate a 100-year rain storm", by engineering standards, but THE ONLY WAY THE MATH WORKS IS THAT WATER FLOWS OUT OF THE VAULTS QUICKLY, ONTO THE PROPERTY WHICH IS PRECISELY ENUMERATED IN THE STORMWATER IMPACT ANALYSIS that the Developer submitted. In his comments, Mr. Jewell intentionally blurred the distinction between capacity and flow. At last night's meeting I reported, straight from the Stormwater Impact Analysis Report, that at current vault size and pipe configuration, the peak water flow velocity leaving the vaults (SCM A and SCM B combined) into the wetlands area will be nearly 4000 gallons/minute after a 2-year rain event, and over 10,000 gallons per minute after a 25-year rain event. The peak flow rate after a 100-year event will be an astounding 12,190 gallons per minute (27.16 cubic feet/second)! This is over four times the pre-development flow rate at this area (Point of Analsis #1) for a 1-year rain event and more than twice the pre-development flow rate for this area for a 2-year rain event. This is clearly not the impression that the Developer has given you, of water trickling out over 2-5 days.

Please don't take my word for it. Check the calculations straight off the SIA with Town Stormwater Experts. Prove me wrong or prove me right. Then make the applicant provide specific plans in writing that will indeed reduce the 100 year rain storm flow rate, as a component of the zoning application, not an afterthought.

Greed:

The display of greed on behalf of Developer last night was astounding. From Mr. Jewell and Ms Dancy squabbling back and forth about 7 vs 8 affordable town-homes, Ms Dancy using every synonym she could to describe how the affordable town-homes will in fact be substantially lower quality than the market-priced town-homes (I don't accept the size of the construction price differential that she described since the units are being built in bulk), and then Mr. Jewell proposing some cockamamie price-sharing for traffic signal light if it is at Estes/Somerset rather than Estes/Aura. These displays of greed were glimpses of the truest nature of this proposed development. Its all about the money. It always has been.

Scott Buck

208 Huntington

Amy Harvey

From: Jeanette Coffin
Sent: Friday, May 28, 2021 9:51 AM
To: Fred Lampe
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Final Aura Modeling Needed

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Fred Lampe [mailto:fred@lampe.com]
Sent: Thursday, May 27, 2021 8:46 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Cc: Maurice Jones <mjones@townofchapelhill.org>; Judy Johnson <jjohnson@townofchapelhill.org>; Kumar Neppalli <kneppalli@townofchapelhill.org>; Bob Nau <robert.nau@duke.edu>; Julie McClintock <mcclintock.julie@gmail.com>; Amy Harvey <aharvey@townofchapelhill.org>
Subject: Final Aura Modeling Needed

Mayor and Council Members,

At the May 26th Aura public hearing, the staff revealed the specific location of three newly proposed pedestrian controlled flashing crosswalk signals between the MLK and Caswell intersections on Estes Drive (see

attachment). These proposed crosswalks had been mentioned in staff presentations previously but their locations had not been shown before on a map.

Given that this is a school walk zone and a potentially dangerous and already congested roadway, we request that staff direct the HNTB consultant to model the impact of pedestrians and bikes crossing Estes during AM and PM rush hour traffic on the Estes traffic flow using the Town-Wide Traffic Model. Please ask your staff to spend the necessary resources to make this happen.

Likewise, we request that the consultant also model the impact of pedestrians and bikes using the new bike/ped path along the North side of Estes crossing the 3 lane Estes Aura full access driveway during AM and PM peak hours on Estes traffic and the usability and safety of this full access driveway.

Given that the developer representative indicated that there will be between 1100 and 1200 residents in Aura, the above 2 modeling requests are fully justified due to the likely high impact on Estes traffic and the impact on safety and utility of the proposed Aura Estes driveway.

The HNTB consultant specifically indicated that the Town-Wide Traffic Model has the capability to model bike and pedestrian traffic, so the model simulation will be incomplete without measuring the impact of people crossing and stopping the flow of Estes traffic at the flashing crossings during am and pm peak hours as well as traversing the Aura Estes driveway.

