

TOWN OF NEWINGTON
CONSERVATION COMMISSION

Special Meeting

January 22, 2013

I. CALL TO ORDER

Chairman Philip Block called the Special Meeting of the Newington Conservation Commission to order at 7:00 PM.

II. ROLL CALL

In attendance:

Philip Block, Chairman
John Igielski, Secretary
Jeffrey Zelek, Vice Chairman
Andreas Sadil, Member
Kathleen Clark, Member
Alan Paskewich- Alternate Seated for Commissioner Shapiro (7:30 p.m.)

Absent:

Philip Shapiro, Member

Also in Attendance: Chris Greenlaw, Town Engineer, Peter Boorman, Town Attorney, Peter Arburr, Secretary and Norine Addis, temporary recording secretary.

III. ACCEPTANCE OF MINUTES

A. Special Meeting of January 8, 2013

B. Special Meeting of January 17, 2013

Chairman Block: We have the minutes of January 8, 2012 to review and approve. Does anybody want to do that, or do you want to table that, because we also have the minutes of January 17th now to review as well which we just recently got. What's the pleasure of the Commission?

Commissioner Clark: I'd like to table January 8th.

Chairman Block: As well.

Commissioner Clark: As well.

Chairman Block: So we will have to make a motion then.

Commissioner Zelek: If we make any references to anything that is in the minutes if we are going to use that for a decision, will we need to have those minutes approved?

Chairman Block: Yes we will and we will do that Thursday for sure. We'll catch up with our bookkeeping by Thursday, so please everybody read, and be ready.

Chris Greenlaw: Just to be sure Mr. Chairman, you want both minutes to show up on the Agenda, as well as tonight's, for Thursday. Thursday's will not be ready.

Chairman Block: Well, that's all right because we still have 35 days to deliberate on them, so we can catch up at that time, but I would like to be as much up to date as you can be for the close of the public hearing.

Commissioner Zelek: So for what it's worth, I'm prepared to approve the minutes of the 8th, if anybody else is.

Commissioner Clark: I didn't read them yet.

Chairman Block: John, are you ready?

Commissioner Igielski: I've read the minutes and I'm prepared if the Commission so desires to go in that direction.

Commissioner Sadil: I'm ready to approve the 8th.

Chairman Block: Okay, that's three, is that going to be enough?

Commissioner Clark: I'll still approve them.

Chairman Block: You haven't read them.

Commissioner Clark: So, then I can't, okay.

Chairman Block: Okay, then let's go forward. Does anyone have any comments or corrections?

Commissioner Igielski: On the first page the date that is listed for the meeting is January 8, 2012 which should be January 2013, and on pages 7,8,30,34,39, and 40 my name is mis-spelled, but it is recognizable.

Chairman Block: On page 45 there is a, in the first paragraph, the comments of George Logan, it says, such as the Creative Inaudible Method, okay, do we have the proper reference for the method that he used? The proper title? The sentence reads, the applicant continues any model deemed appropriate including the Scheuler Simple Method but a robust model such as the Creative (inaudible) Method would be recommended. Please give the correct spelling to Norine later on. On page 47 there was the mis-spelling of phytoremediation. Those are my corrections.

Commissioner Sadil moved to accept the minutes as amended. The motion was seconded by Commissioner Zelek. The vote was in favor of the motion, with five voting YES.

IV. PUBLIC HEARING

A. Application 2012-22, Russell Road North of Old Highway

Chairman Block: Okay, at this point, Application 2012-22 the public hearing continues, and I believe we were waiting for the response of the applicant to the comments raised at the last meeting.

Chris Greenlaw: Mr. Chairman, as we had discussed, in light of the new information that we had received did you want to comment to that regard?

Chairman Block: Indeed I do. I would like to request the members of the Commission and the audience to please review carefully the new proposal that the applicant has presented. At first

blush, I've only seen this tonight, but it represents to me a clear attempt to meet the comments and concerns that have been raised on the prior hearings. I applaud the applicant's efforts to do this and I sincerely hope that the applicant is going to be able to provide the backup data that is needed to go along with this, and that we will have time to properly review it within the short time left to us. I will go on record at this point as saying that I will bend over backwards to be sure that the applicant has a fair shot of proving his case on this revised layout.

Attorney Regan: Thank you Mr. Chairman. For the record, my name is Tom Regan, I'm an attorney with the law firm of Brown, Rudnick, LLT, One City Place, Hartford Connecticut. I'm here tonight representing the applicant, Toll Brothers. Thank you for your comments and just let me set a little bit of the framework. After hearing Mr. Logan's report on Thursday night and his various concerns about the project, we set ourselves to work on Friday and our team and our engineering team worked all weekend, Friday, Saturday, Sunday, Monday going over Mr. Logan's report, going over Mr. Logan's comments, actually talking to Mr. Logan because in the course of the report the other night, he had mentioned that he had some design thoughts on how to improve the project, so we did explore that with him, and what Ray is going to present in a few minutes is a revision to the plan that we think substantially addresses Mr. Logan's report of the other night. In short, to give you the broad brush, we have increased dramatically the upland areas on the wetlands, three and a half acres less of disturbance Ray, is that right?

