September 4, 2018

SB 343

Senate Bill 343 mandates supplemental materials that have been received by the City Clerk's office that relate to an agenda item after the agenda packets have been distributed to the City Council be available to the public.

The attached documents were received in the City Clerk's office after distribution of the September 4, 2018, City Council meeting agenda packet.

Item 6.1

Valley Christian Center – Comment Letters

From: <kvnm@quiet-river.com>
Date: August 27, 2018 at 9:40:49 AM PDT
To: <janine.thalblum@dublin.ca.gov>
Subject: Agenda Item: Valley Christian Center and Schools Master Plan...

Good Morning Councilmember

Thalblum, I hope all is well with you today.

I write to you to express my **emphatic support** for the Valley Christian Center Master Plan. As such, I respectfully request and encourage you, and each of the City Council members, to **approve** the VCC/VCS Master Plan as submitted, **without** resorting to adding difficult, expensive, restrictive and/or punitive- type project overlays and conditions. Valley Christian Center and School are marvelous Community Citizens and good neighbors on that hill; respectful of others and interested to include and invite all the neighbors around the property to participate in wholesome, good, healthy, uplifting and positive activities for all families. It's a GOOD thing going on up there! And that goodness does not just stay up on that hill, but instead reaches-out to many others in Dublin and beyond.

My family and I are 24-year west-side residents of Dublin. I have a surveying and mapping business located here in Dublin, attend Valley Christian Church, financially support City Serve, and our a daughter attended VCS for 13 years and graduated from that School in 2014. She is doing fantastic, and we love how that church and school helped our family grow properly, helped us be better-equipped parents, mature as people and citizens, and serve our community along the way.

Being in the land development business, I have seen my share of planning commission and city council hearings in various cities in California and elsewhere. I have listened as various residents get-up to the

podium with quivering voices and expound on how one particular project or another is going to bring ruin upon their home values, bring irreparable environmental destruction upon the community, destroy the peace and tranquility of their backyard Bar BQ, create horrendous, snarling traffic jams, and bring financial ruin by disrupting the local economy, run-off business and the loss of jobs. Good Grief!

I remember when even some of my brethren from VCC spoke against the Hooters many years ago – although I have never been inside the establishment, none of the moral degradation and community decline has taken place yet that I can discern.

I listened during the Dublin Planning Commission hearing while a couple (very distant) neighbors got-up and said these types of things about the VCC Masterplan, AND they wanted to outright **kill the whole project**!! They asked the Planning Commission to deny the VCC request completely! What a unfair, self-absorbed, close-minded, fearful thing to say. These are people who evidently don't understand that VCC/VCS already has as an approved masterplan for property development that is much larger than what they currently have. IN addition, it is very likely that the development of the projects contained in the new revised Master Plan will be slow and measured over time. Each

application for any of the future development item will be thoroughly scrutinized and subject to the development regulations that would be in effect at that time.

In addition, these are people who evidently don't know, or don't care that VCC & VCS was a church and school on that hill long before they were, and long before Inspiration Drive Right-of-way was taken to serve the new homes. The neighbors up on that hill were informed of the school BEFORE they bought their homes. They may not understand it however, VCC relinquished, lost use and value of the property on the easterly side of the Inspiration Drive after it was constructed. In a City-led negotiation that was decidedly not in the best interest of VCC, the City and those downhill neighbors obtained a substantial permanent buffer along the easterly side of the property, and now it would seem a few of the downhill neighbors appear to want complete control over VCC and stop the natural growth and development rights of a long-time land owner.

Dublin is growing (a lot), and I personally am not a fan at all of the stacked-up, high-density units that have been approved in the City of late, nor the resultant, measurable and actual traffic congestion on Dublin Boulevard – but so be it. However please don't then turn-around and tell VCC/VCS, so sorry, we just can't accept any side-effects of YOUR growth and development. In the 24 years here, I have witnessed that the City has approved and invested in all types of expansion, growth and development still in process today (like IKEA). That development included various schools, parks and sports parks all over Dublin, each with its resultant and commensurate lights, noise, cheering fans, traffic, parking, and yes, even the bits of trash that blow away from each of those venues. It's called Life in the Big City.

So, in conclusion, I respectfully ask each of the City Council members to keep in mind a longer history of VCC/VCS, the value they bring to our City and its residents. Please maintain a recognition of what has already been approved, and that this new plan is BETTER, and please resist any temptation to believe Dublin and our resident will somehow be diminished and damaged by the approval of this Master Plan.

Thank you.

Respectfully,

Kevin M. McGuire, CA PLS #6437
Quiet River Land Services, Inc.
6747 Sierra Court, Suite
K Dublin, CA 94568
(925) 734-6788 Phone

From: Eric Sowl <eric.sowl@gmail.com>
Date: August 27, 2018 at 8:48:30 AM PDT **To:** janine.thalblum@dublin.ca.gov
Subject: Valley Christian Center

Dear Councilmember Thalblum,

Valley Christian Center and Valley Christian Schools are the center-point of my childrens' education, and the spiritual and social lives of my family here in Dublin. Were it not for VCC, we would not live in Dublin.

Please hear our voices and accept the master plan for improvement of the VCC campus in Dublin. The administration, faculty and staff at VCC/VCS are providing superior education for the children in our community and enriching the lives of those who attend services and supporting community events at the Center.

We know that Dublin benefits from a better Valley Christian Center and we thank you in advance,

- The Sowls, Matthew, Alexandra, Katherine and Eric

From: Jeff Gadd [mailto:jgadd@valleychristianschools.org]
Sent: Monday, August 27, 2018 2:07 PM
To: Janine Thalblum
Subject: Valley Christian Master Plan

Hello,

As an alum of Valley Christian Schools who is also a current parent and staff member, I have seen countless students come through our facilities and leave as great young men and women. I believe adding to our facilities with the proposed plan will give even more opportunity to develop these students into the leaders they can become! Furthermore, there will be an increase in the opportunities to develop community, with these families heading out into our awesome tri-valley ready to give back.

Thank you so much for considering the proposed plan.

Jeff Gadd
Director of Athletics
Valley Christian Middle School and High School
7500 Inspiration Drive
Dublin, CA 94568 (925) 560-6257

From: RoseMary Tuuri [mailto:rtuuri@valleychristianschools.org]
Sent: Monday, August 27, 2018 1:24 PM
To: Abe Gupta; Arun Goel; Janine Thalblum
Subject: Valley Christian Schools - Development Plan

Dear Council Members,

I have been employed at Valley Christian Schools since 1990. I appreciate the support the schools have received from the city of Dublin over the years as the school has transformed into a dually accredited educational institution offering a college preparatory program. As a member of a family of teachers and school leaders, public and private, I am happy to live in the tri-valley community where excellence in education is valued and educational choice is supported. After four years of strategic planning, I hope the city will once again approve plans presented to the City Council.

I urge you to vote in favor of the VCS development

plan. Kind regards,

RoseMary Tuuri
Assistant to the Head of Schools
Valley Christian Schools
Dublin, CA
Phone - 925-560-6240

From: Martha McNally [mailto:Martha@amarantdesign.com]
Sent: Monday, August 27, 2018 1:46 PM
To: Janine Thalblum
Subject: Valley Christian Center propsal

Hello,
I would like to express my support for the future building plans of Valley Christian Center.
It is my belief that having a facility that supports children and extracurricular activities is always a win for any community.

Being someone who lives near a local high school and can hear stadium sounds a few evenings a year does not diminish our community, property values or disturbs our peace. If anything our values remain high due to the closeness of a place our children can go to school and play sports, even if it is only walking the track. I know that VCC is a private school but the surrounding community will benefit from a fully planned school/church which includes a place for youth to meet, go to school and play sports.
Thank you

Martha McNally

From: Kathy Stewart [mailto:kathy.stewart372@gmail.com]
Sent: Monday, August 27, 2018 2:01 PM
To: Janine Thalblum
Subject: Support For Valley Christian Plan

Council Member Thalblum:
I am in full support of passing Valley Christian's Master Plan and will appreciate your and the Dublin City Council's support. Valley Christian School is raising up future leaders who could very well serve as a Dublin business leader including the City of Dublin. The Church is a foundation and pillar that welcomes anyone who desires to come to and stay connected with Dublin to worship, claim Dublin as home and potentially work, open a business and contribute to an already thriving city. Thank you in advance for your support.

Thank you, Kathy Stewart
kathy.stewart372@gmail.com

From: mlcam@aol.com
Date: August 27, 2018 at 3:24:04 PM PDT
To: david.haubert@dublin.ca.gov, melissa.hernandez@dublin.ca.gov, arun.goel@dublin.ca.gov, janine.thalblum@dublin.ca.gov, abe.gupta@dublin.ca.gov
Subject: Valley Christian Center Master Plan

Dear Esteemed Servants of Dublin,

I am writing to you today to implore you to approve the Master Plan for Valley Christian Center, to be considered at your September 4, 2018 meeting.

Valley Christian Center is important to many people, not only in Dublin, but also the Tri-Valley and beyond. *It has only what is good for our valley in its concern.* One powerful example of that is City Serve, which was birthed at Valley Christian Center, and now serves the entire Tri-Valley. I dare say that this one example alone takes an inordinate amount of pressure off the City of Dublin in serving people who have needs that, if not for City Serve, would have to be provided for by city and county governments.

Another example of the good intent toward the people of our valley is Valley Christian School which provides a valuable service to a significant group of people in our community. Many of our finest valley students have attended this educational institute and, after higher education, return to serve our communities. Not only does the school educate, but it also provides quality fine arts and sports in addition to religious training.

VCC provides recreation and teaches/reinforces good character skills through the summer Vacation Bible School program that reaches out to the whole community. VCC weekly supports people in recovery and those in jail. Divorce care and grief support are provided to the community through the church, along with *many* other areas that assist and enrich the lives of numerous people here in our neighborhoods.

With the approval of the Master Plan, Valley Christian Church can not only continue to help and serve those living in our extended community but also expand the areas in which people are ministered to in time of need.

Please cast your vote for the people of your community by allowing Valley Christian Church to expand their ministry areas.

Thank you for your consideration.

Mary Cameron

From: CHERIE MCMICHAEL <cheriemcmichael@comcast.net>
Date: August 27, 2018 at 6:08:00 PM PDT **To:** janine.thalblum@dublin.ca.gov
Subject: VCC Master Plan Approval
Reply-To: CHERIE MCMICHAEL <cheriemcmichael@comcast.net>

Dear Dublin city Council member:

I am writing in support of passing Valley Christian's Master Plan.

Valley Christian Center (VCC) was established 50+ years ago. They have been providing financial support and services to this city and its citizens for longer than most of Dublin's residential communities have been in existence.

VCC birthed City Serve as well as united churches and other organizations throughout the valley, in service to Dublin and its surrounding communities. Each year VCC and their partners provide thousands of volunteer hours of service to this community, truly making a difference in the lives of those who live in and around Dublin. These efforts have enriched and given hope to individuals in every walk of life. I have seen the difference VCC makes in the lives of their people, as well as in the lives of people who have never set a foot on their campus.

Community service is engrained in the hearts of the VCC students, and this community benefits from each and every one of these students, who deserve to reap the benefits of this Master Plan.

VCC has always gone above and beyond in servicing this city and its surrounding communities. They will undoubtedly continue to do so. Their architects and planners have done the research and hired area experts to mitigate any effects that lights, sounds, or traffic may have on any of VCC's neighboring communities.

Thank you for your consideration. I hope my Dublin family members can count on your support of VCC's Master Plan.

God Bless.
The McMichael Families

From: "Claire Hall"
<chhall3@comcast.net> **Date:** August 27,
2018 at 5:34:24 PM PDT **To:**
<janine.thalblum@dublin.ca.gov>
Subject: Concern regarding the Valley Christian School stadium project

Dear Councilmember Thalblum,

I, Claire Hall, am writing in concern of the proposed multi-sport stadium for Valley Christian School. As you are aware, Valley Christian School (VCS) is seeking FINAL approval to build a multi-sport stadium on Inspiration Drive. The pollution impact from the four proposed stadium light towers (60-70 ft. high), an amplified public announcement system, and the traffic from a 1100 seat stadium have not fully been explained by the planning commission or VSC.

The current plan has all the traffic flowing through one lane roads (Inspiration Dr. and Dublin Blvd), but traffic will undoubtedly overflow into the Hansen Hill community, Silvergate Drive and will clog Dublin Blvd in both directions horribly while the stadium is in use and the stadium has the capacity to be used during the days for PE, nights for practice and games (up to 10 pm) and on weekends.

Another point of concern is the fact that VCS was directed by the Commission back in 2016 to contact all Homeowners Association (HOA) that would be impacted by the stadium, but they did not at any time over the past two years connect with our Homeowners Association, which is directly impacted by this stadium project and the additional parking lots. Hacienda Heights has been in place for 30 years and has had the same registered P.O. Box for that amount of time, as well as being registered with the City of Dublin. We received our notification of the project by the City on August 7th through a mass mailing informing us of the upcoming Planning Commission meeting. We learned at that meeting that we
should have been contact in 2016.

Given the lack of due process given to us and the mounting number of unanswered questions regarding noise, lights and traffic, I am asking for a postponement of a final vote and approval to allow us the opportunity to study the amended master plan and prepare for an informed discussion with all parties involved.

The City's website states, "The City Council is responsible for enacting legislation, establishing policies, and providing guidance and direction for actions which affect the quality of life in the City". It is my hope that your will honor that statement and grant us time to process and question this stadium project which will definitely affect the quality of our life in the City.

Sincerely,
Claire Hall
Hacienda Heights Resident

From: <amyolee@leewei.com>
Date: August 27, 2018 at 5:23:31 PM PDT
To: <janine.thalblum@dublin.ca.gov>
Subject: Support - Valley Christian Center Planning Project

Dear Councilmember Janine Thalblum,

I am a resident of Dublin who wishes to express my support of Valley Christian Center's Master Plan. I attend Valley Christian Center regularly, and see the commitment of the church to provide a healthy and welcoming environment to its school.

The well-thought out Master Plan will be a major contribution to the community and the city. Thank you,
Amy Ong

Resident of 7771 Clifden Ct, Dublin, CA 94568

From: Carolyn Silvester <acarolyns@yahoo.com>
Date: August 27, 2018 at 4:23:06 PM PDT **To:** janine.thalblum@dublin.ca.gov
Subject: Valley Christian Master Plan
Reply-To: Carolyn Silvester <acarolyns@yahoo.com>

I just wanted you to know that I am in favor of passing Valley Christian's Master Plan on Sept 4th, 2018. My grandchildren go to Valley Christian School and my daughter and son-in-law both work for the school and Valley Christian Church. We have attended there for about 4 years. . It has been a very positive influence on our whole family and I believe it is a positive influence on the city of Dublin.

Thanks you for consideration of my support for this

project. Carolyn Silvester,
Member of Valley Christian Church.

From: Judy Johnson <judyjohnson@hotmail.com>
Date: August 27, 2018 at 8:46:03 PM PDT
To: "janine.thalblum@dublin.ca.gov" <janine.thalblum@dublin.ca.gov>
Subject: Valley Christian's Master Plan

Ms. Thalblum

Please vote in favor of Valley Christian's Master Plan. Valley Christian is not only a church and school, it is a body of believers but serve the Tri Cities through City Serve.

Judy Johnson

From: Tim Ludden <timludden@comcast.net>
Date: August 27, 2018 at 8:38:48 PM PDT
To: <david.haubert@dublin.ca.gov>, <melissa.hernandez@dublin.ca.gov>, <abe.gupta@dublin.ca.gov>, <arun.goel@dublin.ca.gov>, <janine.thalblum@dublin.ca.gov>
Subject: Valley Christian Center Master Plan

To the Honorable Mayor David Haubert, Vice Mayor Melissa Hernandez, Councilmember Abe Gupta, Councilmember Arun Goel and Councilmember Janine Thalblum...

My name is Tim Ludden and I am the Vice President of Operations for Strizzi's & Rigatoni's Restaurants. Our corporate office is located here in Dublin as is one of our seven restaurants.

I am writing to you this evening to ask you to support and approve the Valley Christian Center Master Plan as presented to you.

I attended elementary school here in Dublin when I was much younger. When my wife and I got engaged to be married 28 years ago this week, the first thing we did was to start looking for a church that we could attend together as a couple. We made a list of potential churches in the East Bay and the very next Sunday we went to Valley Christian Center. After that first Sunday we never even looked at another church. They were so welcoming and loving we couldn't imagine there being a better fit for us.

A year later we got married and began looking for a home to buy. We were both living in the East Bay at the time. While we did look in other cities we felt drawn to plant roots in the city in which our church was located...and so we did.

When our two children were born and were of the age to start attending Preschool and eventually Elementary, Jr High and High School we didn't even think twice about sending them to the school that was such a huge part of our church. Both our kids spent 15 years of their lives on that campus. They are currently 23 & 24 years old respectively and they have lived their entire lives here in Dublin. Our son is now a successful mortgage broker and our daughter recently completed an 8-month internship with the Pebble Beach Company and will graduate from Sacramento State University in December.

Valley Christian Center (both church and schools) have been a huge part of my families lives for 28 years now. While there have been opportunities over the years to move elsewhere, we have felt such a strong connection to Valley Christian Center that we simply could not imagine living anywhere else but right here in Dublin.

All of our closest friendships and even our greater circle of friends have been born, nurtured and developed at either Valley Christian Center or Valley Christian Schools. Our children have developed lifelong friendships because of their involvement in the schools. Our family has literally centered just about everything that we do around what goes on up on that hill each and every week.

Valley Christian Center is a vital part of the Dublin community and has been for over 50 years. For 28 of those years they have been a vital part of my family. Please help us make plans for the future development of the 49 or so acres that God has blessed us with on the hill.

Thank you for taking the time to read this and again I ask you to support and approve the Valley Christian Center Master Plan.

Tim & Lisa Ludden
7812 Mayan Ct
Dublin, CA 94568
(925) 989-1594

From: Holly Johnson [mailto:hjohnson@valleychristianschools.org]
Sent: Tuesday, August 28, 2018 9:44 AM
To: Martha Battaglia
Subject: Valley Christian School

Dear Ms. Battaglia,

While I do work for Valley Chrisitian, I wanted to reach out as a parent of 7 years at this school. I have 3 kids who moved here at the HIgh School level for 3 different reasons and this school community has been such a positive impact in our family.

My oldest started here to challenge himself with the great class offerings and AP classes as well as the ability to play sports and get involved in student government and clubs. Did you know that there is a Space Experimentation Club that only a handful of schools in the country get to participate in? Well he got involved and it helped shape his desire to study Aerospace Engineering at CalPoly. He is currently getting ready to start his senior year. He has also been in leadership roles with his fraternity and I truly believe going to Valley Christian helped shape him into a quality future employee we will have in the Bay Area.

My second son took a different path. He was not interested in challenging AP classes like my older but wanted to be more involved in the community helping fellow students. With the strong culture of service at Valley Christian, he got involved in Joni abd Friends during his High School summers being a "buddy" to special needs children at the camp. What also took root was a desire to become a youth pastor. He has helped in CityServe and is currently a part time employee in the youth department at a local church and a full time student at Las Positas. His hopes are to transfer to CDUEB next year and pursue a Communications degree. He was able to play sports all 4 years and participate in the many activites Valley offers.

My last child, currently a senior at Valley has dealt with some anxiety issues over the years and Valleys small class sizes and Advisory department has helped her tremendously. She is looking to go away to college and I feel that Valleys student support and equipping them to go to college has been a lifesaver for her. Although not Athletically gifted, she jumped in and play Volleyball for 3 years and was involved in Performing Arts. Now its about those college aps but I am so glad we have a counselor that can help kids every step of the way through their college process.