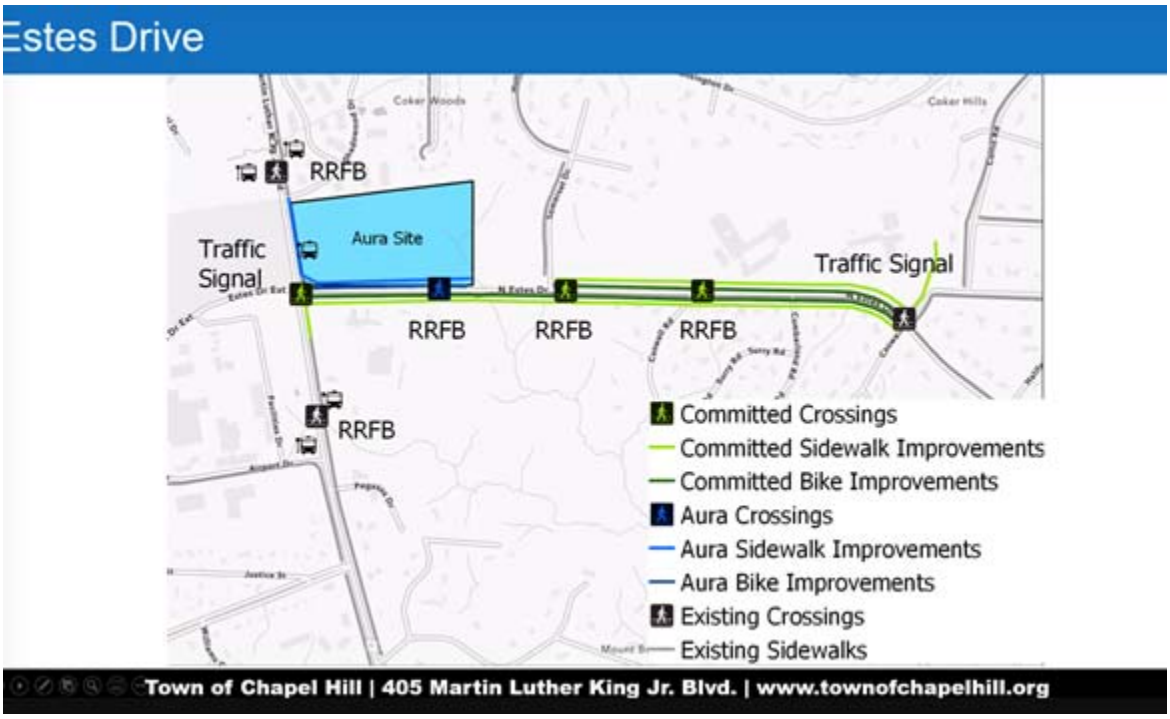
We believe that the users of Estes Drive, students, residents and commuters need this final information to become comfortable with the plan for the Aura development.

Finally, we will be working with NC DOT to identify the specific requirements that must be met to allow a stop signal to be installed at the troublesome Somerset/Estes intersection.

Thank you,

Fred Lampe
Bob Nau
Julie McClintock

PS. Amy, Please make sure to attach this request to the Aura Public Hearing Notes of the May 26 meeting.


Estes Drive
RRFB
Aura Site
Traffic Signal
Traffic Signal
RRFB
RRFB
RRFB
RRFB
Committed Crossings
Committed Sidewalk Improvements
Committed Bike Improvements
Aura Crossings
Aura Sidewalk Improvements
Aura Bike Improvements
Existing Crossings
Existing Sidewalks
Town of Chapel Hill | 405 Martin Luther King Jr. Blvd. | www.townofchapelhill.org

Amy Harvey

From: Jeanette Coffin
Sent: Friday, May 28, 2021 9:51 AM
To: John Morris
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Aura Proposed Development

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: John Morris [mailto:johnnmorris@icloud.com]
Sent: Thursday, May 27, 2021 8:40 PM
To: Pam Hemminger <phemminger@townofchapelhill.org>; Michael Parker <mparker@townofchapelhill.org>; Jess Anderson <janderson@townofchapelhill.org>; Allen Buansi <abuansi@townofchapelhill.org>; Hongbin Gu <hgu@townofchapelhill.org>; Tai Huynh <thuynh@townofchapelhill.org>; Amy Ryan <aryan@townofchapelhill.org>; Karen Stegman <kstegman@townofchapelhill.org>
Cc: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Aura Proposed Development

Dear Town Leaders,

The Aura development has been financially engineered by a big national firm, Trinsic, to create a stream of high monthly rent payments. This income expectation will make the development an

attractive purchase by REITs or hedge funds, who will siphon this money out of our community every month, rather than having it recirculate within the community to be an economic multiplier. That's why the developer offers only a token number of affordable rentals and very few units to purchase. Offering more of these community benefits would reduce its cash flow and its appeal to desired outside investors. What Chapel Hill really needs is affordable mid-range housing, especially homes that families can buy to begin building equity, one of the best paths toward an increasing quality of life. Aura does not contribute to a more equitable and prosperous community.