Ray Gradwell: Three acres less.

Attorney Regan: Three acres less of disturbance. We have attached the wetland corridor completely, we've changed the road system for the project and we have made a plan that we think, we thought the prior plan protected the wetlands sufficiently, but this plan far exceeds the prior plan in its protection of the wetlands and the upland review areas, and with that, and just as a course, I want everybody to realize that we only heard Mr. Logan's report on Thursday night, so this is really the first chance we have had to respond and to provide the engineering in response to that plan. I want everyone to understand the timing here. We don't like doing this at the end of the public hearing either, but we didn't hear Mr. Logan's report until Thursday night so this is the first chance we have had to respond to that, and to the Chairman's comments, we have done our best throughout this process, both this application and the last to try to respond repeatedly to questions, comments and concerns that we have gotten from the Commission, from the consultants, from the public, and that is what the public hearing process is for in land use in Connecticut. There's not a project that I have been involved in, in twenty years where the project hasn't been worked through this process, changed and made better for everybody through this process and I believe this is just an extension of this process, and with that I'll turn it over to Mr. Gradwell to present the changes.

Ray Gradwell: For the record, my name is Ray Gradwell, senior project manager at BL Companies at 355 Research Parkway, and a professional engineer in the State of Connecticut. After last Thursday's meeting, we had the opportunity to review Mr. Logan's very comprehensive report on our project, study that in depth, I don't believe I left the office Thursday until almost 2:00 a.m., I spent a good part in the office making sure that I understood that report fully, before we hit the ground running on Friday morning to more or less respond to Mr. Logan's comments and questions as well address the other comments and questions from the CERT report, and the town staff. Once again, the existing conditions plan, we have three wetlands on site, basin one, basin two and basin three, basin one being the far left, basin two being the center of the site, and basin three being on the east part of the site just west of Russell Road.

The proposed plan as was discussed last week and reviewed by Mr. Logan and Staff, as well as CERT was a 48 lot subdivision with an one access drive located right here, Trap Rock Way, Rockwell Road, Vista and a small Trailside Drive located right there, 48 lots. This plan respected the 150 foot setback located in this area, and respected the 100 foot setback located around the

entire project, around basin three, basin two and basin one. In further review of Mr. Logan's report and questions and comments we had the opportunity to revisit this plan and prepare another plan to address those comments and questions, and that plan is the plan that we have here. Basin One, along with your basin on the left, Basin Two, on the center of the site, and Basin Three on the east of the site. All those basins are now linked by open space. They are not cut off by a road, they are not cut off by an amphibian tunnel, they are all linked by open space. We have a second road located here, Traprock Drive. Once again, it's a 48 lot subdivision, 48 lots on this project.

Commissioner Sadil: The size of the lot, an acre.

Ray Gradwell: This is a 12,000 square foot minimum lot area. So we meet the requirements of zoning for the lot size, and we also meet the requirements to get 48 lots. Other things on this plan are the areas shown in blue. When I get a little further along in the presentation, we have a storm water pond located here, a storm water pond located there, those were ponds located more or less in the same location that they were proposed in the last review. We shifted this pond a little bit further south to get it outside of the 150 foot buffer, along and outside the center wetland basin two and we shifted the outlet to the south, into a flat area located right there.

Commissioner Zelek: How far outside of the wetlands is it now?

Ray Gradwell: That wetland right there, that's the fifty foot, that's the hundred feet, that's the 150 feet.

Commissioner Zelek: The discharge from the detention.

Ray Gradwell: It's probably another 150 feet, so it's about 300 feet.

Chairman Block: Jeff, if you would look at the second page, you will notice that there is, no actually the third page is even better, makes the hydrology a little bit clearer to us all.

Ray Gradwell: When I get a little further along, I just wanted to describe the big picture, the big changes that we made. Once again, this project has a complete natural link from basin one to basin two to basin three within the project site. It's a reduction in total disturbance of approximately three acres, so we are disturbing less land on the site, and that disturbance equals all three acres and we are providing the Town of Newington another two plus acres with respect to open space on this proposal.

This is kind of a comparison of what we proposed and what was reviewed by Mr. Logan and with respect to the new plan. The new plan is shown here, the new plan limits are shown here in dark green, the old plan limits that we proposed at the last couple hearings are shown here in white. You can see how we pulled back the limits of the disturbance significantly in this location. We were up to the 100 foot line there, we pulled it another 150 feet or so to the north. Now you can see that open central link, this is where we proposed the amphibian tunnel, that all will be open space undisturbed land that will remain in perpetuity for the Town of Newington. The outfall location Mr. Zelek was located right here, we shifted that further to the south and discharging a little bit further to the west. So it's kind of a good plan to show you some of the changes that we made.