I write this to you to share that these are 3 personal stories. Coming from large public school systems, Valley has had a huge impact on their lives, and really gave each of them the opportunities they needed to succeed!

I could write to you and share many stories of student sucesses from my 7 years of employment there, but that might be expected as an employee. I wanted to share from a parent paying tuition side.

Thank you for the opportunity to share about my kiddos!

Holly Johnson

VALLEY CHRISTIAN

Holly Johnson
School Planning Manager
Valley Christian Schools
7500 Inspiration Drive, Dublin, CA 94568
925-560-6256
www.ValleyChristianSchools.org

From: Laura McLeod [mailto:lauramcleod13@gmail.com]
Sent: Tuesday, August 28, 2018 10:09 AM
Subject: Valley Christian Center

To our City Council and Dublin Leaders,

I want to personally share my support for the Valley Christian master plan. Valley Christian is vital institution for the tri-vially, not just for Dublin. We serve, educate, develop, and empower leaders of every generation across San Ramon, Livermore, Dublin, Castro Valley and Pleasanton. Shepherd's Gate, Valley Pregnancy Center and City Serve are only three of the non-profits that have yet to be birthed from our organization. We are committed to seeing the cities and communities around us THRIVE.

The approval of this master plan is extremely important for the development of the vision and mission of our organization and will be more of a benefit to all city dwellers.

I believe that the argument against our master plan regarding lighting and sound has been blown out of proportion, and the voice against us is small but they are yelling loudly.

Please approve the Valley Christian master plan.

I am an employee of 5 years, and I benefit from the Preschool facility for daycare for my son. I envision a long life ahead of us where we are involved in every aspect of Valley Christian and strongly believe

that Valley Christian is the launching pad for so much good in Dublin and the surrounding cities. Lights and sound for 6 night games per year is no reason to dismiss our building proposal.

Thank you
Laura McLeod
phone: 408-209-3978

From: Costa [mailto:whycookinc@gmail.com]
Sent: Tuesday, August 28, 2018 9:54 AM
To: David Haubert; Melissa Hernandez; Abe Gupta; Arun Goel; Janine Thalblum; Martha Battaglia
Subject: Valley Christian Center

Dear Committee Members of our Dublin City, My Husband I would like to start off by saying;

Thank you for the service and hard work to our city!!!

We are emailing to let you know how important & vital to our family Valley Christian center is. We have been members for 14 years and our boys attend the school. The church and school has been a great blessing and support to our family and we urge you to vote yes on the building project.

Sincerely,

Qustandi & Rima Kopti
From: Donna Carvalho [mailto:dpc56@hotmail.com]
Sent: Monday, August 27, 2018 9:38 PM
To: Janine Thalblum
Subject: Valley Christian Center's Master Plan

Hello Councilmember Thalblum,

My name is Donna Carvalho, and I have been attending Valley Christian Center for three years. I live alone in San Leandro, but I chose VCC for my place of worship, social community and personal growth. I have not once regretted my decision to drive over the hill to this location each week.

I want you to know that I support the passing of the Master Plan for Valley Christian Center because your vibrant town of Dublin needs this church on the property as well as the schools, from as young as infant-toddler in the preschool, all the way up to the high school.

It is important that you hear my voice on behalf of Valley Christian Center, along with those who live in Dublin, and who are in favor of the numerous positive benefits that VCC brings to the community at large.

Thank you for your time and for allowing me to share.

Sincerely,

Donna Carvalho
dpc56@hotmail.com
(510) 407-1794

From: Saul Drevitch [mailto:sdrevitch@valleychristianschools.org]
Sent: Tuesday, August 28, 2018 7:20 AM
To: Janine Thalblum
Subject: Please Support Valley Christian

My name is Saul Drevitch. I have been a teacher at Valley Christian School for 10 years. I am also a member of the Valley Christian congregation and a former resident of Dublin.

Through my close association with the city and with the campus, I have learned one significant and indisputable fact: Dublin is a better city and the Tri-Valley is a better region because Valley Christian exists.

I have been associated with a variety of institutions during my 35-year career in education and have never experienced a place like Valley. Both the Church, and the school it birthed and nurtures, put a remarkable value on outreach and service.

I am proud to be associated with this incredible institution and I humbly ask you to support the church's master plan so that the campus will be able to grow in ways that will allow it to be of even greater service to the community we share.
Thank you, Saul Drevitch

From: Nancy Seibert [mailto:gracexii@aol.com]
Sent: Tuesday, August 28, 2018 10:26 AM
To: MayorDavidHaubert@aol.com; David Haubert; ViceMayorMelissaHernandez@aol.com; Melissa Hernandez; CouncilmemberAbeGupta@aol.com; Abe Gupta; CouncilmemberArunGoel@aol.com; Arun Goel; CouncilmemberJanineThalblum@aol.com; Janine Thalblum
Subject: Valley Christian Master Plan

Dear City Gate Keepers,

I attended the recent city meeting to consider the proposals related to

VCC. I have been a member of VCC for almost 4 years.

I support the passage of resolutions related to the VCC Master Plan. The impact of light, landscape, noise, traffic and culture is all reasonable for the adjacent neighborhoods and location on the
hill. Mediating solutions are possible and addressed, for each concern.

The city of Dublin will benefit by the future fulfillment of sport field and other additions to the church and school property. Though it will be years until construction begins, the commitment, sensitivity and service to city needs- individual, school and public has been stated and will continue.

Please pass the Mater Planand observe our integrous commitment to building community, educating youth, stabilizing families, cultural inclusiveness, outreach, generosity, and living faith.

This is very important!

Thank you, Nancy Seibert

From: Brenda Fisher <fisher_brenda@att.net>
Date: August 28, 2018 at 12:59:30 PM PDT
To: janine.thalblum@dublin.ca.gov
Subject: Fisher vs. Valley Christian Project

Hi Janine,

Thank you for taking the time out of your busy schedule to meet with our Homeowners Assoc. last night. I attended the meeting and hopeful that you understood our concerns. Even though my husband and I share a fence with Valley Christian and next to the water tower we were NEVER notified or had the ability to share our input. Nor were the 25 homes within our homeowners association, where at least 7 homes share a fence. I also know of homes on Hansen Drive and Betlen Drive that were NOT notified, all within 300 feet of Valley Christian. We have just had a few days to review the 263 page document which I am still trying to review. Many parts do not make sense nor is the information clear. We are trying to learn more about the changes to the original master plan. I understand that a few other homeowners associations have been aware since 2016 and actively working with Valley Christian.

Here are a few of my concerns:

Long Term Effects of Athletic field - Noise and studies as it relates to noise with the Dublin wind

- Loitering/Partying(I already have issues of pot, smoking, drinking and noise from people on VC property)
- Traffic
- Property Values
- Other Events that it maybe used for and/or rented

We would like to ask that this agenda item for September 4th be postponed so that the residents can truly be informed and have a voice. This approval will have a BIG impact on our quality of life and property.

I trust you will do the right thing.

Kindest Regards,
Brenda Fisher
7448 Las Palmas Way
Dublin, CA 94568
925-413-0799

From: Elaine Moal <elaine@fcgainc.com>
Date: August 28, 2018 at 2:58:47 PM PDT
To: "david.haubert@dublin.ca.gov" <melissa.hernandez@dublin.ca.gov>, <abe.gupta@dublin.ca.gov>, <arun.goel@dublin.ca.gov>, " <janine.thalblum@dublin.ca.gov>, "martha.battaglia@dublin.ca.gov" <
Subject: Valley Christian Schools Master Plan

Dear Mayor Haubert + Vice Mayor Hernandez + Councilmember Gupta + Councilmember Goel + Councilmember Thalblum + Associate Planner Battaglia:

The Moal family of San Ramon is in support of passing Valley Christian's Master Plan because the Tri-Valley is in dire need of more high-quality education for the exponentially expanding population base. There are limited options in the Mount Diablo region for a faith-based school that goes through 12th grade - Valley Christian Schools is the only option in the Tri-Valley.

Rex, my son, just started 7th grade at Valley Christian Schools. At the new family welcome social, I met a parent who moved his family from Chicago to the Tri-Valley. He works for Genentech in the Silicon Valley. He told me he visited the Bay Area several times to decide where to live. In particular, with three children in school, his decision was based where his children would attend school. After looking around closer to work and other parts of the Bay Area, he decided on Valley Christian Schools. THAT was the determining factor on where the family would live.

Valley Christian Schools' improvements and growth will help the City of Dublin by giving residents an alternative for high school, along with many other benefits to the surrounding community AND draw more people to the City – to eat, shop, play... may be, even work and live.

Please pass the Valley Christian School's Master Plan.

Respectfully submitted,

Elaine Moal
Business Development | Marketing
925·678·2003 d
925·820·7585 o
925·856·2922 m
FCGAarchitecture.com

FCGA **architecture**
a California corporation
301 Hartz Avenue Suite 213
Danville California 94526

From: Sandy Brunson <sandystitches@comcast.net>
Date: August 28, 2018 at 2:39:44 PM PDT
To: david.haubert@dublin.ca.gov, melissa.hernandez@dublin.ca.gov, abe.gupta@dublin.ca.gov, arun.goel@dublin.ca.gov, janine.thalblum@dublin.ca.gov
Subject: Support for Valley Christian's Master Plan
Reply-To: Sandy Brunson <sandystitches@comcast.net>

Dear Dublin City Leaders,

We are in support of the future growth and Master Plan for Valley Christian Center and Schools. Valley Christian is an asset to our young people through it's schools and also through it's connection with the community via City Serve of the Tri-Valley. Many gifted and talented future leaders have attended and graduated from Valley Christian High School. This Plan will allow for the anticipated future growth of Valley Christian Schools in the Tri-Valley Community.

We have lived in Dublin for 35 plus years within a block of Dublin High School. During this time we have not experienced any undue hardship from the high school activities. We believe that Valley Christian will also be respectful of it's neighbors and community and will bring additional revenue to restaurants and retail in the area.

Please respectfully consider passing Valley Christian Center's Master Plan.

Respectfully,

Bill and Sandra Brunson

From: Lorraine Demmel <lorraine.demmel@gmail.com>
Date: August 28, 2018 at 2:17:42 PM PDT
To: Councilmember Janine Thalblum <janine.thalblum@dublin.ca.gov>
Subject: Valley Christian Center Master Plan

I am a Dublin resident of 52 years and have been a property owner since 1969. We moved here before Dublin was incorporated and became a city in 1982. I started my marriage here, raised my family here, buried my husband here; my son is raising his family here and is a business owner. I love Dublin!

We bought our home in the Silvergate area when the cows were on the hills in our back yard. We loved our community then. As growth came to Dublin, we grew and changed with it... we didn't object to it. We still love Dublin! I'm wondering how many of your homes would be here had we objected.

Inspiration Drive was a 2 lane private road on their property; it was not there until Valley Christian gave permission for it to be a public road when homes were projected to be built. Valley Christian has been a part of this community since 1963, purchasing property (McNamara's Restaurant) and building a church and starting a school in 1968, moving the school to Dublin Elementary and the Church to Dublin High Little Theatre when they outgrew the facilities on San Ramon Rd. The church was moved on the property in 1982 having completed 3 buildings along with the preschool.

Needless to say, VCC has been an integral part of this community, and has had a school for 50

years. Before homes were built around it, Valley Christian Schools were here. There has been no secret a school resides on the property. A school has students, parents, teachers and staff with lots of events including sports and a church has weekend and evening events.

I am in favor of Valley Christian Center's Master Plan for their property.
Please cast your vote for Valley Christian Center's Master Plan on September 4th. What is being requested for the build out of the property is not for the immediate future and is certainly not unexpected knowing a school has existed.

Come on, Dublin! Make us proud!
Lorraine Demmel

From: Larissa Tomanek <ltomanek@gmail.com>
Date: August 30, 2018 at 9:40:33 AM PDT
To: janine.thalblum@dublin.ca.gov
Subject: Please support Valley Christian's Master Plan

Hello Councilwoman Thalblum,

I am writing to ask you to please support Valley Christian's Master Plan. I have a child that goes to school there and she loves her school! My son will also be attending Valley soon as well. Valley Christian's expansion of its sports program and field is a great asset to both the community and the City of Dublin. We need to foster and support, excellent private education in our wonderful city. In order to do this, Valley Christian must grow in the future in order to be able to offer first class sporting and educational opportunities to its students. We are proud Valley Christian is celebrating its 50th year in our city of Dublin!

Thank you for your consideration,

Larissa Tomanek
Vice President

TOMANEK, LLC
7950 Dublin Blvd., Suite 207
Dublin, CA 94568
408-515-4500 Cell
510-404-7023 E-fax
ltomanek@gmail.com

From: Steve Johnson <stevejohnson1357@gmail.com>
Date: August 30, 2018 at 9:55:52 AM PDT
To: david.haubert@dublin.ca.gov, melissa.hernandez@dublin.ca.gov, abe.gupta@dublin.ca.gov, arun.goel@dublin.ca.gov, janine.thalblum@dublin.ca.gov, martha.battaglia@dublin.ca.gov
Subject: Support of Valley Christian's Master Plan

Good Morning Dublin City Council,

I'm a parent of three Valley Christian students (2 alum and 1 senior), and I would like to voice my support for Valley Christian's Master Plan that is before you for consideration.

I live near Amador Valley High School in Pleasanton where the Friday night experience is an important part of the community where people come together as families to celebrate. It's a central gathering place for young and old from all different backgrounds to talk, eat, laugh, cheer, and support their friends, family, and community.

Where else can you find this type of community connection. It's less about the buildings and fields, which are important to provide the place, but more about the people and community coming together as one.

I would like to support the Master Plan so future generations (including my kids as alumni) can experience this type of community like other schools in the area, so they too can show pride in their school.

Thank you for your consideration.

Regards,

Steve Johnson

(a Pleasanton resident since 1996)

From: Larry Lopez <llopez@valleychristianschools.org>
Date: August 30, 2018 at 10:25:05 AM PDT
To: david.haubert@dublin.ca.gov, melissa.hernandez@dublin.ca.gov, abe.gupta@dublin.ca.gov, arun.goel@dublin.ca.gov, janine.thalblum@dublin.ca.gov, martha.battaglia@dublin.ca.gov
Subject: Master Site Plan - Valley Christian Center

Mayor David Haubert, Vice Mayor Melissa Hernandez; Council Members Abe Gupta, Arun Goel, Janine Thalblum; Associate Planner Martha Battaglia,

I have been an employee of Valley Christian Schools since August 2009 and have served in the capacity as high school and middle school principal (2009-2014), athletic director (2014-2017), and elementary principal (2017-). During my tenure at Valley Christian, I have had the opportunity to engage with our families, neighbors, and surrounding community as students have attended school, participated in on-campus before and after-school activities, and traveled off-campus to other venues for athletic

events. Two of my children have graduated from Valley Christian (2016, 2018) and I have another child that is currently a junior in high school. The education, character development, and city-reaching community service opportunities provided by Valley Christian have allowed my children to become effective members of the Dublin community and beyond.

As I consider effective models of educational institutions within our local community, I have witnessed the expansion and development of schools to enhance learning opportunities for children. Being a resident of the Dublin community since 2010 at 7423 Limerick Avenue, located next to Dublin High School, I have been seen the development of the site to meet the needs of its growing student population. In early 2014 at Dublin High School, Phase 3B began and the construction of the Performing Arts Center, cafeteria remodel and band rooms. In 2014-2015, Phase 4 construction took place to enhance the gymnasium, quad area and the demolition of the Little Theater. A current project at DHS is the demolition of Building EE and the new construction of the Engineering and Science Building to be completed in 2020. As a resident of the Dublin community, I see the long-term benefits in maximizing the educational opportunities for children and would be negligent and shortsighted as a citizen to limit those opportunities.

The education of children is a community endeavor that requires all citizens to train up a child in the way they should go. As I understand the contentious arguments regarding the development of the Master Site Plan for Valley Christian Center, the concern I have is the lack of consideration of what would be best for the child. Children need to be provided effective learning environments within the classroom and, equally important, beyond the classroom. The development of effective athletic opportunities will provide children with mentorship, team dynamics, self-discipline, character, and lasting pride not only in their team and school, but also in the community that supports them in their endeavors.

I fully support and ask the City Council to accept the Master Site Plan of Valley Christian Center and allow the children attending Valley Christian Schools the same opportunities afforded to their peers in our local community. The enhancement of the site, located at 7500 Inspiration Drive in Dublin, will provide long-term benefits to the community as we develop creative, thoughtful and courageous young leaders that have been serving our local community and beyond since the establishment of the school in 1968.

Sincerely,

Lawrence Webster Lopez
Resident of Dublin since 2010
Principal of Lower Schools
Head Coach Varsity Track

From: Carolyn Mariot <carolyn.mariot@gmail.com>
Date: August 30, 2018 at 9:46:12 AM PDT
To: janine.thalblum@dublin.ca.gov, david.haubert@dublin.ca.gov, melissa.hernandez@dublin.ca.gov, abe.gupta@dublin.ca.gov, arun.goel@dublin.ca.gov
Subject: What Valley Christian Schools Means to Me

Hello Dublin City Council,

I am taking a moment to let you know what Valley Christian Schools, namely the preschool, has means to my family. My three year old daughter is currently enrolled in the Valley Christian Preschool and my five year old just completed the Pre-K program in May.

Valley is a place where my daughters are known and loved. Their faith and self confidence have grown so much through the program Valley offers. My five year old was so well prepared to enter kindergarten this year. She has developed both the academic and social skills which has made starting school an easy transition.

This is due to the high quality of administration and teachers at Valley. Each person at Valley is a talented, experienced professional who has a heart for children and service.

As a working parent, I can't begin to describe the peace I have knowing that when I am at work, my children are in the care of a team of people who are helping them grow into thoughtful, caring individuals who see value in themselves and others. We have been a part of the Valley community for four year. My daughters are excited to come to campus each day and be a part of the loving community created on this hill.

I am in support of the Master Plan Valley Christian is proposing. The school does excellent work in developing the character and instilling a love for learning in their students. I believe their proposed plan will benefit the Tri Valley Community.

Thank you for considering my perspective,

Carolyn Mariot

From: Karen Lester [mailto:mzsparklez2014@gmail.com]
Sent: Thursday, August 30, 2018 12:52 PM
To: City Council
Subject: Valley Christian Center re-zoning and explansion

I don't want any expansion up on the hill. I remember vividly when they expanded many years ago. My whole neighborhood was covered in dirt and debris. Especially my backyard patio area and pool. They were full of dirt and I had to replace pool equipment because it couldn't handle all the dirt blowing down off their construction site.

We already have way too much traffic in Dublin clogging our streets, we definitely don't need more.

I certainly hope you reconsider the impact this will have on the community.

From: Kristen Martin <kristenjmartin@gmail.com>
Date: August 30, 2018 at 2:58:01 PM PDT
To: council@dublin.ca.gov
Subject: Valley Christian Center football field

To whom it may concern,

I'm writing in opposition to the proposed football field expansion that Valley Christian is wanting to complete, specifically as a homeowner right next to the proposed location. When I purchased my home a few years back, I was told the hill behind my home was a greenbelt and that no construction could or would happen behind it. I enjoy the quiet at home and I don't see how a new construction and football games and any other events that will happen there are conducive to maintaining it. While I am not opposed to progress in the community, I don't believe that creating additional traffic, bright lights, and amplified noise are necessary. I firmly believe that California Highlands, the housing complex literally right next to the proposed location, deserves to remain the quiet and peaceful place it has always been.