Traffic issues surrounding Aura have been much discussed, but the main point has been missed. It may be that the traffic models are correct and that the extra lanes on Estes (almost all funded by the Town and State and not by Trinsic) will allow traffic to be no worse than it is now, at least for a while. And possibly the Council will insist on a traffic light at the Somerset-Estes intersection, which will certainly improve safety and convenience at that spot. The real problem is at the entrance to Aura on Estes, which will soon be just opposite a new driveway leading to the Y. Here we will have two new busy driveways, opposite each other on Estes Drive, with cars passing on Estes every two seconds on average during peak traffic periods, with drivers going in and out of each driveway, making both right and left turns, cutting across lanes of traffic, sidewalks and bike paths. NC DOT has said that a traffic light can not be placed here because it is too close to the intersection with MLK. The Aura development will create an extremely dangerous intersection, hazardous to vehicles, bikes, and pedestrians. No solution has been identified, much less planned.

I urge you to vote no on Aura. Aura will create serious dangers on Estes Drive and will not contribute to making Chapel Hill a safe, more equitable and inclusive community. Chapel Hill has real needs that Aura will not meet. We can do better than this.

Thank you for the opportunity to comment.

John Morris

Amy Harvey

From: Jeanette Coffin
Sent: Friday, May 28, 2021 9:51 AM
To: msJuliemcclintock
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: Comments on AURA public hearing process

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

-----Original Message-----
From: msJuliemcclintock [mailto:mcclintock.julie@gmail.com]
Sent: Thursday, May 27, 2021 8:05 PM
To: Pam Hemminger <phemminger@townofchapelhill.org>; Maurice Jones <mjones@townofchapelhill.org>
Cc: Town Council <mayorandcouncil@townofchapelhill.org>
Subject: Comments on AURA public hearing process

Good Evening Mayor and Town Manager,

Virtual meetings put citizens at a disadvantage. During last night's AURA public hearing the zoom link became unstable and many were knocked off for what seemed like a good half hour or so. Two council members and the applicant were in one zoom room with some members of the public including me, and then the mayor and rest of the council and 90+ members (according to text from Pam) of the public in another room.

I witnessed both meetings because on my lap top were Council members Tai Hunyh, Amy Ryan and Applicant Dan Jewell and the formal speakers who were about ready to speak. At the same time on the public access TV were the rest of the Council, the Mayor and council members except for two. The meeting proceeded and although everyone sensed something was wrong, the meeting was not paused and restarted. The Mayor called on several speakers who were not heard by those in the other zoom room.

This was a very important public hearing to many of us and very disconcerting to have it interrupted. Technical glitches happen. In the future I think the Town needs a protocol ready for such incidents in order to preserve the integrity of the open meetings process. It did not work as it should have last night.

Julie McClintock

Amy Harvey

From: Jeanette Coffin
Sent: Friday, May 28, 2021 9:52 AM
To: Jill Blackburn
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; CHRIS BLUE; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: RE: MLK/Estes, one of the most dangerous CH intersections: Public Records Request from Website/ #1272/ accidents...

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Jill Blackburn [mailto:jridkyb@gmail.com]
Sent: Thursday, May 27, 2021 7:48 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>
Cc: Jeanne Brown <jbrown2@townofchapelhill.org>
Subject: MLK/Estes, one of the most dangerous CH intersections: Public Records Request from Website/ #1272/ accidents...

Dear Mayor and Town Council,

Please note and place in the town's public record, the report below obtained from the Chapel Hill Police Department. The data in this report is further evidence that Estes and MLK is one of the most dangerous intersections in our town.(see data below).

We are not opposed to development in our town but we are opposed to development that will stress and strain an already very dangerous intersection.
The size of AURA needs to be scaled back, including parking spaces. AURA is only one of many other proposals that will come about for this area. We can not afford to continue to overload an already congested area. Rising traffic congestion is a safety hazard that leads to unnecessary accidents, injuries, and loss of life, as well as the rapid deterioration of our roads, resulting in increased maintenance.

Additional consideration needs to be given since AURA will not be the last developed area on Estes. This will all be happening in an area that leads to a Public Library and not one public school but two public schools, with very young children all under the age of 12. This is a very special consideration as we focus attention on the health and safety of our young children and the many families who reside in this area. The public schools are used by area children during school hours and non school hours.

Before any consideration or approval of development proposals, the town should first implement the needed traffic safety and road measures to ensure the wellbeing of every citizen.