Commissioner Sadil: So when you said you limited disturbance, did the lot size get shorter, did the grading change?

Ray Gradwell: We lost all this work in the middle of the site, we had a cul-de-sac here so we were working down there, pretty much all the way already with respect to the east cul-de-sac, we

narrowed up some of the lots, some of the lots were over 100 feet wide, we narrowed them up to 80 feet wide which is the minimum required by the Town of Newington zoning, so we kind of pulled the development limits in. That's kind of shown here. We lost these lots that were in this corridor which was part of that central road, we lost the amphibian tunnel, so this is now a nice natural link from basin one to basin two to basin three on the site.

This is a little more detailed, a little more blown up for staff and Commission to kind of review and get a feel for the changes. Once again, the limits of disturbance we were proposing for kind of hug the basin number two, wrap around the amphibian tunnel, wrap around outside of the 150 foot line, and then wrap around the 100 foot line. All those limits have been tucked further to the north, the south side of our 48 lots subdivision to a new storm water pond located right there, all the way around the existing basin number three and all the way around Rockville Road, well outside the 150 foot setback proposed for this wetland number two.

Commissioner Sadil: So from the edge of that pond, give me a sense of the distance from there down to the wetland?

Ray Gradwell: This is fifty, one hundred, one fifty, two hundred, about 220 feet from the edge of the wetland basin number two all the way to the south property line.

Commissioner Sadil: And from the south side?

Ray Gradwell: Fifty feet, one hundred feet, one hundred and fifty feet. Right to that line right there is 150 feet outside the limits of wetland number two. This is the plan, a little bit hard to read, but this describes the watersheds and the areas of disturbance that we are not doing any more, and areas of disturbance that we are proposing. We are proposing some additional disturbance here, we are moving that outfall to there. As you can see, the old disturbance limits were in red, the new disturbance limits are in green. Old Disturbance limits in red, we are not proposing that any more, all this is disturbed land in red here, that we are not proposing any more.

Commissioner Zelek: Do you have an overlay that shows, I think George Logan said that there was 4.18 or 4.19 acres that contributed to the watershed. Do you have an overlay that shows that 4.19 acres and what you are preserving and what you are taking?

Ray Gradwell: I have, I think it's two more slides down. So this is a summary of the changes that we made with respect to the limits of disturbance, the overall limits of disturbance are about three acres less, with this plan. The area outside the 150 foot now is another eight tenths of an acre, the open space goes up approximately two acres on that table on the far right, a little hard to read.

Commissioner Sadil: So that upper area where the brown is, describe what that area is going to look like. You covered the area, but what is that physically going to look like?

Ray Gradwell: This area in the brown here, it's going to remain open space. Just woods as it exists today, so as it exists today it will be woods, so all of this will be turned back to open space to the Town of Newington, so that provides a link from basin one to basin two to basin three, all that open space that we are proposing now.

Chairman Block: Mr. Gradwell, if I'm jumping the gun, just tell me, but between the lots to the north and this new extended area of open space, what is the re-contouring that is going to occur there, what is be the break point between what you are now getting with the open space, and the developed lots.

Ray Gradwell: Mr. Chair, as I get further along I'll get to the topography, what we are proposing along that north edge and north road.

Chairman Block: I'll wait.

Ray Gradwell: This is the proposed grading and drainage plan for that, and I'll describe the topography and what we are proposing here. The new road location is located right here, it will climb up from approximately Tin Smith, climb up to a high point that is located roughly right there. The natural terrain does that so we ran the profile per the Town of Newington's guidelines and established grade based on those guidelines along this new, or relocated Trap Rock Way to a high point there, and then we will slope down to the end of the cul-de-sac there. The grade and drainage more or less mirrored the drainage that we were proposing along that section of the old proposal, but we have added some additional storm water management features, and those storm water management features include bio-swales. We were proposing bio-swales before, but we are proposing bio-swales again along this whole south line to capture any runoff from the roofs, or from the yards before it discharges, to stop and we are also proposing the bio-detention area located right here to capture runoff from Lots 27 and 28 before it discharges into the detention pond or discharges to the north and west towards basin number two. The other storm water features that we are proposing on site are to remain as they were proposed. We have storm water pond located there and a storm water pond located there and a storm water pond located there. We added one additional storm water pond and that is located right there. That is to eliminate this one pond that was a significant concern of Mr. Logan. We eliminated that pond and shifted it approximately 400 feet to the east across the ridge line, so that water will drain, so Trap Rock will drain to the east, drain to the south to this pond, the outlet control in this location, daylight to the additional pond that was proposed originally just west of Russell Road and then daylight into an existing drainage system and then daylight to Tin Smith just to the east of our site.