Sincerely,

Kristen Martin

7429 Brigadoon Way

Dublin, CA 94568

From: Magdalena Kazberuk <mkazberuk@valleychristianschools.org>
Date: August 30, 2018 at 9:16:13 PM PDT
To: david.haubert@dublin.ca.gov, melissa.hernandez@dublin.ca.gov, abe.gupta@dublin.ca.gov, arun.goel@dublin.ca.gov, janine.thalblum@dublin.ca.gov
Subject: Vote YES in support of passing Valley Christian's Master Plan

Dear Mayor, Vice Major and Council Members of Dublin,

Both schools and churches are deeply interested in helping people learn and work toward wholeness and better character. It makes sense for these two great institutions to work together to improve communities. Partnerships between churches and schools are a natural progression toward meaningful community engagement and ultimately a glimpse into the kingdom of God.

I am a firm believer that schools, churches and community are one unit and partnerships with all sectors of the community are essential to helping children reach their maximum potential. Community collaboration with schools complements and reinforces values, culture and the learning opportunities that schools can provide for their students. We need it in Dublin.

Valley Christian Church and Valley Christian Schools work hard to provide students with an incredible educational experience. You can assist us by voting YES in support of passing Valley Christian's Master Plan.

Sincerely

Magdalena Kazberuk
AP Physics/AP Calculus/Pre-Calculus Teacher
ISS Project Mentor

From: Eloise Hamann <eloisehamann@gmail.com>
Date: August 30, 2018 at 5:17:48 PM PDT
To: council@dublin.ca.gov
Subject: The proposed new multiuse field proposed by VCC's impact on the surrounding residential community

Dear council members,

The proposed new multi-use field by VCC needs much more written definition. The field if built will be permanent. There needs to be written assurance that its use will not destroy the surrounding community's peace and quiet. What the current congregation and pastors envision now may not be tomorrow's vision.

I personally have no problem with six home football games, but my understanding is that there is a possibility of over 220 events per year. Currently, during the school year we can hear their PA system announcing reminders to students in our yard on Inclined Place. A PA system blasting even closer to residential homes 220 times per 365 days amounts to noise 2 out of 3 days per week and is simply unacceptable.

The planning committee needs to go back to the drawing board and explicitly protect the surrounding residential community now and in the future from excess noise and attendant disruption.

Eloise Hamann

From: Lily Wang [mailto:eewang08@gmail.com]
Sent: Friday, August 31, 2018 2:28 PM
To: City Council
Cc: Abe Gupta; janice.thalblum@dublin.ca.gov; David Haubert; Melissa Hernandez; Arun Goel
Subject: Request To Postpone Vote On VCC Development Plan

Dear Dublin Council members,

We are writing to express our concern on the proposed Valley Christian Center athletic field project.

We have not been formally informed of the proposed development or the Planning Commission Meeting on Aug 14 2018. The city excluded us and many of our neighbors from the notice because we are not within 300ft of the project. We are discontented with this exclusion, since we could be adversely impacted by the use of the sports complex.

While the addition of the athletic field will certainly be valuable for the enjoyment of the students at VCC, we are concerned with the use of the field. Like many of our neighbors, we live on the hills and thus are very vulnerable to excessive noise. Noise from the events and the traffic before and after the events will severely impact our normal life, especially to our little kids whose bedtime schedule is early. The more the number of events, the more the impact.

VCC's proposal did not specify whether the field would be used exclusively by them. Any use beyond their own needs will bring a large number of non-residents into our neighborhood, posing threats of burglary and other criminal activities. There are quite a lot of children in the neighborhood, to maintain peace and safety of our community means more protections to our children.

Given the scope of the VCC's future development plans and the insufficient time of notice we were given, we strongly urge the Council to postpone the final decision on the plan until we all have enough time to review the proposal and assess the implications. We also urge the city to include more affected residents into its consideration by giving us sufficient notice when future development proposals arise.

Sincerely, Aili Dong & Dong Wang

7155 Inclined Pl, Dublin, CA 94568

From: Amy Pao [mailto:amycpao@gmail.com]
Sent: Friday, August 31, 2018 9:56 PM
To: Martha Battaglia
Subject: Valley Christian: Public Hearing

As a resident of California Highlands, I oppose the plan to build out the Valley Christian campus over time. Not only does it come extremely close to the California Highlands community, but it also cuts into wildlife habitat. Continuing to modify previously developed zoning plans will disrupt the peace and tranquility of the existing community and wild animals. There are still families of deer who come through the hills where Valley Christian is planning to build. Preserving their habitat is more important for future generations than a football field or parking lot. Valley Christian's part-time use of a sports field

and parking lot will permanently damage the hills that are reminiscent of Dublin's namesake. Please do not approve this plan which promotes urban sprawl.

Thank you.

Amy Pao

From: Arlene Wong <joyfulway@comcast.net>
Date: September 3, 2018 at 11:53:34 AM PDT
To: david.haubert@dublin.ca.gov, melissa.hernandez@dublin.ca.gov, janine.thalblum@dublin.ca.gov, arun.goel@dublin.ca.gov, martha.battaglia@dublin.ca.gov, abe.gupta@dublin.ca.gov
Subject: Valley Christian Center Master Plan

Honorable members and staff of the Dublin City Council,
I have been a member of the Valley Christian community since 2005. Both of my kids have been students of the school since kindergarten. My older one graduated just this May and has gone on to college choosing Christian ministry as his career goal. Valley Christian has done a fantastic job not only in education - nurturing fine young people with high moral standards, teaching them to be "salt" and "light" wherever they live and work, and to be good citizens helping people in need, Valley Christian is also actively partnering with Dublin and neighboring cities in various community causes. Approving this plan will greatly help Valley expand its good works and be more effective. I respectfully ask that the Council approve the proposal.

Thank you.
Arlene Wong of the Valley Christian Center Congregation

From: Mary Ackley <mgackley@ackind.com>
Date: September 3, 2018 at 3:44:17 PM PDT
To: <david.haubert@dublin.ca.gov>, <melissa.hernandez@dublin.ca.gov>, <abe.gupta@dublin.ca.gov>, <arun.goel@dublin.ca.gov>, <janine.thalblum@dublin.ca.gov>
Cc: <rvalci@comediscovervcc.org>
Subject: Valley Christian enter Master Plan

Valley Christian Center's master plan will be presented to the Dublin City Counil on Tuesday, September 4. VCC has been a light on the hill for over 60 years being a leader in bringing Dublin together through involvement, worship, school, outreach, training, and much more. We need to be able to put our plan in place for serving better in time, talent, finances, ideas, and volunteering in the years to come.

Thank you,

Mary Ackley
Resident of Dublin for 42 years
Member of Valley Christian Center for 41 years

From: S White <NLDAadmin@juno.com>
Date: September 2, 2018 at 5:27:26 PM PDT
To: <council@dublin.ca.gov>
Subject: vote IN FAVOR of allowing Valley Christian Schools to reposition their football field

Hello,

A football field has been part of the master plan for VCC for many years, and repositioning the (already existing) field should be viewed as only a minor adjustment to an already existing and approved master plan. After all, VCC owns the property, and no taxpayer dollars are involved. VCC has already paid megabucks to improve the roads and add other modifications (e.g., traffic lights), so that traffic runs smoothly past their campus.

Please use good judgment and approve the proposed changes to the VCC master plan.

Thanks!

Sharon White

8340 Rhoda Ave, Dublin

From: Rachel Webb <rrachelwebb@aol.com>
Date: September 3, 2018 at 9:02:27 PM PDT
To: janine.thalblum@dublin.ca.gov
Subject: Valley Christian Master Plan

Dear Councilwoman Thalblum,

I am sending you this important email to give my support to Valley Christian's Master Plan. VCC has been my strongest support system since 1995 when my son started Pre-School even after 2008 when he finished high school at Valley Christian High School. VCC has always been a very important part of Dublin's growth. It is through VCC's ministry that CityServe, a very respected Non Profit Organization in the Tri-Valley, was created.

Thank you for listening.

Sincerely,
Rachel Webb
VCC member and Dublin resident

From: Dennis Ackley <dcackley@ackind.com>
Date: September 3, 2018 at 6:45:56 PM PDT
To: <janine.thalblum@dublin.ca.gov>
Cc: <dcackley@ackind.com>
Subject: Valley Christian Center Master Plan

Dublin City Council:

I'm writing you in support of the Valley Christian Center master plan which will be in front of the city council on September 4th. VCC has been a strong community-minded leader in this valley for over 60 years and this only strengthens our position. Being able to plan ahead for the next 20-25 years allows us to be better stewards of our resources of time, talent, and finances. Thank you for your support as we work toward building a stronger Dublin.

Dennis Ackley
Dublin resident since 1976
VCC member since 1977
Dublin Rotary Foundation B.O.D

From: KATHY AVANZINO [mailto:avanzink@comcast.net]
Sent: Tuesday, September 04, 2018 9:55 AM
To: City Council
Subject: VCC Rezoning & Expansion

To the Mayor and Members of the City Council,

As a resident of the California Highlands I respectfully request you defer/postpone any decisions on the VCC expansion, and provide additional time for citizens to evaluate and respond to the proposal and its impact to the west Dublin communities.

We would also need VCC to have the time and opportunity to adequately address community concerns before the final decision.

Respectfully,

Kathy Avanzino

Dublin Leadership Academy Graduate

Former City of Dublin Housing Committee Member

10767 McKay Lane, Dublin, CA

avanzink@comcast.net

925-918-2483

From: MICHAEL SEILER [mailto:mmseiler0223@comcast.net]
Sent: Tuesday, September 04, 2018 11:10 AM
To: City Council
Subject: Proposed Valley Christian Center Athletic Field and Stadium Re-Zoning and Expansion

Dear Dublin City Council,

We are Dublin residents and own a home very close to Valley Christian Center. And we are registered voters. We strongly oppose the proposed re-zoning and expansion of Valley Christian Center and addition improvements to it's athletic field/stadium.

Valley Christian has already not shown themselves to be responsible planning events at their facility with parking spilling over into our neighborhood for their science fair and their athletic field PA system blaring loudly for the whole neighborhood to hear. We oppose any expansion of their facilities that will increase these problems. Also, we understand that the proposed re-zone and expansion does not set any limits to use of the facility, including allowing to be rented out for events that do not even have anything to do with Valley Christian church or school. Such an expanded athletic facility Should not be allowed in a residential neighborhood and will hurt our property values.

Fire safety is an additional concern. With wild fires increasing every year, over crowding parking and traffic of Inspiration Drive will simply add to the danger. Crowds coming to the area will increase the possibility of a human event causing a fire in the surrounding grass land exactly when there are too many people in the area for them to escape of for emergency vehicles to access the area of the fire.

Inspiration Drive and it's intersection with Dublin Blvd is not designed to handle the kind of traffic that will result from big events at the expanded athletic field/stadium.

Sincerely,

Michael, Marianne and Regina Seiler

11056 Inspiration Circle, Dublin, CA

From: norbert lewandowski [mailto:norm.lewandowski@att.net]
Sent: Tuesday, September 04, 2018 10:35 AM
To: David Haubert; melisa.hernandez@dublin.ca.gov; Arun Goel; Abe Gupta; Janine Thalblum
Subject: Valley Christian Alarming Summary Report for Field Usage

September 4, 2018

Dear Mayor and Council Members,

I am a Dublin resident and my home is located right below Valley Christian Center (VCC).

I first heard of the VCC Expansion Project postcard notification in the mail from the city 8 days prior to city Planning Commission Meeting on August 14. VCC's presentation to the Planning Commission described the athletic/stadium field with its lights and amplified sound as only 7-9 football games with some additional soccer & track games. This is the same messaging that VC has been sharing with the neighborhoods. I am writing this letter to share with the City Council the scope of what is actually in the 263 page VCC Proposal. Please reference attached Summary report of VCC Supplemental MND Report on Noise as related to the number of planned use of the athletic field/stadium.

Regarding the athletic field/stadium, there are 327 sporting activities and 249 days of use of athletic field/stadium based on actual games and practices over the course of 10 months for Football, Soccer and Track. Lights will be required due to the time of year and time of day in use. Sound will be used for all games and there is no wording that prevents sound from being used during all the practices.

The Amphitheater will be in use 232 days of the year for school lectures, Bible College lectures, Sunday sermons and summer theatrical plays and other events. Sound & Lights will be used for these events.

With lights, sound and option for sound at almost all of these events, you are looking at a serious intrusion into the lives of approximately 2000 families that live in close enough proximity to hear the noise pollution. It's a lot, lot more people than the 300 ft perimeter that the city was required to inform. The noise from this amount of activity will profoundly affect the lives of my neighbors and community.

Currently VCC has their games and practice on the back side of the property away from the homeowners and without lights or sound. The new location right over tops of our homes will bring all of this noise practically to our doorsteps. I can hear conversations of people on VCC property from 1000 ft away. How am I supposed to live with almost a constant daily noise pollution that will be a result of this Project.

I ask that you do not approve this project as written. It is a grandiose plan for a Private School with a total enrolment of 104 high school students. It takes away our homeowners right to a peaceful and tranquil environment.

Sincerely,

Norm Lewandowski

VCC Supplimental MND Report on Noise

Football - (August to November 16 weeks) p. 176

Games:	9 max (4- 10 pm) Lights & Sound	
Practice:	5 days/wk (3-5:30pm) 16 weeks = 80 total days	Lights, no wording preventing sound
Total	89 total days.	

Mens Soccer - (November – February 14 weeks) p. 178

Mens Games:	2 game /wk (3:30-7:30) + Sat (1:30-3:30)	28 total days Lights & Sound
Mens Practice:	3 days/wk (3-5:30pm) 14 weeks	42 total days Lights, no wording preventing sound
Total	70 days	

Womens Soccer - (February – May 14 weeks) p. 178

Womens Games:	12 games (4-6 pm)	12 total days Lights & Sound
Womens Practice:	5 days/wk (3-5 pm) 14 weeks	70 total days Lights, no wording preventing sound
Total	82 days	

Track - (February – May 14 weeks) p. 179

(.22 calibre starter pistal during meets)

Games:	4 track Meets (2-6 pm)	4 total days Lights & Sound
Games:	4 Invitational Meets (9am -6 pm)	4 total days Lights & Sound
Practice:	5 days/wk (3-5 pm) 14 weeks x 5	70 total days Lights, no wording preventing sound
Total	78 days	

Amphitheater - (52 weeks/yr) p. 178

School Lectures	(daytime)	180 total days	Sound
North CA. Bible College	(evening)	180 total days	Lights & Sound
Theatrical Plays	(summer)	?	Lights & Sound
Sunday Sermons	52 days		Sound
Total	232 days		

Sports Events	249 days 327 Events
Amphitheater	232 days

August 23, 2018

Martha Battaglia
Associate Planner
City of Dublin
100 Civic Plaza, Dublin, CA 94568

RE: Valley Christian Center Master Plan

Dear Martha;

My family moved to Dublin in October 1999, and purchased a home that was under construction in the Hansen Hill neighborhood. We chose this neighborhood because we enrolled our 3 children in the Valley Christian Schools, and living close to the VCC campus would allow them to walk to school and for us to be a part of the Valley Christian Community. My family is also a part of the Valley Christian Church community.

Since that time, my 3 children have graduated from Valley Christian High Schools, and we continue to support the school community and church. Valley Christian's Master Plan is consistent with the growth vision for the school and church. When I purchased my home in Hansen Hill, I was aware that I would be living in a community that was adjacent to a private school that owned 50 acres, and would likely be expanding at some point.

Full disclosure, I am an Elder in the Valley Christian Church, and have served on the Valley Christian School Board. I am currently the Chairman of the Valley Christian Bldg. Committee, and have been involved in the direction of the Master Plan.

Sincerely,

Richard Lietz
10890 Inspiration Circle
Dublin, CA 94568

August 23, 2018

Martha Battaglia
Associate Planner
City of Dublin
100 Civic Plaza, Dublin, CA 94568

RE: Valley Christian Center Master Plan

Dear Martha & City Commissioners of Dublin;

My name is Miriam Lietz, and I live at 10890 Inspiration Circle in the Hansen Hill neighborhood. My family moved to Dublin 20 years ago when our three children were in elementary school. We sent all three of them to Valley Christian Schools, and they've now graduated and are either attending university, or have graduated from a secondary school. We love Valley Christian Schools and Church and the contributions that they make to the Dublin and Tri-Valley area.

I am in support of the Master Plan that will be going before the Dublin City Commission on Sept 4th, which will allow the school to continue to grow and thrive, and better serve the community. Please vote favorably for the Valley Christian Master Plan, so that they can continue to provide a quality Christian education in the areas of academics, arts and sports.

Thanks for taking the time to read this letter.

Sincerely,

11221 Las Palmas Ct.
Dublin, CA 94568

August 29, 2018

VIA EMAIL: *council@dublin.ca.gov*

Dublin City Council
100 Civic Plaza
Dublin, CA 94568

RE: Request for Sixty-Day Continuance Regarding Valley Christian Center Planned Development Zoning Amendment and Site Development Review Permit (PLPA-2014-00052) for the Project site located at 7500 Inspiration Drive

Dear Mayor Haubert and Honorable Members of the City Council:

My husband and I have been living in West Dublin since 1997. When we were searching for a house to buy 21 years ago, we purposefully chose a hilltop location because we treasure the view, tranquility, and seclusion. Like all other home owners, we value our right to quiet enjoyment of our property and want to protect this. It has recently come to our attention that the Valley Christian Center (the "**Applicant**") has plans to build a lighted athletic field with sound amplification, parking lot, concession stand, ticket booth and associated land improvements (hereinafter, collectively referred to as the "**Project**") right behind our property. We and other neighbors who live in very close proximity to the Project site have grave concerns about the magnitude of the progress made thereon without our knowledge and/or involvement. In light of the upcoming City Council's September 4th meeting, I, for myself and on behalf of all interested parties, hereby submit this Request for Continuance so that we are afforded a fair and just opportunity to review, understand, analyze and respond to various submissions provided by the Applicant in connection with the Project.

Based on our limited review of various Project-related documents posted on the City's website, we provide below our preliminary concerns in support of our request herein:

A. Even though the Applicant allegedly met with the Hansen Ranch and California Highlands neighborhood in August/September 2016 upon the City's requirement that the Applicant conduct public outreach to the surrounding neighborhoods to discuss the Applicant's proposed plans, our neighborhood, which would be most impacted by the Project, has never been contacted by the Applicant. We found out about the Project only eight days before the Planning Commission's meeting on August 14. The Applicant's failure to conduct outreach to the surrounding neighborhoods, as required by the City, has materially and adversely impacted our ability to raise our concerns in due course.

B. Since we never received a proper notice from the City regarding the circulation of the Initial Study/Supplemental Mitigated Negative Declaration ("**Supplemental MND**") dated June 8, 2018 for public review, we have not had the opportunity to review and properly respond thereto, challenging the Applicant's various misstatement of facts, miscalculations, misplaced theories,

misuse of certain methods and methodologies, etc. included therein and in other submissions provided by the Applicant to the City *(such as the EIR)* and ensure that there is sufficient remediation to fix deficiencies therein.

C. Since the Project has the potential to negatively impact the surrounding neighborhood and our property values, we request that certain restrictions, limitations and conditions be imposed upon the Applicant to avoid post-decision ramifications. This can be accomplished only by giving us the opportunity to engage in discussions related to the Project, but such discussions can only take place after we independently conduct a technical analysis of the Applicant's submissions and the City's responses thereto.

We are concerned about and believe the proposed use of the Project site will:

i. Adversely affect the peace, health, safety and/or welfare of persons residing in the surrounding area; and
ii. Impair the utility or value of property located in the vicinity of the Project site.