Thank you for your consideration,

Jill Blackburn
President, Coker Hills Neighborhood Association

Sabrina M. Oliver
Communications and Public Affairs Director/
Town Clerk
Communications and Public Affairs
Town of Chapel Hill
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514-5705

Phone: (919) 968-2743
Fax: (919) 967-8406

Twitter: @chapelhillgov
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From: Andre Masnari <amasnari@townofchapelhill.org>
Sent: Thursday, May 27, 2021 11:52 AM
To: Sabrina Oliver <soliver@townofchapelhill.org>
Subject: RE: Public Records Request from Website - #1272 - accidents...

Ms. Oliver,
In regards to the information request below from Jill Blackburn,
The top 3 intersections for accidents in Chapel Hill since 2016 are:

1. Franklin/Columbia St
2. Rosemary/Columbia St
3. Estes/MLK

There have been 72 crashes at Estes/MLK since 2016

Andre Masnari
Crime Analyst
Chapel Hill Police Department

919-968-2864
amasnari@townofchapelhill.org

Amy Harvey

From: Jeanette Coffin
Sent: Friday, May 28, 2021 9:53 AM
To: raphaelg@email.unc.edu
Cc: Colleen Willger; Loryn Clark; Sarah Vinas; Allen Buansi; Amy Ryan; Hongbin Gu; Jeanne Brown; Jess Anderson; Karen Stegman; Michael Parker; Pam Hemminger; Tai Huynh; Amy Harvey; Ann Anderson; Carolyn Worsley; Laura Selmer; Mary Jane Nirdlinger; Maurice Jones; Michael Simms; Rae Buckley; Ran Northam; Ross Tompkins; Sabrina Oliver
Subject: FW: AURA opposition document for inclusion in the public record
Attachments: Dear Mayor and Council.docx

Thank you for your correspondence with the Town of Chapel Hill. The Mayor and Town Council are interested in what you have to say. By way of this email, I am forwarding your message to the Mayor and each of the Council Members, as well as to the appropriate staff person who may be able to assist in providing additional information or otherwise addressing your concerns.

Again, thank you for your message.

Sincerely,

Jeanette Coffin

Jeanette Coffin
Office Assistant
Town of Chapel Hill Manager's Office
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514
(o) 919-968-2743 | (f) 919-969-2063

From: Raphael-Grimm, Theresa [mailto:raphaelg@email.unc.edu]
Sent: Thursday, May 27, 2021 6:54 PM
To: Town Council <mayorandcouncil@townofchapelhill.org>; Amy Harvey <aharvey@townofchapelhill.org>
Subject: AURA opposition document for inclusion in the public record

Please see attached letter

Theresa Raphael-Grimm PhD, PMHCNS-BC
Professor
Schools of Nursing and Medicine

Adjunct Professor of Psychiatry
Associate Director: Taking Care of Our Own Program, School of Medicine
University of North Carolina- Chapel Hill
Chapel Hill, NC 27599-7460
919-966-3649
trg@unc.edu

May 27, 2021

Dear Mayor and Council,

It has come to our attention that during the review of the Aura project, town staff have determined that the project meets the standards set out by the Central West Area Plan (CWAP). Little could be further from the truth. While the practice of presenting misinformation as "fact" runs rampant in our wider society, we had thought that our own town management was beyond such folly. It seems we are mistaken.

The final report of the CWAP, (which was presided over by two people who are now elected council members: Michael Parker and Amy Ryan), provided guidelines for density limits, photos of potential development and descriptions of a community gathering place. None of these parameters are reflected in the AURA project. It seems particularly ironic that Mr. Parker and Ms. Ryan want to ignore (or outlandishly re-spin) the same Central West guidelines for which they fought hard at the time. This seems like a full-scale, bait-and-switch maneuver.

We in Chapel Hill depend on our elected officials to operate in good faith, with honesty and integrity. We the people of the Estes Neighborhood believed that the hours and hours spent on the Central West Area Plan actually mattered, only to now learn that we've been duped.

We the people need to believe in the good faith of town officials who commissioned the creation of the Central West Area Plan. We need to believe in the leaders who advocated for the Plan (i.e. Mr. Parker and Ms. Ryan). And we need to believe that the town will act in good faith to implement the plan as conceptualized and reflected in the final report. Nothing about the Aura proposal reflects the guidelines agreed to in the CWAP. The people of Chapel Hill are too smart, too well educated and too savvy to not see through such a sham.

Sincerely,
Theresa Raphael-Grimm
Ian S. Grimm

234 Huntington Dr.