Once again, we are proposing the bio-swales, along the south edges shown here in blue, all these lots that have a little blue line, all those lots will have bio-swales in the rear yards.

Commissioner Igielski: So as I understand it, all of the drainage from the paved areas of the streets will be collected in Russell Road near Tin Smith and basically not be directed toward wetland two.

Ray Gradwell: Correct. I'll show you, when I get to the graphic showing the pre and post conditions, drainage areas, I'll describe that a little further, but that's a good question and it's a good point to kind of describe that, the drainage system in Trap Rock will drain via catch basins, inlets with hoods, and then drain to this storm water pond there.

Commissioner Igielski: What part of those southerly lots will be having the water that falls on them directed towards the road versus directed southerly?

Ray Gradwell: On these lots here, I think it's 42, 43, and 44 in the front of the yard there is going to be a yard drain, that collects the roof water as well as the lawn water. You can see that red line right there, and then these lots here, this is lot 38, 34, 32, 35 and 36, those lots will have a front yard lawn drain to collect storm water before it gets into the street.

Commissioner Igielski: So it's only backyard water that would be draining.....

Ray Gradwell: It will be back yard water that will be draining to the bio-swales. That yard water will be collected by a yard drain there, to a yard drain there and then drain into this rear yard bio-swale system.

Commissioner Igielski: Is there any advantage to re-directing that water down the road and over towards the basin and then out into the, Russell Road?

Ray Gradwell: We wanted to mimic the existing conditions, the existing hydrology going to the central basin, as much as possible, so that is why we are directing the roof water and the yard water from that direction and diverting the pavement water to the storm water pond.

Commissioner Igielski: And you are expecting the bio-swales to be able to filter out any chemicals and things of that nature before the water reaches the wetland?

Ray Gradwell: Correct, and that's why we did it that way, and in this one, we had this bio-retention basin, once again, it's going to collect yard water, the yard water and then the yard water will drain to this bio-detention area before it overland discharges to the storm water pond or discharges to the north.

Commissioner Clark: Would you describe what the bio-swale would look like to a home owner and what the home owner's responsibility is to maintain the bio-swale?

Ray Gradwell: The bio-swale, it's on the project plans, it's a very low berm, I think on the plans it's a half a foot high, and it's a swale, and within the berm itself, there is a gravel core and that gravel core will act as a filter that will filter the top soils and the soil materials and loam and grasses, as well as plant materials that are planted on the bio-swale berm, will filter the pollutants, per se, from lawns before filtering through the gravel core and then from the gravel core it will discharge to the west.

Commissioner Clark: My question is, how would the home owner be expected with the home owners association or whatever document.....

Attorney Regan: If I may, I think I can address that question. The home owners association, to answer your question, the home owner is not going to have any responsibility for maintaining the bio-swale because we are going to take all landscaping responsibility for the project as part of the homeowners association. So the homeowners are not, and we have done this in other communities of this kind, the homeowners are not going to be responsible for maintaining their landscaping, the homeowners association is, so they'll be responsible for maintaining the bio-swales, they'll also be responsible for maintaining the landscaping. In previous hearings, Dr. Abrams has mentioned the Turf Management Plan that will apply to the whole project. That Turf Management Plan will set forth what can and can't be used by the homeowners association in maintaining the landscaping for the entire project, so it won't be up to each homeowner as to what they can and can't treat their lawns with, and how they are handling their lawns. That will be the responsibility of the homeowners association, will be in the declaration of the home owners documents and quite honestly I would expect a condition of any approval would be that we would work, that the Turf Management Plan would be worked on with the consultant representing the Town, probably Mr. Logan to make sure that everybody agrees that what is being used up there is appropriate and won't contribute any pollutants to that too, but we are taking the extra steps in this project of having the homeowners association be responsible for all of the landscaping and the homeowners association will also be responsible for plowing the driveways which will remove the ability of individual homeowners from having it plowed and using their own treatments on the driveways, so we have taken those two extra steps.

Commissioner Clark: That sounds good. I want to know, would the homeowner, let's say, this is my yard, I would rather plan something else in the backyard than what is sitting there. Do they have the right to do that, or, I'm not saying that.....

Attorney Regan: No, no is the answer. The landscaping will be controlled by the homeowners association and we do this quite frequently in planned development communities where the units are land as opposed to building so it's not an unusual concept for us at all. It's a little different in a single family residential community, but since it is going to have a homeowners association, it's perfectly permissible and that is the way that we will handle that. Those are two extra steps that we wouldn't usually take in a community, but given the uniqueness that we have all heard from Mr. Logan, of wetland two, and our desire to protect it, and make sure it's protected to whatever degree is necessary, we're going to take those two extra steps and take all of that out of the process, so we won't have to worry about the home owner who goes to Home Depot and uses either the wrong products or uses too much of those products. That's going to be taken away and controlled by the homeowners association. That will be recorded as part of the declaration and a stipulation of the entire project.