We understand that whenever an entitlement process is moving forward under time pressure, there are many moving parts involved in such a process. However, we believe that there is significant evidence to the contrary that should be considered before moving forward with the Project. For the aforementioned reasons, we respectfully request that the City Council continue the matter for sixty days to provide an opportunity for further dialog and full vetting of the Project considerations before proceeding.

Sincerely,

Gigi Remington, Esq.
Attorney at Law

cc: Chris Foss, City Manager, City of Dublin, via email chris.foss@dublin.ca.gov
Caroline P. Soto, City Clerk, City of Dublin, via email caroline.soto@dublin.ca.gov

September 3, 2018 ***VIA EMAIL:*** council@dublin.ca.gov

Dublin City Council
100 Civic Plaza
Dublin, CA 94568

RE: Valley Christian Center Planned Development Zoning Amendment and Site Development Review Permit (PLPA-2014-00052) for the Project site located at 7500 Inspiration Drive

Dear City Council Members:

I have a PhD in nuclear physics and am the Discovery Science Program Manager, a senior scientist and Distinguished Member of the Technical Staff at Lawrence Livermore National Laboratory (LLNL). I am also a fellow of the American Physical Society (APS), recipient of the APS Excellence in Plasma Physics award (Dawson award), recipient of the American Nuclear Society Excellence in High Energy Density Physics award (Teller award), and author/coauthor of over 400 in the scientific literature on nuclear physics, plasma physics, high pressure materials science, and laboratory astrophysics.

I am writing to you regarding my concerns over the Valley Christian Center's (VCC) plans to develop a stadium, which will be situated about 500 feet away from our property. The increased noise levels projected to result from this development have not been adequately assessed or analyzed. Three points need to be raised as follows:

1. In their report, VCC say that they accounted for sound attenuation due to distance and topography, and conclude that the increased noise level from the project would be up to 1 dB. They do not mention the effects of wind and temperature gradients. For noise from VCC traveling downwind, the effect of wind can cause refraction (or bending) of the sound waves downwards towards the ground, enhancing the sound strength that reaches the surrounding neighborhoods. Our initial estimates, based on published scientific literature suggest, depending on frequency, that the noise level increase due to wind on the downwind side could be up to ~10 dB, compared to the case of no wind. This wind effect could enhance significantly the 1 dB noise level estimate given in the VCC reports to 10 dB. The two relevant scientific papers are attached.

2. There is potential sound amplification due to a "wind tunnel effect" from the surrounding roads, bounded on either side by houses which act like the walls of a wind tunnel. Consequently, sound may be able to travel much further into the surrounding neighborhoods than one might otherwise assume, which is an effect not taken into consideration in the VCC reports.

3. The VCC calibration measurements of noise level vs distance were done on flat land near San Jose, whereas VCC sits 100-200 ft above the affected neighborhoods in west Dublin in hilly land, enhancing the distance that noise produced at VCC above us can propagate into our neighborhoods.

Based on my initial review of various related reports posted on the City's website, I believe that further substantive study and analysis of this development project relating to the effects on noise propagation of wind, temperature, and the "wind tunnel effect" is essential prior to final approval. Therefore, I request that City Council postpone making a decision during its September 4th meeting and send the matter back

to the Planning Commission for further review and analysis, based on the scientific deficiencies in the noise analysis of this project.

Sincerely,

/Bruce A. Remington/

Bruce A. Remington
11221 Las Palmas Ct.
Dublin, CA 94568

cc: Chris Foss, City Manager, City of Dublin, via email chris.foss@dublin.ca.gov
Caroline P. Soto, City Clerk, City of Dublin, via email caroline.soto@dublin.ca.gov

Encl: David C. Pridmore-Brown, Sound Propagation in a Temperature- and Wind-Stratified Medium; The Journal of the Acoustical Society of America 34, 438 (1962)

K.B. Rasmussen, Outdoor Sound Propagation Under the Influence of Wind and Temperature Gradients; Journal Sound *and* Vibration M(2), 321-335 (1986)

Three (3) viewgraphs on Sound Effects Due to Wind

Sound Propagation in a Temperature- and Wind-Stratified Medium

David C. Pridmore-Brown

Citation: The Journal of the Acoustical Society of America **34**, 438 (1962); doi: 10.1121/1.1918146
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Sound Propagation in a Temperature- and Wind-Stratified Medium

DAVID C. PRIDMORE-BROWN
Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge 39, Massachusetts
(Received October 3, 1961)

The general linearized equations governing the propagation of sound in a dissipationless temperature- and wind-stratified medium are derived. A formal integral expression is given for the field of a point source located in such a medium, when it is bounded by an absorbing plane under conditions which lead to the formation of a shadow zone. This integral yields the following approximate (high-frequency) expression for the decay rate within the shadow

$$|p|^2 = (B/r)\exp[-(n/c)f^{\frac{1}{3}}(-c'-U'\cos\phi)^{\frac{1}{3}}r].$$

Here p is the acoustic pressure, r is radial distance from the source, B is independent of r, f is frequency in cps, c is sound speed, c' and U' are sound- and wind-speed gradients at the ground surface, ϕ is the angle between the wind direction and the direction of sound propagation, and n is equal to 5.93 for a pressure release boundary and to 2.58 for a hard boundary.

INTRODUCTION

THE influence of temperature inhomogeneities on sound propagation has been the subject of numerous theoretical studies, particularly in connection with underwater acoustics. A classical paper in this field is that of Pekeris,[1] who determined the sound field from a point source in a temperature-stratified semi-infinite medium bounded by a pressure release surface. He computed the decay rate of the sound field in the shadow zone, which results from the combined effect of the curvature of the rays and the boundary, and thus explained, at least in principle, a frequency observed sound-propagation anomaly in the sea.

In the corresponding problem of sound propagation in the atmosphere studied in this paper, one finds that wind gradients play as important a role as temperature gradients, as has been demonstrated in numerous experimental investigations.[2,3] The presence of a wind gradient makes the medium not only inhomogeneous but also anisotropic, and, as illustrated in Fig. 1, the sound field around a point source over a boundary is no longer symmetrical about the source as it is in a thermal gradient. Rays from the source are bent upwards on the upwind side and downwards on the downwind side. The presence of a negative temperature gradient (lapse rate) tends to accentuate the bending of the rays upwind and to reduce it downwind, while a positive temperature gradient (inversion) has the opposite effect. This behavior is well known from ray studies of sound propagation in which it is found that as far as the curvature of the sound rays is concerned, a wind gradient (dU/dz) is equivalent to a temperature gradient $(dT/dz)=(2T/c)\cos\phi(dU/dz)$, where ϕ is the angle between the direction of sound propagation and the wind direction, and c is the speed of sound. It is clear that the ground shields the rays off from a shadow zone which lies within a sector on the upwind side of the source. This sector subtends an angle at the source which is greater than 180° in a negative temperature gradient and less than this value in a positive gradient. In the present analysis, it is found that the equivalence between temperature and wind gradients referred to above applies also to the rate of decay of the sound field within the shadow zone, and that the decay rates produced by temperature and wind gradients are additive.

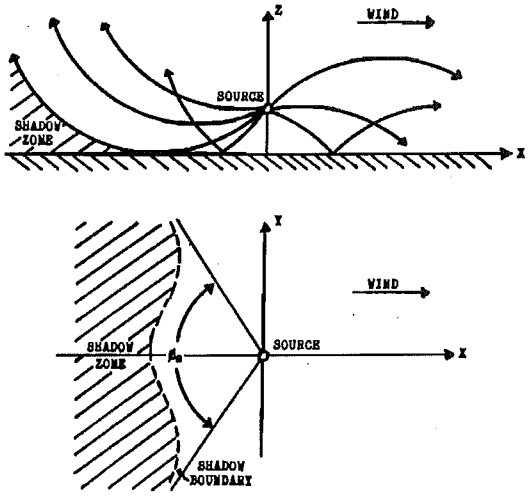

FIG. 1. Illustrating the formation of a shadow zone due to the combined effect of a wind gradient and a temperature inversion $(dU/dz>0, dT/dz>0)$.

This analysis refers to the idealized situation of a point source of sound located above a flat boundary whose acoustic properties are described by a normal impedance. The atmosphere is steady and vertically stratified, that is, the temperature and wind velocity vary monotonically with the height above the plane. Since we assume the atmosphere to be steady, this

[1] C. L. Pekeris, J. Acoust. Soc. Am. 18, 295 (1946).

[2] U. Ingard, Proc. 4th Annual Nat. Noise Abatement Symp. 4, 11 (1953).

[3] F. M. Wiener and D. N. Keast, J. Acoust. Soc. Am. 31, 724 (1959).

means, of course, that effects due to turbulence are not included.

The diffracted field deep within the shadow is very small, and only a minute perturbation of the medium may noticeably influence the shadow field. For this reason we have been careful to start from the basic conservation equations including the effect of gravity and by so doing have been led to retain terms that have usually been ignored.

EQUATIONS OF MOTION IN A STRATIFIED INHOMOGENEOUS MOVING MEDIUM IN THE PRESENCE OF A GRAVITATIONAL FIELD

We assume the atmosphere to be a perfect gas which is horizontally stratified, that is, its undisturbed properties are functions only of height z and its motion consists of a steady velocity $U(z)$ which we take to lie in the x direction. If we neglect all dissipative effects, then the propagation of small (acoustic) disturbances will be governed by the linearized equations expressing the conservation of mass, momentum, and convected entropy. In order to carry out the linearization we shall write the total pressure $\hat{p}=P(z)+p$ as the sum of the undisturbed (barometric) pressure $P(z)$ and the acoustic pressure fluctuations $p(x,y,z,t)$, and similarly for the density $\hat{\rho}=R(z)+\rho$ and the velocity $\hat{\mathbf{v}}=[U(z)+u; v; w]$.

The conservation of mass equation

$$(\partial\hat{\rho}/\partial t)+\mathrm{div}(\hat{\rho}\hat{\mathbf{v}})=0,$$

then yields to first order in the acoustic variables

$$\frac{\partial\rho}{\partial t}+U\frac{\partial\rho}{\partial x}+wR'+R\left(\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}+\frac{\partial w}{\partial z}\right)=0, \tag{1}$$

where the prime denotes the z derivative.

The effect of gravity is to introduce a force per unit volume in the medium with the components $(0; 0; -\hat{\rho}g)$, so that the equation for the conservation of momentum becomes

$$\hat{\rho}(\partial\hat{\mathbf{v}}/\partial t)\hat{\mathbf{v}}+\hat{\rho}\cdot\mathrm{grad}\mathbf{v}+\mathrm{grad}\hat{p}-\hat{\rho}\mathbf{g}=0.$$

Linearization of this equation leads to the following three equations:

$$\frac{\partial u}{\partial t}+U\frac{\partial u}{\partial x}+U'w+\frac{1}{R}\frac{\partial p}{\partial x}=0, \tag{2}$$

$$\frac{\partial v}{\partial t}+U\frac{\partial v}{\partial x}+\frac{1}{R}\frac{\partial p}{\partial y}=0, \tag{3}$$

$$\frac{\partial w}{\partial t}+U\frac{\partial w}{\partial x}+\frac{1}{R}\frac{\partial p}{\partial z}-\frac{P'}{R^2}\rho=0. \tag{4}$$

Neglect of dissipation requires that the convected entropy be conserved

$$(d\hat{S}/dt)\equiv(\partial\hat{S}/\partial t)+\hat{\mathbf{v}}\cdot\mathrm{grad}\hat{S}=0.$$

If we use the relation

$$\hat{S}=\hat{S}_0+c_v\ln[(\hat{p}/\hat{p}_0)/(\hat{\rho}/\hat{\rho}_0)^\gamma],$$

which holds for the entropy of a perfect gas, then this requirement is equivalent to

$$(\partial\hat{p}/\partial t)+\hat{\mathbf{v}}\cdot\mathrm{grad}\hat{p}=\hat{c}^2[(\partial\hat{\rho}/\partial t)+\hat{\mathbf{v}}\cdot\mathrm{grad}\hat{\rho}],$$

where $\hat{c}^2=\gamma\hat{p}/\hat{\rho}$, and $\gamma=c_p/c_v$. Linearization of this equation then leads to

$$\frac{\partial p}{\partial t}+U\frac{\partial p}{\partial x}+P'w=c^2\left(\frac{\partial\rho}{\partial t}+U\frac{\partial\rho}{\partial x}+R'w\right). \tag{5}$$

Equations (1)–(5) are five first-order partial differential equations in the dependent variables p, ρ, u, v, w which are functions of x, y, z, and t. Owing to the assumption of vertical stratification, their coefficients are functions only of z. Thus if we assume harmonic time dependence, $e^{-i\omega t}$ and replace each dependent variable $f_i(x,y,z,t)$ by its corresponding Fourier transform $F_i(\alpha,\beta,z)$ where these are connected by

$$f_i=e^{-i\omega t}\int_{-\infty}^{\infty}\int e^{i(\alpha x+\beta y)}F_i\,d\alpha\,d\beta,$$

then this set of partial differential equations will be replaced by a set of ordinary differential equations in the F's.

We introduce the symbols Π, Δ, μ, ν, Ω to represent the Fourier transforms, respectively, of p, ρ, u, v, w. Then, taking the Fourier transforms of Eqs. (1)–(5), we obtain

$$\eta\Delta+R'\Omega+R(i\alpha\mu+i\beta\nu+\Omega')=0, \tag{1a}$$

$$\eta\mu+U'\Omega+R^{-1}i\alpha\Pi=0, \tag{2a}$$

$$\eta\nu+R^{-1}i\beta\Pi=0, \tag{3a}$$

$$\eta\Omega+gR^{-1}\Delta+R^{-1}\Pi'=0, \tag{4a}$$

$$\eta\Pi-Rg\Omega=c^2(\eta\Delta+R'\Omega). \tag{5a}$$

In these equations P' has been eliminated by using the zeroth order contribution from the momentum equation, viz., $P'+Rg=0$. Also, for brevity we have used $\eta=-i\omega+i\alpha U$.

We now successively eliminate μ, ν, Ω, and Δ from these equations to obtain a second-order differential equation for Π

$$\Pi''-\left\{\frac{d}{dz}\ln[\eta^2R(1-gQ)]\right\}\Pi'-\left\{\frac{\eta^2}{c^2}+(1-gQ)(\alpha^2+\beta^2)+\frac{g}{c^2}\frac{d}{dz}\ln[\eta^2c^2(1-gQ)]\right\}\Pi=0. \tag{6}$$

Here $Q=\eta^{-2}(g/c^2+R'/R)$ and, as before, primes denote derivatives with respect to z.

It is interesting to study the behavior of Eq. (6) in the absence of wind. In an adiabatic atmosphere where $P/P_0=(R/R_0)^\gamma$ and no wind it reduces to the simple form

$$\Pi''+(g/c^2)\Pi'+[k^2-\kappa^2+(\gamma-1)g^2/c^4]\Pi=0,$$

where

$$k=\omega/c,$$
$$c^2=c_0^2(1-z/H),$$
$$H=[\gamma/(\gamma-1)](P_0/R_0g),$$

and

$$\kappa^2=\alpha^2+\beta^2.$$

In an isothermal atmosphere with no wind the equation becomes

$$\Pi''+(\gamma g/c^2)\Pi'+\{k^2-\kappa^2[1-(\gamma-1)(g/\omega c)^2]\}\Pi=0,$$

which has the solution

$$\Pi=\exp(-\gamma gz/2c^2)\exp\{\pm i[k^2-\kappa^2(1-\epsilon)-(\gamma g/2c^2)^2]^{\frac{1}{2}}z\},$$

studied by Lamb.[4] Here $\epsilon=(\gamma-1)(g/\omega c)^2$ and c is of course constant. If one neglects the barometric pressure variation, as Pekeris did, by setting $g=0$ in Eq. (6), one obtains

$$\Pi''+2(c'/c)\Pi'+(k^2-\kappa^2)\Pi=0,$$

which differs from the corresponding equation of Pekeris by the presence of the first-derivative term. This is due to the fact that Pekeris assumed the relation $p=\rho c^2$ instead of $\partial p/\partial t=c^2\partial\rho/\partial t+R'w$ which follows from Eq. (5) in the absence of wind and gravity. Since this first-derivative term goes roughly as $1/\lambda$ (λ is wavelength) whereas the other terms in the equation go as $1/\lambda^2$, it can be expected to be important only at low frequencies. Thus it does not affect the final high-frequency approximation given by Pekeris.

In the more general case with wind Eq. (6) can be simplified if one is willing to neglect terms of the order gQ with respect to unity. In fact, for a polytropic atmosphere for which $P/P_0=(R/R_0)^n$ we readily find that

$$gQ=(g/\omega c)^2(\gamma/n-1)(1-\alpha U/\omega)^{-2},$$

where

$$H=[n/(n-1)](P_0/R_0g)$$

is the "height" of the polytropic atmosphere, P_0 and R_0 being the pressure and density at the ground $z=0$. Thus for wind speeds smaller than the sonic speed gQ is of the order of $(g/\omega c)^2$ which at 100 cps is about 10^{-9}. If then we consistently neglect terms of this order of magnitude compared to one, Eq. (6) simplifies to

$$\Pi''-\left(\frac{2\eta'}{\eta}+\frac{R'}{R}\right)\Pi'-\left(\frac{\eta^2}{c^2}+\alpha^2+\beta^2\right)\Pi=0,$$

which can be cast in the form

$$\Pi''-\left(2\frac{k'-\alpha M'}{k-\alpha M}-\frac{\gamma g}{c^2}\right)\Pi'$$
$$+[(k-\alpha M)^2-\alpha^2-\beta^2]\Pi=0, \quad (7)$$

where $k=\omega/c$, $M=U/c$.

FIELD OF A POINT SOURCE OVER A PLANE WITH IMPEDANCE-BOUNDARY CONDITIONS

In order to study the sound field from a point source it is convenient to introduce polar coordinates by putting

$$x=r\cos\phi, \quad \alpha=\kappa\cos\theta,$$
$$y=r\sin\phi, \quad \beta=\kappa\sin\theta.$$

With this substitution, the equation connecting p and its Fourier transform Π becomes

$$p=e^{-i\omega t}\int_0^\infty\int_0^{2\pi}\exp[i\kappa r\cos(\theta-\phi)]\Pi(\kappa,\theta;z)\kappa d\kappa d\theta, \quad (8)$$

and there is an exactly similar relation between w and Ω. Equation (7) takes the form

$$\Pi''-\left(2\frac{k'-\kappa M'\cos\theta}{k-\kappa M\cos\theta}-\frac{\gamma g}{c^2}\right)\Pi'$$
$$+[(k-\kappa M\cos\theta)^2-\kappa^2]\Pi=0. \quad (9)$$

We now turn to the task of writing the function Π appearing in the integrand in Eq. (8) in such a form that the integral shall represent the pressure field around a point source of sound which is at a height h above ground and is in the presence of the temperature and wind gradients described by $c(z)$ and $U(z)$. We adopt a cylindrical coordinate system with the ground at $z=0$ and the source at $r=0$, $z=h$. The boundary condition at the ground surface is specified by assigning to the ground a normal impedance Z, which is assumed independent of the angle of incidence, i.e., the ground is locally reacting. The condition at the source is obobtained by specifying the mass outflow across a small surface enclosing it. The condition at infinity (the outgoing radiation condition) is imposed in that sector on the upwind side of the source within which the sound rays are concave upwards. We shall call this the shadow sector. These conditions can be conveniently expressed in terms of the two independent solutions of Eq. (9), which we denote by $\Pi_1(z)$ and $\Pi_2(z)$, where $\Pi_1(z)$ is chosen such that it represents upgoing radiation at large heights in the shadow sector (in conjunction with the time factor $e^{-i\omega t}$). Clearly, below the source we shall have both a downgoing wave and a reflected upgoing wave, whereas above the source, we shall have only the one represented by the function Π_1. Accord-

[4] H. Lamb, *Hydrodynamics* (Cambridge University Press, Cambridge, England, 1940), 6th ed., pp. 541–543.

ingly we can write

$$\begin{aligned}\Pi &= A\Pi_1(z), && \text{above the source } (z>h),\\ &= B\Pi_1(z)+C\Pi_2(z), && \text{below the source } (z<h),\end{aligned} \tag{10}$$

where A, B, and C are constants to be determined. The functions $\Pi_1(z)$ and $\Pi_2(z)$ cannot, of course, be determined until $M(z)$ and $k(z)$ are specified in Eq. (9). If, for example, $M=0$, $g=0$ and $k=$ constant everywhere, then, clearly,

$$\Pi_1=e^{ik_z z}, \quad \Pi_2=e^{-ik_z z},$$

where $k_z^2=k^2-\kappa^2$. In the general case of varying sound and wind speeds one must usually have recourse to approximate solutions. Convenient high-frequency approximations can always be obtained by the method of Langer,[5] according to which one can write the independent solutions to Eq. (9) in the following form

$$\Pi_m=(k-\kappa M\cos\theta)(1-\gamma gz/2c_0^2)s^{\frac{1}{6}}q^{-\frac{1}{4}}H_{\frac{1}{3}}^{(m)}(s), \tag{11}$$

where

$m=1$ or 2,

$$q=(k-\kappa M\cos\theta)^2-\kappa^2,$$

$$s=\int_{z_1}^{z} q^{\frac{1}{2}}dz.$$

Here z_1 is a zero of q which is assumed to be of first order [so that $q(z_1)/(z-z_1)\neq 0$] and the phase of s is taken to be zero when s is real. If s is large and positive, the function Π_1 becomes asymptotically

$$\Pi_1\sim(2/\pi)^{\frac{1}{2}}(k-\kappa M\cos\theta)(1-\gamma gz/2c_0^2)q^{-\frac{1}{4}}e^{i(s-5\pi/12)}, \tag{12}$$

which is obtained in the WKB approximation. We shall see later that the radiation requirement is satisfied with this form for Π_1.