Chairman Block: Would you please consider notes to that declaration regarding swimming pools, because the question of appropriateness of swimming pools and backwash up stream of these areas would be of equal concern.

Attorney Regan: Yeah, I'll talk to Dan about that, I don't think that's a problem but that is something that I never even thought of on a project this size, but we will talk about that.

Commissioner Zelek: The design itself is changing, are there any changes to the construction approach, the phases?

Ray Gradwell: We do have changes on the phasing too. If I may I want to take you through that watershed mapping and then I will get to the phasing. We did get the phasing changes.

Commissioner Sadil: Just one quick question, relative to the drainage capacity, is that a ten year storm or what is the bench mark that you used.

Ray Gradwell: Our benchmark is one hundred, we design these ponds for one hundred year storms, so in excess of DEEP's requirements, they like us to design for the hundred year.

Chairman Block: I would like to interrupt to recognize the presence of Alan, has joined our group.

Attorney Boorman: Excuse me Mr. Chair, would you also appoint him to indicate that he is seated.

Chairman Block: Yes indeed, and he is filling our vacant position.

Ray Gradwell: The next graphic, Mr. Zelek, you were looking for this graphic, this is a graphic, pre and post conditions of drainage analysis, hydrologic analysis, in doing any of the drainage area that is going to that existing basin number two. Those drainage areas are shown here in blue and red. The red signifies what is existing, what drains there today, and that is about 12.8 acres, 12.81 acres.

Commissioner Zelek: When you say drains, surface drainage or ground....

Ray Gradwell: Surface water. Topography, the high point is the ridge line here, a ridge line here, all that topography dictates where that water goes on that site. There is a saddle of land located right there, so if you were a drop of water you land right there, you are going to flow either into the ground or to the west if you are going to be runoff to basin number two.

Commissioner Zelek: So the overlay that I'm more interested in is ground water.

Ray Gradwell: I'll get to that, there's a graphic in respect to that. So this shows the drainage basin number two, existing conditions shown here in red, and proposed conditions shown here in blue. The blue line signifies the area that is going to go to basin number two, these dark blue areas, dark blue area, dark blue area, those areas will drain towards basin number two. The areas in light blue are areas that won't drain to basin number two. Road areas, see that road area right there, that's in light blue, that will drain towards the storm water collection system, and discharge into a storm water pond located there, or a storm water pond located right there. Area in light blue located here, this road will drain here, this light blue area of the roads and driveways will drain to a storm water collection system, and also will land in storm water basin number three located right there. So the storm water associated with respect to pavements and driveways will drain to storm water features that do not discharge into basin number two. That was one of Mr. Logan's comments, questions as we reviewed his report. So areas, once again, in dark blue are the areas that will be draining towards basin number two, dark blue, dark blue, dark blue, and the light blue are the areas that will not be draining toward basin number two.

Commissioner Zelek: So is there a net gain or net loss in the amount of surface water?

Ray Gradwell: It's a net gain of about a tenth of an acre. It's 12.95 acres, post development shown here in blue and 12.8 acres, existing conditions.

Commissioner Zelek: Okay, how about water contributing.

Chairman Block: What happens to lots 27 and 28? Down the bottom there.

Ray Gradwell: Those lots are filtered through the bio-detention area and that bio-detention area goes back into basin number two.

Chairman Block: Okay, so they are really dark blue.

Ray Gradwell: Yes, well, dark blue are areas that aren't contributing today that will contribute.

Chairman Block: Oh, so you're saying 27 and 28 already contribute today.

Ray Gradwell: That area already contributes.

Chris Greenlaw: Mr. Chair, if I will, Mr. Gradwell, have you utilized the bio-detention area as part of your design, and if not could you possibly explain now or at a future time what a bio-detention area is, how it's constructed, what it does?

Ray Gradwell: Okay, it's a brief, brief summary. It's more or less a sand filter. It connects this area, top soil, loaming material, sandy material, gravel material. It's more of a filter, it will allow the water that will discharge from these yards to be drained into this bio-detention area and be filtered back into the ground.

Commissioner Igielski: Was your last comment in respect to basin two? What I'm getting at is, I realize might be a technicality but aren't you really referring to Wetland Two and Basins are the collection basins, entirely different if that is the case.

Ray Gradwell: Correct, in recording we have recorded that this is basin number one, basin number two and basin number three, wetland number one, wetland number two, and wetland number three.

Commissioner Igielski: Okay, because I'm thinking of the basins that are made to collect the waters in the upper right.

Ray Gradwell: Those are storm water management areas.

Commissioner Igielski: Storm water management, okay.

Commissioner Clark: Can you walk me through Lots 27 and 28, somebody is watering their lawn, would you follow that water for me.

Ray Gradwell: If you are watering your front yard, the contour of the land will drain to the east and into the road itself. The house is more or less at a high point. If you are watering your back yard, that water will drain to this bio-detention area located right here, Lots 27 and 28 do that.