The requirement that the vertical component of the particle velocity be continuous across the plane of the source, except right at the source, leads to

$$w(h^+)-w(h^-)=(4/r)\delta(r). \tag{13}$$

Here, $\delta(r)$ is the delta function having the property that $\delta(r)=0$ for $r\neq 0$ and

$$2\int_0^\infty \delta(r)dr=1.$$

If this relation is integrated over a "pillbox" enclosing the source, it is seen to be equivalent to the requirement $\int \mathbf{v}\cdot d\mathbf{S}=4\pi$, i.e., that the total outflow from the source be equal to 4π.

Taking the inverse Fourier transforms of both sides of Eq. (13) leads to

$$\begin{aligned}\Omega(h^+)-\Omega(h^-)&=\frac{1}{\pi^2}\int_0^\infty\int_0^{2\pi}\delta(r)e^{-i\kappa r\cos(\theta-\phi)}dr\,d\phi\\ &=1/\pi.\end{aligned} \tag{14}$$

The relation between Ω and Π can be got by eliminating δ from Eqs. (4a) and (5a). This gives

$$\eta R\Omega+\Pi'=(g/c^2)\Pi. \tag{15}$$

Thus in terms of Π and Π' Eq. (14) becomes

$$[(g/c^2)\Pi-\Pi']_{h^-}^{h^+}=\eta R(h)/\pi,$$

where the left-hand side is the jump in $(g/c^2)\Pi-\Pi'$ across the plane of the source. Reference to Eq. (10) then leads us to write this equation explicitly in the form

$$\begin{aligned}&(A-B)[\Pi_1'(h)-(g/c^2)\Pi_1(h)]\\ &\quad -C[\Pi_2'(h)-(g/c^2)\Pi_2(h)]=-\eta R(h)/\pi.\end{aligned} \tag{16}$$

Another relation between the constants A, B, C is given by the requirement that the pressure be continuous across the plane of the source, $z=h$,

$$A\Pi_1(h)=B\Pi_1(h)+C\Pi_2(h). \tag{17}$$

Finally, a third relation is provided by the normal impedance boundary condition at the ground surface. Since the wind velocity is assumed to be zero at the ground, this condition takes the usual form

$$p/w=-Z=\text{const at } z=0.$$

Using Eq. (15), this becomes

$$\frac{B\Pi_1'(0)+C\Pi_2'(0)}{B\Pi_1(0)+C\Pi_2(0)}=\frac{g}{c_0^2}-\frac{i\omega R_0}{Z}. \tag{18}$$

The three relations (16), (17), and (18) determine A, B, and C as follows:

$$A=B+\Pi_2(h)/W,$$

$$B=-\frac{\Pi_2'(0)+(i\omega R_0/Z-g/c_0^2)\Pi_2(0)}{\Pi_1'(0)+(i\omega R_0/Z-g/c_0^2)\Pi_1(0)}\frac{\Pi_1(h)}{W},$$

$$C=\Pi_1(h)/W,$$

where

$$W=\left(\frac{\pi}{iRc}\frac{\Pi_1'\Pi_2-\Pi_2'\Pi_1}{k-\kappa M\cos\theta}\right)_{z=h}, \tag{19}$$

involves the Wronskian of Π_1 and Π_2. Thus, above the source we obtain

$$\begin{aligned}\Pi(\kappa,\theta,z)&=A\Pi_1(z)\\ &=\frac{1}{W}\left[\Pi_2(h)-\frac{\Pi_2'(0)+(i\omega R_0/Z-g/c_0^2)\Pi_2(0)}{\Pi_1'(0)+(i\omega R_0/Z-g/c_0^2)\Pi_1(0)}\Pi_1(h)\right]\Pi_1(z).\end{aligned} \tag{20}$$

[5] R. Langer, Trans. Am. Math. Soc. 33, 29 (1931). See also M. J. Lighthill, Quart. J. Mech. Appl. Math. 3, 311 (1950).

Interchanging z and h in this expression gives the form which holds below the source. This is then the explicit form of the function which appears in the integrand of Eq. (8). Note that approximate expressions for Π_1 and Π_2 have been given in Eq. (11).

Approximate Evaluation of the Field

In the presence of a temperature gradient only and no wind [so that $k=k(z)$ but $M(z)=0$] the dependence on θ drops out of Eq. (9) and hence out of $\Pi(\kappa,\theta,z)$ which becomes simply $\Pi(\kappa,z)$. The integration over θ can then be carried out directly in Eq. (8) with the result that

$$p(r,z)=2\pi e^{-i\omega t}\int_0^\infty J_0(\kappa r)\Pi(\kappa,z)\kappa d\kappa. \qquad (21)$$

This is the case of a variable index of refraction in a quiescent medium which has been treated extensively in the literature.[1,6,7]

In the more general case the integration over θ can still be approximately carried out, for large κr, by the saddle-point method. It is clear that the integration range for θ passes through two points of stationary phase of the exponential term $\exp[i\kappa r\cos(\theta-\phi)]$ in Eq. (8), namely $\theta=\phi$ and $\theta=\phi+\pi$ (for $0<\phi<\pi$). Saddle-point integration through these two points yields

$$p(r,\phi,z)=e^{-i\omega t}\int_0^\infty\left(\frac{2\pi}{\kappa r}\right)^{\frac{1}{2}}e^{i(\kappa r-\pi/4)}\Pi(\kappa;\phi,z)\times\left[1-\frac{i}{8\kappa r}+\cdots\right]\kappa d\kappa$$
$$+e^{-i\omega t}\int_0^\infty\left(\frac{2\pi}{\kappa r}\right)^{\frac{1}{2}}e^{-i(\kappa r-\pi/4)}\Pi(\kappa;\phi+\pi,z)\cdot\left[1+\frac{i}{8\kappa r}+\cdots\right]\kappa d\kappa, \qquad (22)$$

where Π is given in Eq. (20).

In this way the double integral (8) for the pressure field is reduced to the sum of two single integrals which can be treated by methods which have already been used in studying the integral (21) corresponding to the temperature problem. Thus we can represent these integrals as an infinite series of normal modes whose convergence is rapid in the shadow zone or, alternatively, we can evaluate them approximately by performing an additional saddle-point integration through the stationary phase points in the κ plane; this last procedure then yields a ray-acoustics representation which is adequate in the normal region. Since both of these methods are discussed by Pekeris,[1,6] we merely summarize the first one in the Appendix, showing how it applies to the present formulation.

[6] C. L. Pekeris, J. Appl. Phys. 18, 667 (1947).
[7] D. C. Pridmore-Brown and U. Ingard, J. Acoust. Soc. Am. 27, 36 (1955).

The result is that the integrals appearing in Eq. (22) can be evaluated, at least asymptotically (for high frequencies), as a sum of residues of a contour integral. Within the shadow sector the various terms of this series decay at such a rate that far enough from the source the pressure field is adequately represented by the first term alone. Under these conditions the square of the pressure takes the form

$$|p|^2=(B/r)\exp[-n(f/c_0)^{\frac{1}{3}}\gamma^{\frac{1}{3}}r],$$

where B is independent of r, $f=\omega/2\pi$ is the frequency, and $\gamma=-(c_0'/c_0+U_0'\cos\phi/c_0)$ is positive within the shadow sector and can be regarded as an equivalent sound speed gradient. Notice that it depends only on the values of the gradients at the ground surface. The quantity n is a function of the ground impedance. For a very "hard" ground (specifically for $Z/R_0c_0=i213f$ where f is frequency in cps) n is easily evaluated as 2.58, whereas for a pressure-release boundary ($Z=0$), $n=5.93$ in agreement with the results of a previous paper[7] for the case of no wind.

ACKNOWLEDGMENT

The author is indebted to U. Ingard for some valuable discussion of this problem.

APPENDIX

The normal mode representation is obtained formally by replacing the integration paths in Eq. (22) by contours such that the first integral is taken over a path enclosing the first quadrant of the complex κ plane in an anticlockwise sense while the second is taken over a path enclosing the fourth quadrant in a clockwise sense. In general, the presence of branch points will necessitate the introduction of cuts which these contours must skirt if they are to close upon themselves. These contour integrals will then differ from the original integrals (22) by the values of the integrations along the infinite arcs, along the imaginary axes, and around the branch cuts. Now Pekeris has shown that although these contributions will not in general vanish, they do vanish asymptotically if one uses the high-frequency solutions of Langer given in Eq. (11). Thus in this limit the two integrals in Eq. (22) become expressible as two contour integrals encircling the first and fourth quadrants of the κ plane in the manner described. It is worth remarking that the restriction to high frequencies is not usually stringent in practice since it is roughly equivalent to the requirement that fractional changes in the temperature and velocity of the medium over the distance of a wavelength be small.

Having the two integrals in (22) expressed as contour integrals, we evaluate them as a sum of residues taken at the poles of the respective integrands. Now, on physical grounds we should expect the fourth quadrant to be free of poles so as to give no contribution from the second integral, which has the form of a sum of waves

converging on the source. That this is the case can again be readily verified with the help of the Langer solutions. For simplicity we shall restrict ourselves for the moment to extreme values of the ground impedance. For a very "hard" ground for which $Z/R_0c_0=i\omega c_0/g$ the poles in Eq. (20) will occur at the zeros of $\Pi_1'(0)$. According to Eq. (11) these are asymptotically equivalent to the zeros of $H_{-\frac{1}{3}}^{(1)}(s_0)$, which occur at $s_0=A_ne^{-i\pi}$ where $A_1=0.686$, $A_2=3.90$, $\cdots$, $A_n\rightarrow(n-3/4)\pi$ (as $n\rightarrow\infty$). Conversely we can consider a pressure-release boundary ($Z=0$) corresponding to which the poles occur at the zeros of $\Pi_1(0)$ which are asymptotically the zeros of $H_{\frac{1}{3}}^{(1)}(s_0)$. These are given by $s_0=A_ne^{-i\pi}$, where $A_1=2.38$, $A_2=5.51$, $\cdots$, $A_n\rightarrow(n-1/4)\pi$. The quantity s_0 is given by the integral

$$s_0=\int_{z_1}^{0}(q)^{\frac{1}{2}}dz=\int_0^{q_0}\frac{q^{\frac{1}{2}}dq}{dq/dz}, \tag{A1}$$

where the subscript zero denotes the value of the quantity at $z=0$, and $q(z_1)=0$.

If we expand q and dq/dz in Taylor series about $z=0$ we obtain

$$\begin{aligned} q&=q_0+q_0'z+\tfrac{1}{2}q_0''z^2+\cdots,\\ dq/dz&=q_0'+q_0''z+\cdots, \end{aligned} \tag{A2}$$

where primes denote differentiation with respect to z. If we now eliminate z from the second series by substituting for it the reversion of the first series we obtain

$$\frac{dq}{dz}=q_0'+\frac{q_0''}{q_0'}(q-q_0)+\frac{q_0'''q_0'-q_0''^2}{2q_0'^3}(q-q_0)^2+\cdots.$$

In terms of this series the integral for s_0 yields

$$s_0=-\frac{2}{3}\frac{q_0^{\frac{3}{2}}}{q_0'}\left[1+\frac{2}{5}\frac{q_0''q_0}{q_0'^2}+\cdots\right], \tag{A3}$$

which must be set equal to $A_ne^{-i\pi}$, the A_n being real and positive. It is clear that within the range of integration the series expansion for dq/dz converges rapidly at high frequencies, since q_0 must be proportional to $\omega^{\frac{1}{2}}$ whereas q_0', q_0'', etc., are all proportional to ω^2 as $\omega\rightarrow\infty$. Thus, if we take the first term only, we obtain

$$q_0=(\tfrac{3}{2}q_0'Ae^{-i\pi})^{\frac{1}{3}}.$$

Since $q_0=k_0^2-\kappa^2$, this leads to

$$\kappa_n=k_0\left[1-\tfrac{1}{2}(\tfrac{3}{2}|q_0'|k_0^{-3}A_n)^{\frac{2}{3}}e^{-2i\pi/3}\right], \tag{A4}$$

for $q_0'=|q_0'|$ and

$$\kappa_n=k_0\left[1-\tfrac{1}{2}(\tfrac{3}{2}|q_0'|k_0^{-3}A_n)^{\frac{2}{3}}\right], \tag{A5}$$

for $q_0'=-|q_0'|$. Thus the poles κ_n will lie in the first quadrant of the complex κ plane if q_0' is positive and on the real axis if q_0' is negative. In either case we can take the integration paths in Eq. (22) just below the real axis so that when the contours are completed, the second integral, encircling the fourth quadrant, will vanish since this quadrant will then be free of poles. Thus the pressure field is given by the first contour integral only and takes the form

$$p(r,\phi,z)=e^{-i\omega t}\oint\left(\frac{2\pi}{\kappa r}\right)^{\frac{1}{2}}e^{i(\kappa r-\pi/4)}\Pi(\kappa;\phi,z)\kappa d\kappa. \tag{A6}$$

Here Π is given by Eq. (20) and the contour encloses the first quadrant in an anticlockwise sense and includes any poles that may exist on the real axis.

Expressing this integral as a sum of residues at the poles we obtain formally

$$\begin{aligned} p(r,\phi,z)=-2\pi ie^{-i\omega t}\sum_{n=1}^{\infty}&\left(\frac{2\pi}{\kappa_n r}\right)^{\frac{1}{2}}e^{i(\kappa_n r-\pi/4)}\\ &\cdot\frac{\kappa_n}{W}\left\{\frac{\Pi_2'+(i\omega R/Z-g/c^2)\Pi_2}{\partial/\partial\kappa[\Pi_1'+(i\omega R/Z-g/c^2)\Pi_1]}\right\}_{\substack{\kappa=\kappa_n\\ z=0}}\\ &\Pi_1(h)\Pi_1(z)+O(1/\kappa r)^{\frac{1}{2}}. \end{aligned} \tag{A7}$$

If $q_0'<0$ and the poles lie along the real axis the convergence of this series will be slow, and the integral (A6) is probably better evaluated by the saddle-point method. On the other hand if $q_0>0$ and the κ_n lie in the first quadrant so that $\mathrm{Im}(\kappa_n r)>0$, then the terms of the series decay rapidly with r so that at sufficient distances from the source the pressure may be adequately represented by the first term alone.

The radial dependence of the pressure squared due to the first term is

$$|p|^2=(B/r)e^{-2\,\mathrm{Im}\kappa_1 r}, \tag{A8}$$

where B is independent of r. Now

$$2\,\mathrm{Im}\kappa_1=\tfrac{1}{2}\sqrt{3}k_0(\tfrac{3}{2}q_0^{\frac{1}{2}}k_0^{-\frac{1}{2}}A_1)^{\frac{2}{3}},$$

where

$$\begin{aligned} q_0'&=(\partial/\partial z)[(k-\kappa M\cos\phi)^2-\kappa^2]_{z=0},\\ &=-2k_0^2(c_0'/c_0+U_0'\cos\phi/c_0). \end{aligned}$$

Combining these terms leads us to write

$$2\,\mathrm{Im}\kappa_1=n(f/c_0)^{\frac{1}{2}}\gamma^{\frac{3}{2}}, \tag{A9}$$

where $n=3.32A_1^{\frac{1}{2}}$, $f=\omega/2\pi$ and

$$\gamma=-(c_0'/c_0+U_0'\cos\phi/c_0).$$

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OUTDOOR SOUND PROPAGATION UNDER THE INFLUENCE OF WIND AND TEMPERATURE GRADIENTS

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The situation investigated is sound propagation from a monopole point source located over an impedance surface. The sound propagation is assumed to be influenced by wind and temperature gradients. A very accurate calculation method for taking into account the effect of wind and temperature gradients on sound propagation outdoors is presented and used for verification of a new approximate calculation model. This comparison shows that the approximate model is accurate. A series of loudspeaker measurements has been carried out over a grass-covered ground for distances up to 80 m. The measurements were carried out for a wind speed of 2-2·5 m/s measured 10 m above the ground. The measured data agree very well with the calculated results. Furthermore the results from the approximate calculation model agree with results from previous investigations [1, 2]. Hence, the main conclusion is that a simple and powerful approximate model for sound propagation under the influence of wind and temperature gradients has been developed. However, the influence of turbulence is not taken into account in this paper, and the wind and temperature gradients are assumed to be constant as functions of height.

1. INTRODUCTION

In recent years a substantial effort has been made in order to develop theoretical models for sound propagation outdoors. The starting point is usually a monopole point source over a locally reacting impedance plane. Appropriate models for the description of the acoustic ground impedance exist and are still being developed [3-6]. Efficient and accurate approximate solutions for a monopole point source over an impedance plane have been developed, too. Hence, the calculation of sound propagation over plane ground represents no major problem so long as atmospheric effects may be ignored. A number of efficient calculation models for taking the effect of terrain profile into account have also been developed [7, 8]. Thus one of the remaining problems is to take the influence of atmospheric effects into account. These effects are atmospheric absorption, the influence of wind and temperature gradients, and of turbulence in the atmosphere. Atmospheric absorption is today considered to be well known as a function of relative humidity and temperature. It may be considered as an extra contribution to attenuation versus distance apart from the basic spherical spreading. The atmospheric absorption is, however, frequency-dependent. The influence of atmospheric turbulence on sound propagation outdoors has not been investigated to very large extent, but some preliminary investigations have been performed [9]. As regards the influence of wind and temperature gradients most of the previously developed calculation models are very crude and inaccurate [10]. In the following sections a new and powerful calculation model will be introduced. Comparisons are made with tedious, but precise, calculations as well as measured data

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from outdoor measurements using a loudspeaker as source. The influence of turbulence is ignored in this paper.

2. THEORY

2.1. PRECISE THEORY

The analysis given in this section follows those of Pridmore-Brown [11] and Pierce [12].

In a still and homogeneous atmosphere one may write for the sound pressure p emitted from a monopole point source at $(x, y, z) = (0, 0, z_0)$

$$\nabla^2 p + k^2 p = -4\pi\,\delta(x)\,\delta(y)\,\delta(z - z_0), \tag{1}$$

where δ is the Dirac delta function, and k is the wavenumber. If one assumes that a vertical temperature gradient is present in the atmosphere, the sound speed will vary with height. One can still apply equation (1), but now k varies with height since

$$k(z) = \omega / c(z). \tag{2}$$

Assuming that the field is cylindrically symmetric around the z-axis, one may introduce a Hankel transform

$$p = -\int_0^\infty 2J_0(\kappa d) P(z, \kappa) \kappa \, d\kappa, \tag{3}$$

where P denotes the transform of p, and d is the horizontal distance between source and observation point. If p satisfies equation (1) then P must satisfy the transformed equation

$$\partial^2 P / \partial z^2 + [\omega^2 / c^2(z) - \kappa^2] P = \delta(z - z_0). \tag{4}$$

Thus equation (4) may be solved, with appropriate boundary conditions, in order to find solutions for sound propagation under the influence of temperature gradients. It should be noted that the vertical density variation in the air has been ignored in equation (4).

The boundary conditions which are to be used together with equation (4) are the Sommerfeld radiation condition (for $z \to \infty$) and an impedance boundary condition for $z = 0$. Two solutions, ψ and ϕ, of the homogeneous equivalent to equation (4) are considered. ψ is assumed to satisfy the condition at infinity while ϕ is taken to satisfy the impedance condition for $z = 0$,

$$\partial\phi / \partial z + ik(0)\beta\phi = 0, \tag{5}$$

where β is the specific normalized admittance of the surface. For the inhomogeneous equation (4) the solution may be defined as

$$P = A\psi \quad \text{for } z > z_0, \qquad P = B\phi \quad \text{for } z < z_0. \tag{6}$$

The constants a and b may be determined from the fact that the sound pressure p is continuous for $z = z_0$, and that the vertical component of the particle velocity is also continuous for $z = z_0$ except right at the source. Continuity in sound pressure across the plane $z = z_0$ leads to continuity in the transformed sound pressure P. Considering the vertical particle velocity component leads to

$$\partial P(z_0 + \varepsilon, \kappa)/\partial z - \partial P(z_0 - \varepsilon, \kappa)/\partial z = 1 \tag{7}$$

for ε small and positive. Equation (7) is obtained by integration of equation (4) with respect to z. Hence equation (6) may be written as

$$P(z, \kappa) = \psi(z_L, \kappa)\phi(z_S, \kappa) / [(\partial\psi/\partial z)\phi - (\partial\phi/\partial z)\psi]_{z=z_0}, \tag{8}$$

where z_L is the larger of z and z_0 and z_S is the smaller. The denominator in equation (8)

is the Wronskian of ψ and ϕ. In order to find explicit expressions for ψ and ϕ it is necessary to specify how the sound speed varies with height. Here a linear variation

$$c(z) = c(0)(1+\gamma z), \tag{9}$$

is assumed, where γ is a constant. Inserting this in the homogeneous equivalent of equation (4) one obtains, for $\gamma z \ll 1$,

$$\partial^2 P/\partial z^2 + [k^2(0) - \kappa^2 - 2\gamma z k^2(0)]P = 0. \tag{10}$$

The restriction to small sound speed gradients which is inherent in equation (10) is likely to be unimportant as far as outdoor sound propagation is concerned.

Solutions to this equation may be expressed as Airy functions [12, 13]. For $\gamma < 0$ one chooses

$$\psi(z, \kappa) = w(\tau - y), \tag{11}$$

where $w(x) = 2\sqrt{\pi}\, e^{i\pi/6}\mathrm{Ai}(x\, e^{i2\pi/3})$ and $\tau = [\kappa^2 - k^2(0)]l^2$, $y = z/l$, $l = [|\gamma|2k^2(0)]^{-1/3}$. Ai denotes the Airy function as defined by Pierce [12]. ψ may be shown to satisfy the Sommerfeld radiation condition. The ϕ-function satisfying the impedance condition is then given by (for $\gamma < 0$)

$$\phi(z, \kappa) = v(\tau - y) - \frac{v'(\tau) - qv(\tau)}{w'(\tau) - qw(\tau)}\, w(\tau - y), \tag{12}$$

where $v(x) = \sqrt{\pi}\mathrm{Ai}(x)$ and $q = ik(0)l\beta$. This choice of ψ and ϕ leads to a Wronskian of -1 in equation (8). Hence one obtains

$$P(z, \kappa) = -w(\tau - y_L)\phi(z_S, \kappa)l, \tag{13}$$

where $y_L = z_L/l$. For $\gamma > 0$ one chooses

$$\psi(z, \kappa) = v(\tau + y), \tag{14}$$

and consequently

$$\phi(z, \kappa) = w(\tau + y) - \frac{w'(\tau) + qw(\tau)}{v'(\tau) + qv(\tau)}\, v(\tau + y), \tag{15}$$

and hence one obtains, instead of equation (13),

$$P(z, \kappa) = -v(\tau + y_L)\phi(z_S, \kappa)l. \tag{16}$$

Tedious but very accurate calculations of the influence from sound speed gradients may be carried out by implementing equation (3) with either equation (13) or equation (16) inserted for P. This has been done by means of numerical methods given in the Appendix.

The formulas above have been derived for a sound speed gradient only. This sound speed gradient may be caused by a temperature gradient or a wind speed gradient. The speed of sound is proportional to the square root of the absolute temperature, and it is therefore easy to interpret a temperature gradient as a sound speed gradient. In the case of a wind speed gradient the cylindrical symmetry which has been assumed around the z-axis is no longer present, since downwind propagation is equivalent to propagation in a positive sound speed gradient, whereas upwind propagation is similar to propagation in a negative sound speed gradient. Hence, the angle between the wind speed vector and the vector pointing from source to receiver is essential. Another difficulty is to quantify the sound speed gradient which is equivalent to a given vector wind. In ray tracing calculations it is found that the curvature of the rays due to a wind speed gradient of

dV/dz is the same as the curvature due to a temperature gradient dT/dz if

$$dT/dz = [2T_0/c(0)](dV/dz)\cos\theta, \tag{17}$$

where θ is the angle between the direction of propagation and the wind direction. T is the absolute temperature and T_0 is the absolute temperature at the ground. The relation between γ in equation (9) and dT/dz is

$$\gamma = \tfrac{1}{2}T^{-1/2}T_0^{-1/2}\,dT/dz \simeq (dT/dz)/(2T_0). \tag{18}$$

Hence equation (18) specifies γ in equation (9) for a temperature gradient.

In the case of a wind gradient equation (18) is used with equation (17) inserted. If both wind and temperature gradients are present, γ is determined as the sum of the γ's due to each type of gradient. In practice, however, γ is usually dominated by the effect of the wind speed gradient. Figure 1 shows typical γ-values as a function of wind and temperature gradients.

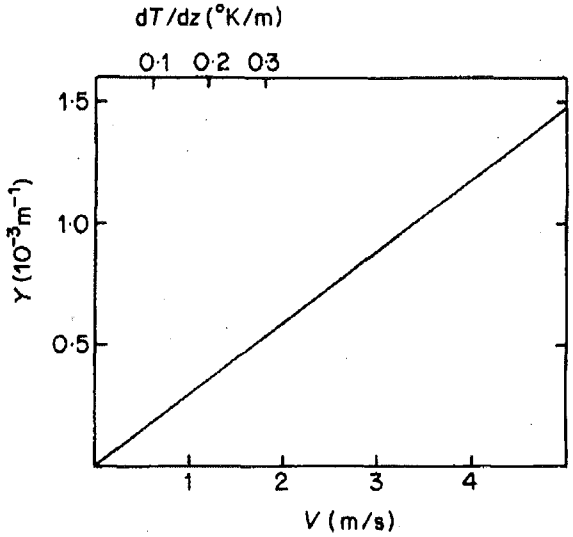

Figure 1. γ versus wind speed 10 m above the ground and versus temperature gradient.

2.2. APPROXIMATE THEORY

An approximate theory for the calculation of sound propagation under the influence of wind- and temperature gradients has been developed. It would seem logical to develop such an approximate theory on the basis of the precise theory presented in the previous section. Attempts in this direction were, however, not quite satisfactory [10]. Instead an approach based upon the Rayleigh integral has been employed. The approach is by no means mathematically rigorous, but, as will become clear in the following, the resulting expressions are efficient as well as accurate.

As a starting point the Rayleigh integral will be derived. Figure 2 shows the source and receiver geometry and a screen halfway between source and receiver.

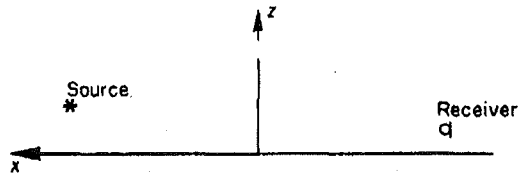

Figure 2. Geometry of source and receiver and screen. Source is located at $(x_S, 0, z_S)$ and receiver at $(x_R, 0, z_R)$.

From Green's theorem one obtains for the sound pressure in a homogeneous and still atmosphere [14]

$$p(\bar{r}_R|\bar{r}_S) = p_L(\bar{r}_R|\bar{r}_S) + \frac{1}{4\pi}\int\int_S [p_L(\bar{r}_R|\bar{r})\partial_n p(\bar{r}|\bar{r}_S) - p(\bar{r}|\bar{r}_S)\partial_n p_L(\bar{r}_R|\bar{r})]\,\mathrm{d}S. \tag{19}$$

∂_n denotes the normal derivative, and p_L is the solution for a point source over an impedance plane [5, 15],

$$p_L = (\mathrm{e}^{\mathrm{i}kR_1}/R_1) + Q(R_2, \theta)\,\mathrm{e}^{\mathrm{i}kR_2}/R_2, \tag{20}$$

where R_1 is the direct ray path and R_2 is the reflected ray path (see also Figure 3). Q is the spherical wave reflection coefficient given by the relations

$$Q(R_2, \theta) = R(\theta) + [1 - R(\theta)]E(P_e), \qquad R(\theta) = (\cos\theta - \beta)/(\cos\theta + \beta),$$
$$E(P_e) = 1 + \mathrm{i}\sqrt{\pi}P_e\,\mathrm{e}^{-P_e^2}\,\mathrm{erfc}\,(-\mathrm{i}P_e), \qquad P_e = \sqrt{\tfrac{1}{2}\mathrm{i}kR_2}(\beta + \cos\theta). \tag{21}$$

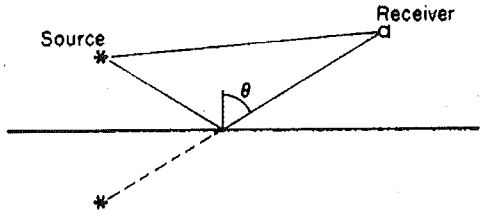

Figure 3. Point source over impedance plane.

θ is the angle of incidence, also shown in Figure 3. Erfc is the complementary error function [15]. Equation (21) is a very good approximation to point source propagation over an impedance plane.

For equation (19), the integration is to be carried out over the screen surface. An explicit expression for p is obtained from equation (19) by making reasonable assumptions regarding the field on the screen. Assuming the screen to be hard one can make use of the Rayleigh assumption that

$$p = 2p_L \quad \text{and} \quad \partial_n p = 0 \tag{22}$$

on the illuminated side, and

$$p = 0 \quad \text{and} \quad \partial_n p = 0 \tag{23}$$

on the shadowed side. Inserting equations (22) and (23) in equation (19) one obtains

$$p = p_L - \frac{1}{4\pi}\int\int_{S_1} 2p_L\,\partial_n p_L\,\mathrm{d}S, \tag{24}$$

where S_1 is the illuminated side of the screen.

If the screen is extended to infinity, p is zero provided that source and receiver are separated by the screen. Hence, from these considerations, one obtains the Rayleigh integral for p_L,

$$p_L = \frac{1}{2\pi}\int\int_{S_1} p_L\,\partial_n p_L\,\mathrm{d}S \tag{25}$$

or, from equation (20),

$$p_L = -\frac{1}{2\pi}\int_0^\infty \int_{-\infty}^\infty \left[\frac{e^{ikR_1}}{R_1} + Q_1\frac{e^{ikR_2}}{R_2}\right] ik\left[\frac{e^{ikR_3}}{R_3^2}x_R + Q_2\frac{e^{ikR_4}}{R_4^2}x_R\right] dy\, dz, \tag{26}$$

where R_1, R_2, R_3 and R_4 are shown in Figure 4. Q_1 is calculated on the basis of R_2 and Q_2 is calculated on the basis of R_4. Equation (26) is valid only if Q varies slowly as a

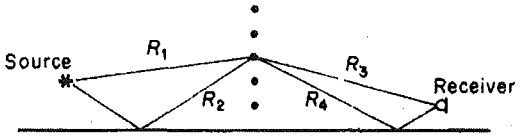

Figure 4. Ray paths used in connection with the Rayleigh integral.

function of horizontal distance. This assumption is justified by numerical investigation of equation (21) [14]. Furthermore, this assumption makes it possible to use the method of stationary phase as an approximation to the integral over y. Hence one obtains, for $k \to \infty$,

$$p_L = -x_R(2\pi k)^{1/2}\frac{e^{-i\pi/4}}{2\pi}\int_0^\infty \left[\frac{e^{ik(R_1+R_3)}}{[R_1R_3^3(R_1+R_3)]^{1/2}} + Q_2\frac{e^{ik(R_1+R_4)}}{[R_1R_4^3(R_2+R_4)]^{1/2}}\right.$$
$$\left. + Q_1\frac{e^{ik(R_2+R_3)}}{[R_2R_3^3(R_2+R_3)]^{1/2}} + Q_1Q_2\frac{e^{ik(R_2+R_4)}}{[R_2R_4^3(R_2+R_4)]^{1/2}}\right] dz. \tag{27}$$

In equation (27) R_1 to R_4 denote ray paths located in the vertical plane containing source and receiver (the plane containing the stationary points).

So far it has been assumed that the atmosphere is still and homogeneous. If a wind gradient or a temperature gradient is present, one may replace k by

$$k(z) = \omega/c(z), \tag{28}$$

so that, with $c(z)$ as defined in equation (9),

$$k(z) \simeq [\omega/c(0)](1-\gamma z) = k(0)(1-\gamma z). \tag{29}$$

In equation (27) the sound field is calculated on the basis of a vertical column of secondary sources. For each secondary source k is regarded as constant along the ray paths R_1 to R_4, but k is calculated on the basis of half the height of the secondary source. In this way the average wind (or temperature gradient) is taken into account for each secondary source. Formally equation (27) leads to

$$p_L = -x_R[2\pi k(0)]^{1/2}\frac{e^{-i\pi/4}}{2\pi}\int_0^\infty \left[\frac{e^{ik(z/2)(R_1+R_3)}}{[R_1R_3^3(R_1+R_3)]^{1/2}} + Q_2\frac{e^{ik(z/2)(R_1+R_4)}}{[R_1R_4^3(R_1+R_4)]^{1/2}}\right.$$
$$\left. + Q_1\frac{e^{ik(z/2)(R_2+R_3)}}{[R_2R_3^3(R_2+R_3)]^{1/2}} + Q_1Q_2\frac{e^{ik(z/2)(R_2+R_4)}}{[R_2R_4^3(R_2+R_4)]^{1/2}}\right] dz, \tag{30}$$

where $k(z)$ is given by equation (29). However, equation (30) does not take curvature of the rays into account—and curvature must arise when sound is propagating through a gradient. Instead equation (30) introduces a phase change at each secondary source. Lindblad [16] has suggested simulating sound propagation in gradients by curving the ground. In equation (30) the introduction of a phase change as a function of height may be regarded as equivalent to curving the ground. Physical intuition suggests that the

aperture ($x = 0$) should be located something like halfway between source and receiver. Numerical investigations have confirmed that this is a reasonable choice, hence in the following $x_S = -x_R$ (see Figure 1). Numerical integration of equation (30) was performed with N points where $N = \text{Max}\,(L/DL, 25) + 25$. DL is the spacing between points, which is 1/5 wavelength, and L is a distance which is determined from $L = \text{Max}\,\{[0{\cdot}5\ \text{Min}\,(x_S, -x_R) + \text{Max}\,(z_S, z_R) + 1{\cdot}0], 2{\cdot}0\}$. The contributions from the last 25 points were reduced by a window-function in order to reduce spurious end-point contributions. The CPU-time necessary for such a numerical integration is approximately 5 s for 1/3 octave calculations between 100 Hz and 2 kHz for a 120 m distance between source and receiver.

In Figures 5 and 6 a comparison is shown of results from equations (3), (12) and (15) (the precise theory) and results from equation (30) (the approximate theory). The comparison is based upon a typical impedance for grass-covered ground. Hence the impedance versus frequency is assumed to follow the Delany-Bazley flow resistance model [3] with a flow resistance of 200×10^3 Nsm^{-4} inserted.

From the figures one can see that for downwind propagation the sound pressure level is generally increased with increasing wind speed. This is to be expected since, according to traditional ray tracing, this situation may allow multiply reflected rays to reach the receiver. In the upwind situation, on the other hand, the rays are bent upwards, and if the wind speed is sufficiently high, no rays will reach the receiver. Hence a shadow zone is created according to ray theory. And indeed the sound pressure level does decrease for increasing wind speed in Figure 6. A comparison between Figures 5 (a) and (b) and 6(a) and (b) shows that the approximate theory is in general very accurate, but that it underestimates the influence of wind (and temperature) gradients for higher wind speeds. These trends are found for other source-receiver geometries also [10], but, as will become

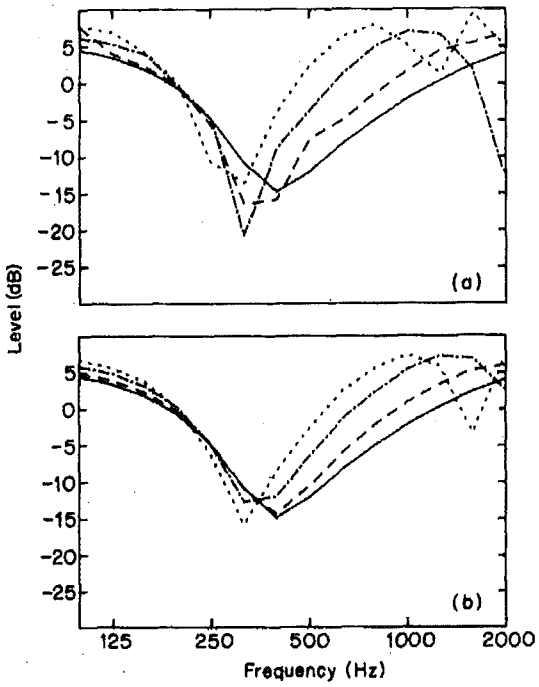

Figure 5. Sound pressure level relative to free field for downwind propagation over typical grassy field. Horizontal distance 120 m; source height 1·8 m; receiver height 2·0 m. Flow resistance, σ, is 200×10^3 Nsm^{-4}. Wind speed ——, 0 m/s; - - -, 1 m/s; — · —, 3 m/s; · · ·, 5 m/s. Calculated from (a) equation (3); (b) equation (30).