Commissioner Sadil: I have a question on that upper land, Lot 42, 43, how come all the way up there is going to contribute to basin two, while their street is going to go the other way. It seems odd.

Ray Gradwell: Lots 42, 43, the dark blue will go toward wetland number two.

Commissioner Sadil: But the street is not, it's colored light blue.

Ray Gradwell: Correct. We wanted to separate them. We have two drainage systems in that area. We have a drainage system in the yard itself, okay, they will be yard drains, they won't be like DOT catch basins, they'll be a little more residential friendly, but those will be in the front yard, at a low point and located, one right there, one right there, one right there, and that will drain to the bio-filter in the back of the yards, so there are two drainage systems, more or less clean water or yard water, roof water and then the street water that a lot of it has sand in it from road saltings and.....

Chairman Block: I presume that there will be a diagram of that when you come up with the details to back up this proposal, so you will be able to do that then.

Commissioner Paskevich: Just expanding though on the yard drains position, is there a sloping from the road to the yard drain, and what is the slope?

Ray Gradwell: The slope will be gradual, the road will be naturally crowned, it will have a crown, it will have a curb and it will have a slope up to the back of the sidewalk, the right of way line, so the sidewalk itself will slope in because sidewalks are sometimes sanded, then it will slope into the road itself, the road will slope down towards the curb but back of sidewalk, it will slope down to a low point.

Commissioner Paskevich: Okay, from the back of the sidewalk towards the house, what is the slope from there to the yard drain in the yard.

Ray Gradwell: It will be about a foot deep, it will be a nice, gradual, shallow swale. It won't be a culvert swale, where you have driveway culverts and you have two foot drop off from the sidewalk to the culvert end, per se.

Chairman Block: So it will look like a gentle dip just beyond the sidewalk.

Ray Gradwell: It will look like a gentle dip just beyond the sidewalk and then it will rise to the house, and within that dip there will be an inlet, the yard drain.

Commissioner Zelek: So there are no separators or anything like that removing suspended solids, etc., from this water. It's just hitting this bio-swale and that's our first line of defense.

Ray Gradwell: The yard drains themselves will have sumps, so sediments will tend to fall out in the sumps themselves, the yard drain, and then the bio-swale will be the second line of defense.

Commissioner Zelek: Is there some documented science we can reference that is going to tell us that this bio-swale is going to be successful in protecting the water.

Ray Gradwell: We can get you that. We can get you the documents on bio-swales or infiltration swales or bio-retention basins, we can get that documentation.

Commissioner Clark: Similar question on it, again, I'm concerned about Lots 27 and 28 because they're right, the closest, this bio-detention basin, you described it as a sand filter, how big, where is it, does it collect the stuff that drains into the drains, and what's the, could you describe the back yard interface with the woods.

Ray Gradwell: With the woods, okay. Lots 27 and 28 located right here, per the Town of Newington's zoning regulations, you must have a thirty foot rear yard that has a maximum slope of I think five percent. So, you have to have at least thirty feet in back of the house before you can start sloping off into the woods, or to the yards, or to a bio-detention basin, so those Lots, 27 and 28 have their rear yard, the thirty foot rear yard, and then they will slope gradually down into this bio-detention basin. It's a few feet lower than the yard itself because it has to collect the drainage system that is located right here, right there. So it's a few feet lower. Then that will filter, yard and storm water and will overflow either into the ground, or to the north.

Commissioner Clark: What does it look like, is it, does it go to a hole, to sand that is underground?

Ray Gradwell: It will go throughout, through the ground, and it has an emergency spillways so if it does have an insurmountable storm, a hundred year storm, which will overtop a bio-detention basin or a bio-swale, it will have a spillway, so if it does have one of those act of God storms, it will have a place to go before it blows it out and creates a catastrophic event.

Chairman Block: In the normal dry season though, will it be a depressed grass area?

Ray Gradwell: It will be a depressed grass area.

Chairman Block: In normal dry, only when it is re-seeding it's runoff, will it flood and then soak back into the ground relatively quickly.

Ray Gradwell: Correct.

Commissioner Clark: As to the science of bio-retention basins, the Chairman brought up a good question about the pools which hasn't been decided yet, but let's say somebody had an above ground pool that they emptied for the year, would chlorine type products be retained by the bio-detention basin.

Chairman Block: That is why I suggested that they be prohibited.

Chris Greenlaw: Mr. Chairman, ask the engineer a question. I think to the benefit of all the Commissioners would be that bio-filtration is an infiltration type BMP and probably be prudent to go to the Connecticut Storm Water Manual and possibly reference the Massachusetts Storm

Water Manual, and they actually assign percentages as far as what it mitigates as far as whether it is phosphorus and other chemicals. I think it would be a benefit perhaps if you e-mailed that to me, and we can push that out to all the Commissioners so they can actually reflect on that, utilize that as a resource to see the chemicals in a bio-retention swale would be removed from the water, and additionally any information you have on bio-swales, if you could push that out to us, if you don't have that readily accessible at this time, allow them to review that, allow them to see the chemicals that it is going to take from the storm water run-off and then answer any additional questions on Thursday with a follow-up.