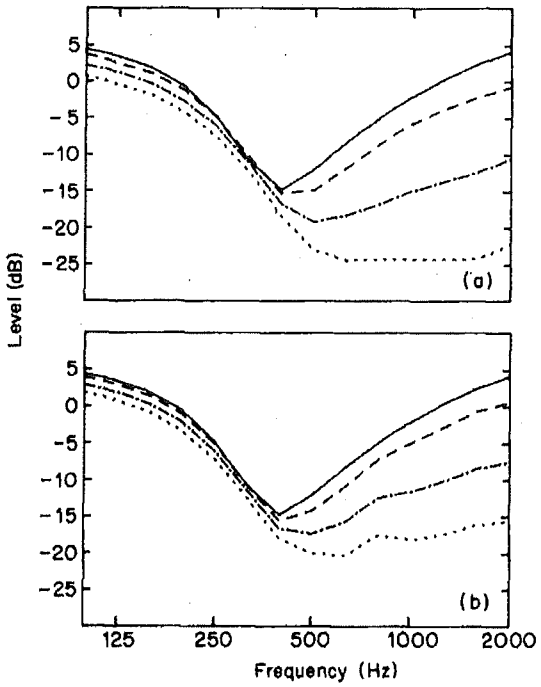

Figure 6. Key as in Figure 5, but for upwind propagation.

clear in the next section, the effect of gradients increases with horizontal distance. In the next section only the approximate model will be used since it requires only less than one-tenth of the computation time needed for the calculation of the precise model.

3. MEASUREMENTS

Outdoor sound propagation measurements were carried out with a loudspeaker as source. Wide band noise was emitted by the loudspeaker and received by Brüel & Kjaer 4165 microphones fitted with wind screens. The signal was recorded on Nagra IV SJ tape recorders for later one-third octave analysis in the laboratory.

During the propagation measurements the direction and speed of the wind were measured and the temperature gradient was measured. The meteorological measuring system consisted of a wind vane and cut anemometer mounted on top of a mast, 10 m high, and of two temperature probes in double radiation shields. The temperature probes were located at 0·5 m above the ground and on top of the mast, respectively. The central unit of the equipment printed the mean vector wind and the average temperature gradient once every minute.

The measurements were carried out on 14 August 1984, in the afternoon, on a grass-covered plane. The atmospheric conditions were very stable during the measurements. The wind speed was 2–2·5 m/s, the temperature gradient less than 0·03°K/m, and the relative humidity was 70%. (The humidity value was obtained from a nearby meteorological centre.)

Measurements were made for source-receiver distances of 40 m and 80 m. The source height was 1·45 m in all cases and for each horizontal distance recordings were made for a receiver height of 0·5 m as well as 1·5 m.

Recordings were made with two different loudspeakers, one at a time. Hence, a Brüel & Kjaer 4205 sound power source was used as well as a loudspeaker developed at the

Acoustics Laboratory, Technical University of Denmark, consisting of 20 units in a spherical arrangement. The former loudspeaker is a reasonable approximation to a point source at higher frequencies (the approximate directional characteristic has been given in reference [5]) whereas the latter has a high output and is omnidirectional within 1 dB up to 1 kHz. Hence, the Brüel & Kjaer loudspeaker could be employed over the entire frequency range from 100 Hz to 5 kHz except when the signal-to-noise ratio became too low because of acoustic background noise. The 20 unit loudspeaker was used in order to obtain a better signal-to-noise ratio at lower frequencies. Thus the results presented in the following are from the Brüel & Kjaer loudspeaker for frequencies above 1250 Hz and from the 20 unit loudspeaker for lower frequencies. The measured data are the results obtained after an integration time of 31 s. Repeated measurements gave only very slight differences, and no influence of the loudspeaker source used could be found. The measured sound pressure levels were related to the free field level obtained for the same distance. The free field levels from the loudspeakers were measured in an anechoic room at a distance of 5 m and this result was then extrapolated to the distance in question, with spherical spreading being assumed.

The measured values in Figures 7, 8, 10 and 11 have all been corrected for atmospheric absorption according to ANSI [17] for 70% r.h. and 20°C.

In Figures 7 and 8 the results for 40 m are shown for downwind and upwind propagation. One can see that calculated results (equation (30)) agree very well with the measured data. The calculated results are based upon a flow resistance value of 200×10^3 Nsm^{-4} in the Delany-Bazley flow resistance model for the ground impedance. This flow resistance value gives a very good agreement between theory and measurement, and also for a horizontal separation of 20 m where the influence of atmospheric effects may be ignored. These results are not shown here, but may be found in reference [10]. From Figure 9 it is clear that the theoretical influence of the atmospheric effects is not very strong at the

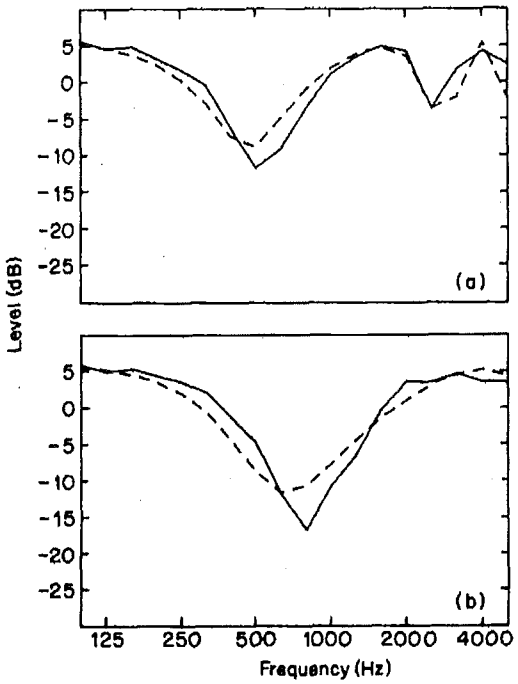

Figure 7. Sound pressure level relative to free field for downwind propagation over grass-covered ground. Horizontal distance 40 m; source height 1·45 m; receiver height: (a) 1·5 m; (b) 0·5 m. Wind speed 2·5 m/s. ——, measured; - - -, equation (30) for $\sigma = 200\times10^3$ Nsm^{-4}.

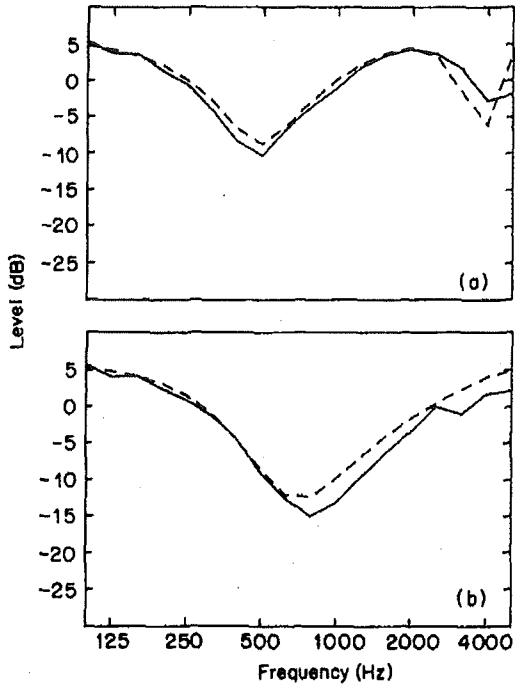

Figure 8. Key as in Figure 7, but for upwind propagation. Wind speed 2 m/s.

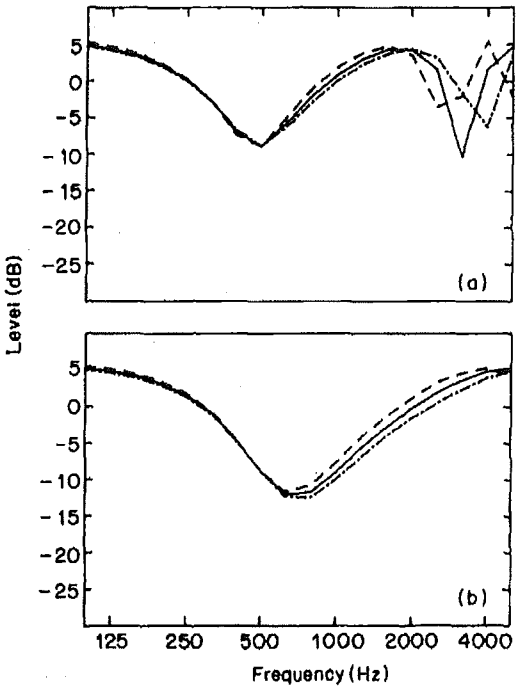

Figure 9. Sound pressure level relative to free field for propagation over grass-covered ground. Horizontal distance 40 m; source height 1·45 m; receiver height: (a) 1·5 m; (b) 0·5 m. Flow resistance, σ, is 200×10^3 Nsm^{-4}. Wind speed ——, 0 m/s; - - -, 2·5 m/s; — · —, −2·0 m/s. Calculated from equation (30).

40 m distance. However, the measured difference is slightly larger than the calculated difference.

Figures 10 and 11 show the results for 80 m for downwind and upwind propagation. Again the agreement between theory and measurement is very satisfactory. The theoretical

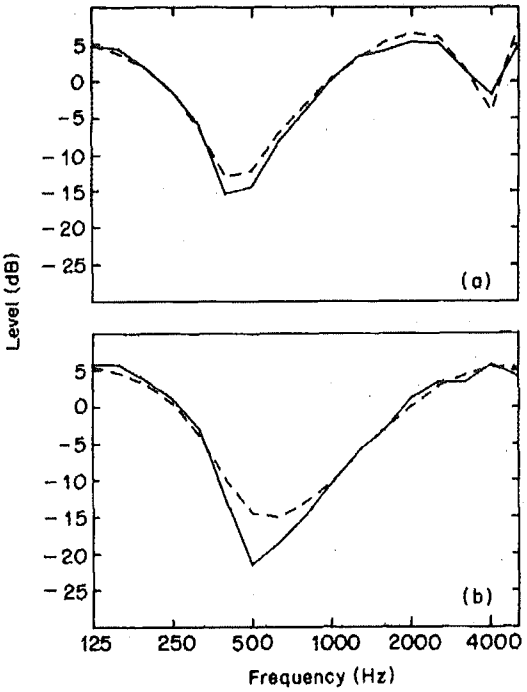

Figure 10. Key as in Figure 7, but horizontal distance is 80 m.

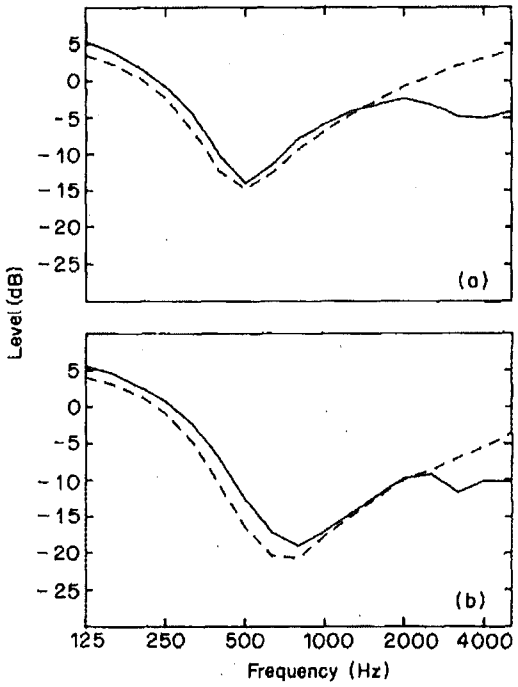

Figure 11. Key as in Figure 7, but for horizontal distance 80 m and upwind propagation. Wind speed 2 m/s.

curves in Figure 12 show that the difference between downwind and upwind propagation is much greater than for the 40 m distance. A marked discrepancy is, however, present in Figure 11 between theoretical and measured data in the high frequency region. This is not surprising since it has been assumed that the influence of turbulence is marginal

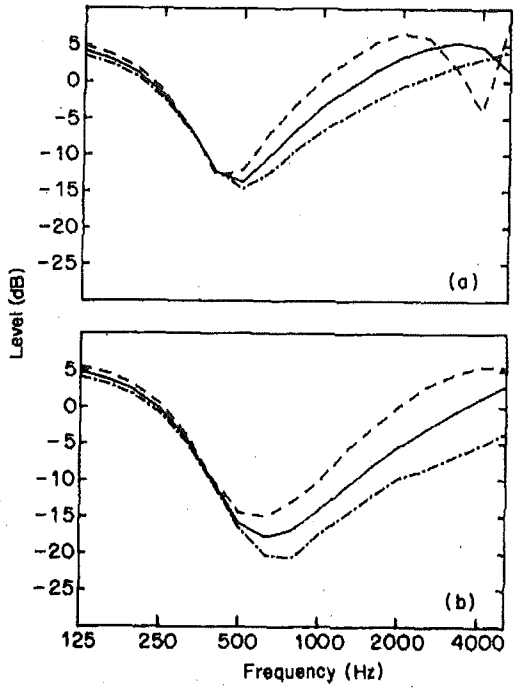

Figure 12. Key as in Figure 9, but horizontal distance is 80 m.

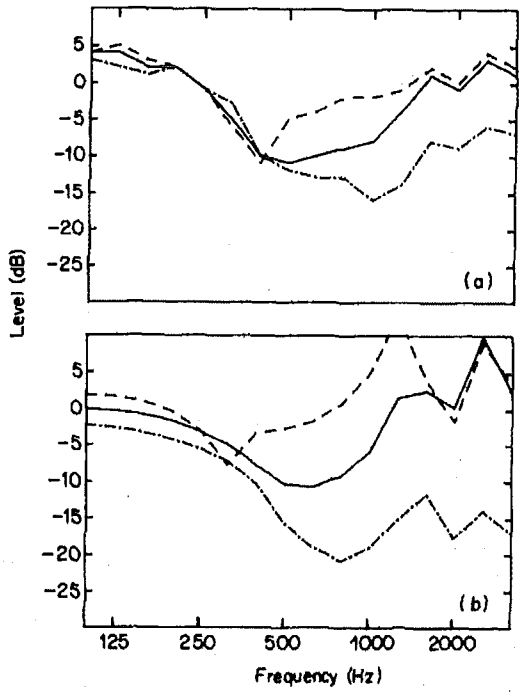

Figure 13. Sound pressure level relative to free field for propagation over grass-covered ground. Horizontal distance 110 m; source height 1·8 m; receiver height 1·6 m. Wind speed ——, 0 m/s; - - -, 5 m/s; — · —, −5 m/s. Temperature gradient; neutral. (a) Measured [1]; (b) equation (30) for $\sigma = 200 \times 10^3$ Nsm^{-4}. Also see text.

and that the gradients are constant as functions of height. Both assumptions are reasonable except for high frequencies and long distances.

Figure 13 shows a comparison of measured data reported by Parkin and Scholes [1] and calculated data. The distance is 110 m. Both measurements and calculations are made

with reference to a point 20 m from the source (which was a jet engine). One can see that the agreement between theory and experiment is good although the combined effect of wind and ground is somewhat greater in theory than in practice in this case. Calculations were made for a flow resistance of 200×10^3 Nsm^{-4} [18].

It should also be mentioned that long distance downwind propagation measurements from the Netherlands [2] confirm the trends observed in Figures 7 and 10 for downwind propagation. These measurements were carried out for distances of several hundred metres. The wind speed and temperature gradient are, however, not specified in reference [2].

4. DISCUSSION

The results from the previous section show that the calculation procedure proposed in equation (30) for sound propagation under the influence of wind and temperature gradients is very accurate. The results from equation (30) are confirmed by calculations made on a far more rigorous basis, equations (3), (13) and (16), as well as by experimental data.

Two basic restrictions are, however, present in all the calculations presented in this paper. Firstly the influence of turbulence in the atmosphere is ignored, and secondly the gradients are assumed to be constant versus height.

The influence of turbulence increases with distance and frequency. The main effect of turbulence is that random phase fluctuations are introduced so that interference dips become less pronounced than they should be according to theory in which turbulence is ignored. Hence for distances exceeding, say, 500 m, the combined effect of wind and temperature gradients and the ground effect will usually be smaller than predicted when ignoring the turbulence. This difference between theory and measurement increases with the wind speed. This tendency may be found even in Figure 13 for a distance of 110 m and a wind speed of 5 m/s. Preliminary investigations of the influence of turbulence have been made by Daigle *et al.* [9].

The fact that the gradients are assumed to be constant is also bound to introduce some kind of error since the wind speed and temperature profiles are usually logarithmic in shape [19]. What has been employed in this investigation is thus actually a sort of average gradient, since the wind speed has been measured 10 m above the ground and it is known to be zero at ground level. In this investigation a linear variation has been assumed between these two points, but in reality the variation is approximately logarithmic. Similarly, the air temperature has been measured at 10 m and close to the ground, and a linear variation assumed. These approximations introduce an error which increases with frequency since the wavelength compared to the shape of the actual gradient determines the size of the error. If the wavelength is sufficiently long, a constant gradient is a good approximation. The high frequency deviations in Figure 11 are probably due to the logarithmic shape of the wind speed profile.

Most of the previously published calculation methods for propagation under the influence of wind and temperature gradients are based solely on ray tracing techniques, and as a consequence the accuracy has not always been satisfactory [10, 20]. Recently De Jong has developed a very advanced calculation method based upon extrapolation [18]. At present the results, however, do not agree well with experimental data. The reason for this is not known. Actually the theoretical results displayed in Figures 5 and 6 may be compared directly with calculated results in reference [18].

Apart from the inaccuracies inherent in the calculations for taking the influence of wind and temperature gradients into account, it should be mentioned that the flow

resistance ground model could also be responsible for some of the deviations between theory and measurement. One such example is the discrepancy in Figures 7(a) and (b) between the measured and calculated first dip.

Finally, it should be pointed out that the influence of a wind component having a direction normal to the sound propagation direction is not taken into account in the present study. Such a side-wind component is, however, expected to have only limited influence on sound propagation from a point source.

ACKNOWLEDGMENT

The present work was sponsored by the Danish Technical Research Council.