Ray Gradwell: We can do that, we can provide a typical detail per se, with what it is actually going to look like.

The next slide has to do with the water budget and this slide was reviewed with the hydro geologist Mr. Slayback and the project team. The water budget is based on a number of things, evapotranspiration, precipitation, ground water flow and runoff. So this is the water budget pre and post conditions. The pre-conditions shown here in red, as the year gets a little bit wetter, and keep in mind, the basin itself has a maximum level for three acre feet, so at this point the basin will overflow to the west, to the broad crest of where that exists today, so this diagram shows that as the year gets wetter the basin crests up and starts filling up and as the year gets drier the basin level will recede and is a smidge under the level that exists or the peak water basin which is about three acre feet in that basin. So the post conditions shown here in red, the, sorry, the preconditions shown here in red, and then the post conditions shown here in blue. They nearly mimic each other and the post development is just a little bit more because of the acre, we have about a tenth of additional area within that basin and the runoff curve number went up just a little bit, so it's an additional runoff that will be associated with the basin for wetland number two.

Chris Greenlaw: Mr. Gradwell if you will, would you explain what a runoff curve number is and how that translates to or from, the comparison between the existing conditions and the post conditions.

Ray Gradwell: A runoff curve number, it's a technical number, it's part of technical release number fifty-five, so if you want to Goodgle it, type in TR-55, published by the USDA probably in the late sixties, and that paper is to develop runoff volumes and peak discharges. A runoff curve number, it's a number associated with the type of soils you have, so if you have an A,B,C,D type soils on your site, A are the better, more granular soils, that let more water flow through, and D are the tight silty, clay type soils, we have a mix of soils on this site, they range from B's and C's. A curve number is also associated with the type of cover that is on the land. So if you have woods, you have one number, if you have paveage you have another number, if you have lawns and grasses you have another number, if you have residential development you have another number. Curve number for woods, with this type of soil, on the site I believe is about 67. The curve number for a parking lot is 98, so you can tell, a 98, much more runoff from a curve number with a higher number, than a curve number with a lower number, 67 for woods. So the curve number that we used for the pre and post kind of water budget I believe we used a 67 for pre conditions, because this is all woods, all that area in red in woods today. We increased that curve number a bit in the post soil conditions to take into account the residential development. I believe we used a 70, so we did a weighted curve number, and most of the area will remain woods and we weighted the curve number based on the area of residential development and the area of woods and we computed a weighted curve number and that weighted curve number equated to about number 70. So in effect, you have a runoff number of 67 existing conditions, a runoff number of 70 for post conditions. A 70 will typically result in a small amount of runoff, of additional runoff and that's what is showing here in this post development water budget a small amount of additional runoff associated with slight higher curve number.

Commissioner Clark: Is this draft just associated with runoff and has nothing to do with ground water movement?

Ray Gradwell: It takes into account runoff, precipitation, evapotranspiration, and ground water and well as the storage volume in that basin, so it takes into account everything.

Commissioner Zelek: So if I can get a clarification once she finds her materials, the total budget is really the amount of water overall, but it doesn't necessarily mean that the same amount of ground water is going into that ground water fed depression. It's just overall that water going in is the same.

Ray Gradwell: Overall it's nearly identical.

Commissioner Zelek: Right, but it's the method that feeds that particular wetland. The percentages, the amount of water that goes in today versus tomorrow I'd like to understand how much of it will be ground water, how much of it is ground water today versus runoff and how is that going to change with the development.

Ray Gradwell: This is pretty hard to read Mr. Zelek, but you look at January, we're looking at, the bottom left corner where we are talking about potential ground water as anticipated, the difference between precipitation, what evapotranspiration, runoff will be ground water, so that equates to, if you look at January, it's really hard to read it's so small, 2.4 inches, so 2.4 inches out of total precipitation that (inaudible) in January approximately 2.4 inches will get into the ground and flow with ground water.

Commissioner Zelek: Has Mr. Logan had a chance to see these numbers and review them with you?

Ray Gradwell: Mr. Logan has seen these numbers and I believe that Mr. Logan will have a couple of questions/comments on these numbers.

Commissioner Igielski: Could you go back to a couple of slides where you show the areas in red and blue. Am I correct in concluding that basically the red area is today after construction, after development it will be the same red area just minus the light blue plus the dark blue?

Ray Gradwell: Correct

Commissioner Igielski: So for the most part it looks as though all of the water that ends up in that red area today will be basically the same after, very little to change the light blue to the dark blue.

Commissioner Paskevich: In regards to surface water.