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APPENDIX: NOTES ON THE CALCULATION OF THE PRECISE THEORY

The numerical integration of equation (3) with either equation (13) or equation (16) inserted is far from simple. First, appropriate expressions for the v and w functions must be found. Both functions are closely related to the Airy function Ai [12, 13]:

$$v(t) = \pi^{1/2}\mathrm{Ai}(t), \qquad w(t) = 2\pi^{1/2}\,\mathrm{e}^{\mathrm{i}\pi/6}\mathrm{Ai}(t\,\mathrm{e}^{\mathrm{i}2\pi/3}). \tag{A1, A2}$$

Series representations for Ai may be found in the book by Abramowitz and Stegun [21]. For t much larger than one the following approximations were used:

$$\begin{aligned} v(t) &\simeq 0{\cdot}5t^{-1/4}\,\mathrm{e}^{-x}, & w(t) &\simeq t^{-1/4}\,\mathrm{e}^{x}, \\ v'(t) &\simeq -0{\cdot}5t^{1/4}\,\mathrm{e}^{-x}, & w'(t) &\simeq t^{1/4}\,\mathrm{e}^{x}, \end{aligned} \tag{A3}$$

where $x = (2/3)t^{3/2}$. For large negative arguments similar expressions could be obtained:

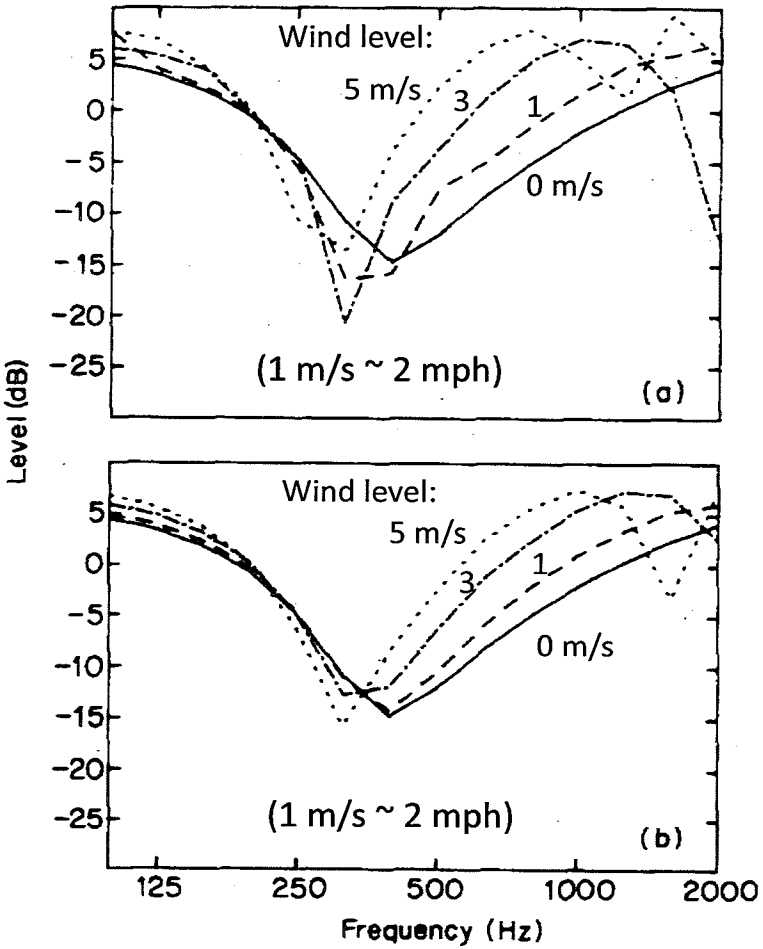
$$\begin{aligned} v(-t) &\simeq t^{-1/4}\sin(x+\pi/4), & w(-t) &\simeq t^{-1/4}\,\mathrm{e}^{\mathrm{i}(x+\pi/4)}, \\ v'(-t) &\simeq -t^{1/4}\cos(x+\pi/4), & w'(-t) &\simeq -\mathrm{i}t^{1/4}\,\mathrm{e}^{\mathrm{i}(x+\pi/4)}. \end{aligned} \tag{A4}$$

Whenever the argument was large enough, v and w were calculated by means of equations (A3) and (A4) in order to save computer time. The Bessel function in equation (3) was calculated from rational approximations [21].

The actual numerical integration was performed by repeated use of Simpson's rule [21]. It was discovered that for upwind propagation it was suitable to integrate from 0 to $2\,k(0)$, with 2000 points used in the numerical integration. For frequencies between 1 kHz and 2 kHz it was, however, sufficient to integrate from 0 to $1{\cdot}5\,k(0)$. For downwind propagation the phase of the integrand varies rapidly for κ close to zero. In this case it was found suitable to integrate only in a small interval around $k(0)$. The integration was performed over the κ-interval

$$[(-4k(0)/l^2 + k^2(0))^{1/2}, (4k(0)/l^2 + k^2(0))^{1/2}], \tag{A5}$$

where l is defined in connection with equation (10). The number of points was 600. If the above interval was increased, the number of points had to be increased very much, but the results were virtually unchanged.



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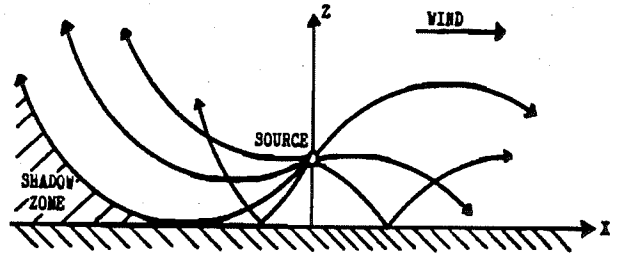


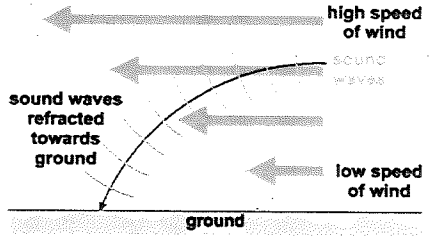


Fig. 1 Sound wave will be refracted to the ground when traveling with the wind.

The effects of sound propagation traveling with the wind could increase the sound levels by up to 10-15 dB, based on theory, simulations, and reference experiments.

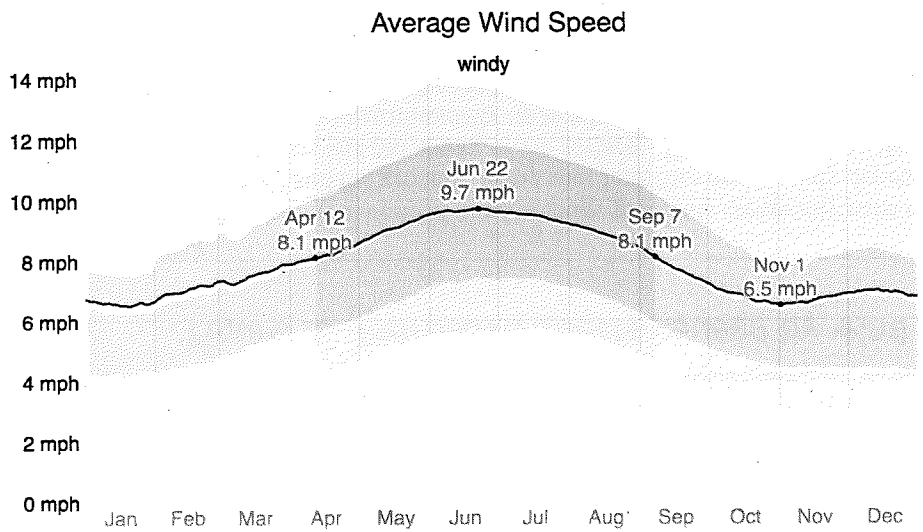
"Sound propagation in a temperature- and wind-stratified medium," David C. Pridmore-Brown, MIT, The Journal of the Acoustical Society of America, Vol. 34, No. 4 pp. 438-443 (April 1962).

The effects of sound propagation traveling with the wind could increase the sound levels by up to 10-15 dB, based on theory, simulations, and experiments, described in published scientific papers.

The VCC report, which does not mention wind effects, estimates the increased noise level would be 1 dB. Our (very preliminary) estimates, based on published scientific literature, is a factor of 10 higher.

<http://www.hk-phy.org/iq/sound_wind/sound_wind_e.html>

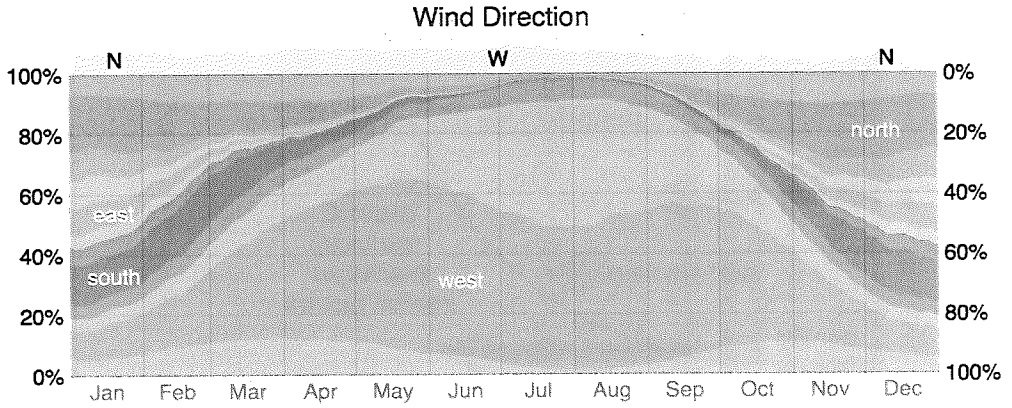
<https://weatherspark.com/y/1074/Average-Weather-in-Dublin-California-United-States-Year-Round#Sections-Wind>



The average of mean hourly wind speeds (dark gray line), with 25th to 75th and 10th to 90th percentile bands.

The predominant average hourly wind direction in Dublin varies throughout the year.

The wind is most often from the **west** for **9.4 months**, from **February 8** to **November 19**, with a peak percentage of **92%** on **August 10**. The wind is most often from the **north** for **2.6 months**, fro **November 19** to **February 8**, with a peak percentage of **35%** on **January 1**.



*The percentage of hours in which the mean wind direction is from each of the four cardinal wind directions (north, east, south, and west), excluding hours in which the mean wind speed is less than **1 mph**. The lightly tinted areas at the boundaries are the percentage of hours spent in the implied intermediate directions (northeast, southeast, southwest, and northwest).*

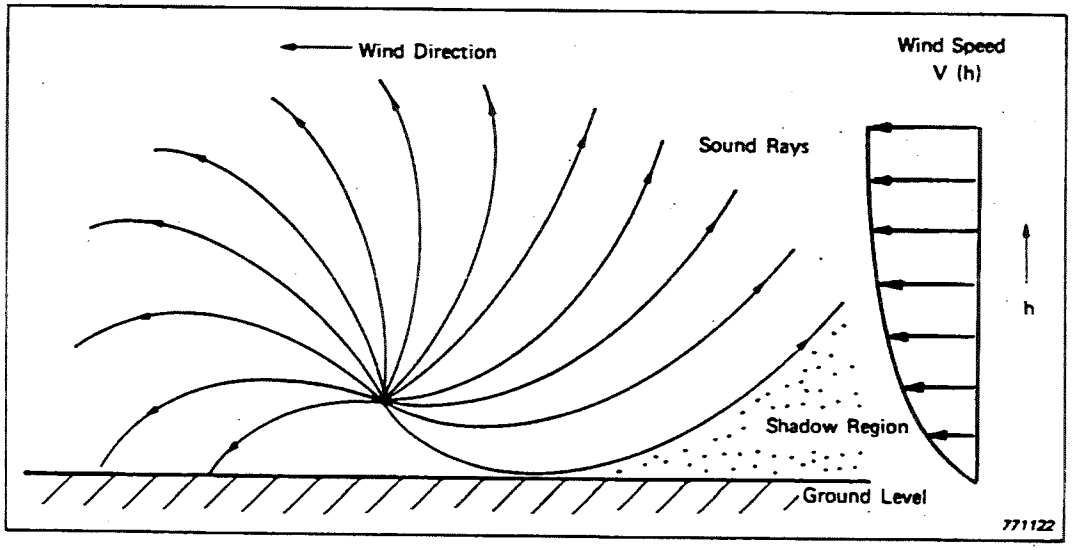


Figure 3. Refractive effects caused by wind

Effects of Wind

Over open ground, substantial vertical wind velocity gradients commonly exist due to friction between the moving air and the ground. Wind speed profiles are strongly dependent on the time of day, weather conditions and the nature of the surface. The wind speed, in the absence of turbulence, typically varies logarithmically up to a height of 30 to 100 meters, then negligibly thereafter. As a result of this velocity gradient (and the resulting change in sound velocity which it causes), a sound wave propagating in the direction of the wind will be bent downward. In the upwind direction the sound speed decreases with altitude, sound waves are directed upward, away from the ground, forming a "shadow zone" into which no direct sound penetrates (Figure 3). This process is called refraction, whereby the path of sound waves curves in the direction of the lower sound velocity. The radius of curvature of the sound path is inversely proportional to the velocity gradient. Sound always refracts toward the lower sound speed.

<http://www.hkphy.org/iq/sound_wind/sound_wind_e.html>

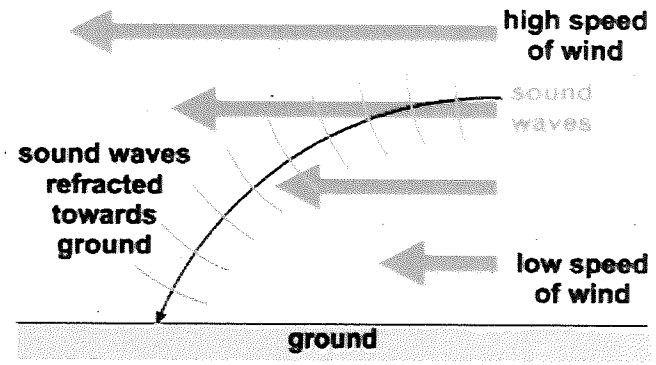


Fig. 1 Sound wave will be refracted to the ground when traveling with the wind.

Sound wave travels faster in the air when it **is** with the **wind**. Generally speaking, **wind** speed **is** lower near the ground because of the presence of blockages, and so it increases with height (Fig. 1). Therefore, when traveling with the **wind, sound** wave farther from the ground travels faster.

TO: MS. CAROLINE SOTO
DUBLIN CITY CLERK

DATE: 8/30/18

RECEIVED
AUG 30 2018
CITY OF DUBLIN
CITY MANAGER'S OFFICE

FROM: ANDREA RENZULLI

RE: OUR 8/30 LETTER TO THE DUBLIN CITY COUNCIL

Dear Ms. Soto:

Since we are concerned about our personal privacy, we hereby request that you redact our personal information (names/signatures and address) if our letter is published online or if you receive a document request relative to this matter.

Sincerely,
Andrea Renzulli

7190 Inclined Place
Dublin, CA 94568
August 30, 2018

Dublin City Council
City Hall
100 Civic Plaza
Dublin, CA 94568

RE: Valley Christian Center Planned Development Zoning Amendment and Site Development Review Permit (PLPA-2014-00052)

Dear Mayor Haubert, Vice Mayor Hernandez, Councilmember Gupta, Councilmember Goel, and Councilmember Thalblum:

We are writing to urge you to postpone your vote on the proposed development (athletic field expansion) at Valley Christian Center. The city failed to notify us and many other residents in the surrounding neighborhoods about this development and the August 14, 2018 Planning Commission meeting/hearing. Since we could be adversely affected by the number of events scheduled and the attendant traffic and noise, the city should have sent us the notice of hearing and given us ample opportunity to review the plans and comment.

When we found the notice of hearing online (see https://www.dublin.ca.gov/DocumentCenter/View/18933/PHN---Website-Version), we were particularly troubled by the following passage:

> You are invited to attend this meeting and provide feedback regarding this project. If you challenge the described action in court, you may be limited to raising only those issues you or someone else raised at this public hearing, or in written correspondence delivered at or prior to this public hearing.

Instead of trying to be inclusive and transparent in its decision-making process, this council appears to be going out of its way to exclude affected residents. If it is so concerned about potential legal action, why did it fail to do the right thing in the first place?

Sincerely,

Andrea and Miriam Renzulli

cc: Caroline Soto, Dublin City Clerk

11221 Las Palmas Ct.
Dublin, CA 94568

September 3, 2018

VIA EMAIL: *council@dublin.ca.gov*

Dublin City Council
100 Civic Plaza
Dublin, CA 94568

RE: Additional Statements in Support of Request for Sixty-Day Continuance Regarding Valley Christian Center Planned Development Zoning Amendment and Site Development Review Permit (PLPA-2014-00052) for the Project site located at 7500 Inspiration Drive

Dear Mayor Haubert and Honorable Members of the City Council:

In addition to the statements included in the Request for Sixty-Day Continuance submitted to the City on August 29, 2018, I am providing additional statements, which are based on the Planning Commission's Staff Report, dated August 14, 2018 in support of our Request for Continuance as follows:

Attachment 7, Exhibit A to Attachment 6, Draft City Council Resolution Approving a Site Development Review Permit ("Attachment 7") states in pertinent parts:

Section A(2) "the proposed project gives **thoughtful consideration** to the athletic field ....;"

- Based on a number of deficiencies we found in reports submitted by the Applicant (which are supported by scientific arguments and papers separately submitted to the City on September 3, 2018 by a world-renowned scientist), we do not believe the proposed project gives "thoughtful consideration," as stated in Section A(2) of Attachment 7.

Section B(1) "the facilities will be used to support the schools [sic] **existing sports programs,** including **football,** track and soccer;"

- Based on the information posted on the Applicant's website and the Applicant's representatives' own statements, there appears to be no "existing" football program provided by the Applicant, contrary to the statement included in Section B(1) above.

Section C(4) "Mitigation Measures **have been placed** on the project to minimize impacts to the surrounding neighborhood;"

- Based on our independent review and assessment of the Supplemental MND and Conditions of Approval included in Attachment 7, it appears that no significant or impactful "mitigation measures have been placed" on the project to minimize the negative effects on the surrounding neighborhood.

Section C(5) "**as conditioned**, the athletic field will be operated in a matter as to reduce impacts on the surrounding neighborhood."

- Other than the two very minor conditions listed in Exhibit 7 on Lighting & Sound (Nos. 18 and 19, respectively), there are no meaningful or material conditions, restrictions and/or limitations (such as limiting uses, users, days used per week/year, hours per day, internal vs. external users, etc.) imposed upon the Applicant to reduce negative impacts on the surrounding neighborhood.

Please be reminded that the Dublin Municipal Code, Chapter 8.56 "Development Agreements Regulations" include the following:

§8.56.080 Determination by Planning Commission.

A. After the hearing by the Planning Commission, the Planning Commission shall make its recommendation in writing to the City Council. **The recommendation shall include the Planning Commission's determination whether the development agreement proposed:**

1. Is consistent with the objectives, policies, general land uses and programs specified in the general plan and any applicable Specific Plans.

2. Is compatible with the uses authorized in, and the regulations prescribed for, the land use district in which the real property is located.

3. **Is in conformity with** public convenience, **general welfare** and good land use practice.

4. **Will not be detrimental to the health, safety and general welfare.**

5. **Will not adversely affect** the orderly development of property or **the preservation of property values.**

B. The recommendation shall include the reasons for the recommendation. *(Ord. 8-91 § 1 (part))*

We believe the reasons for the recommendation included in Attachment 7 by the Planning Commission pursuant to subsection B above are insufficient, incomplete and do not adequately address the issues related to the general welfare, health and safety of the surrounding neighborhoods.

§8.56.090 Decision by City Council.

A. After a public hearing, **the City Council** may accept, modify or disapprove the recommendation of the Planning Commission. It **may**, but need not, **refer back to the Planning Commission matters not previously considered by the Planning Commission during its hearing for report and recommendation.**

B. The City Council may not approve the development agreement unless it makes all the determinations set forth in Section 8.56.080.

Accordingly, we are requesting:

a) the City to (i) postpone or reschedule the matter to be continued; or (ii) send the matter back to the Planning Commission for further review and analysis of the Applicant's Supplemental MND and other submissions to ensure full compliance with the CEQA, the State Guidelines and the City of Dublin Environmental Regulations, as well as with the above cited Municipal Code and other local ordinance and zoning codes; and

b) the City to also require (i) the Applicant's compliance with the City's initial requirement for the Applicant to outreach to the surrounding neighborhoods to discuss and share the Applicant's proposed plans, drawings, project engineering reports, projected timelines, and all other documents, reports, studies, data, etc. related to the project; and (ii) the Applicant to cooperate and work in good faith with impacted households and the City to ensure an outcome that is designed to prevent any pre- or post-construction litigation and/or enforcement issues.

The statements made herein do not constitute full and complete statement of the facts of, or our rights with regard to, this matter, nor do such statements constitute a waiver of any legal or equitable rights or remedies available to us, all of which are expressly reserved.

Sincerely,

Gigi Remington

Gigi Remington, Esq.
Attorney at Law

cc: Chris Foss, City Manager, City of Dublin, via email chris.foss@dublin.ca.gov
Caroline P. Soto, City Clerk, City of Dublin, via email caroline.soto@dublin.ca.gov