Chairman Block: The ground water is going to be altered somewhat too, I really hate to do this, but we cannot ignore this area too. The bedrock contours around here, is it such that a portion of this water is going to drain into here as well?

Ray Gradwell: That water will drain to the east.

Chairman Block: Yeah, the main flow of the.....

Ray Gradwell: Oh, the main flow, yeah, there is a saddle in this terrain right here, so the saddle, everything east of this red line will flow into.....

Chairman Block: And what we are talking about now is how much water, if the storm drainage from here is going to go out to Russell Road, how much is left to sustain this? I don't want to ignore it.

Ray Gradwell: Mr. Chair, we can get those numbers and put it on a graph for you for, show you pre and post.

Chairman Block: I just want to make sure there is enough water there to sustain it.

Commissioner Zelek: A graph is nice, but I would also like to see a watershed overlay, because we heard last week from Mr. Logan about the Berlin application in which they had a perched water table or a perched water wetland, similar to this small number three, and there was a watershed that contributed to that, so I'd like to see what that watershed is, what the acreage is that contributes to that small wetland.

Ray Gradwell: A little further along, there was a question on phasing. This is where we had the opportunity to work a little further. CERT has some comments on construction phasing and we phased the project a little different based on their questions and comments but with this proposal we took the phases a little bit further and the developer can build out one of these phases, Phase One, in about a year. That's between twelve and sixteen homes a year. So Phase One would more or less be year one, Phase Two, just to the west of that, more or less year two, Phase One will have a storm water pond and a storm water pond, Phase Two will have a storm water pond, an outlet, Phase Three runs right here, and that will run to the crest of Trap Rock, the high point in Trap Rock, and then Phase Four, four years, plus or minus from now, will be as far west as you can possibly go.

Commissioner Zelek: Are the phases running parallel, or overlap?

Ray Gradwell: They will not run parallel. We're not going to build a home up in Phase Four before we build a home in Phase One.

Commissioner Zelek: What I mean is, you're doing Phase One, will Phase Two start prior to Phase One ending?

Ray Gradwell: Well, Phase One will commence the stabilization and then, that's the way our notes read, and Phase Two can't start until Phase One is stabilized.

Commissioner Zelek: So then, next question is, within each of the phases, your construction methods, are they still going to be the same. Blasting, soil removal, thirty foot trenches, etc., because I did have a question and I don't know if I got an answer to it, you had in a prior meeting told us, with the prior plan, I think it was approximately 60 thousand cubic yards of soil were to be removed or disturbed, and my question was if you are clear cutting that area and removing that soil will we ever see large types of trees repopulate this area? How much soil is required for a large tree to survive or flourish in this area? Would the project have that amount of soil present once it was completed?

Ray Gradwell: That's a good question. That was a question from a couple of meetings ago, I did have the opportunity to speak with my landscape architect about that, and it was a good discussion and he said for a large tree of significant caliper, native species, you need about two feet of good soil. So that is pretty shallow.

Commissioner Zelek: Just tell me, what does he mean of good caliper. What size tree?

Ray Gradwell: We're talking a large diameter, we're not talking a 2 ½ inch caliper, something to grow, a significant caliper. If you have the opportunity to take a boat ride up the Connecticut River and take a ride into some of the off spurts or off canals of the Connecticut River, there are three are growing right on bedrock. I don't know how they grow and I don't know how they stay on bedrock without falling over in the first wind storm, but there is a tree, right in the middle of bedrock and it's a, it's not a sapling tree, it's a mature thirty inch caliper tree. My landscape architect assured me of significant trees would be able to do well, sustain being planted in the soil.

Attorney Regan: I also want to make the point to be clear, the sixty thousand square foot disturbance number obviously was calculated before we removed a bunch of the disturbance, so that number is going to change. We didn't have time to do all of those calculations, we will have those by Thursday, but three plus acres of the previously disturbed area that was going to be as you termed it, clear cut, will no longer be clear cut, will be remaining wooded, so the phasing plan changed substantially as did the amount of disturbance, so we will have those numbers clarified for Thursday, we just didn't have time to those complete calculations with the engineering being done so quickly.

Commissioner Zelek: I called it clear cut, I'll give you an opportunity to describe it in another way.

Attorney Regan: We are obviously not clear cutting the whole site now, obviously we are doing four phases in two different halves of the site, leaving the middle in place, so it changes dramatically the way the site would have been cleared before. The phasing is changed and the disturbance levels have changed and we'll figure out what the salient number is, but I just wanted to point out that the 60 thousand number that you had quoted was from a previous plan that had significantly more disturbance.

Commissioner Clark: Would you define stabilization?

Ray Gradwell: Stabilization is defined on the plan itself, it's a massive, a stand up grass that grows in a certain area. It's defined in your DEEP guidelines, your storm water S & E guidelines, it's defined and there is a clear definition if you have a chance to read those, or download those, there is a definition of stabilization. It's, you have to have this amount of grass in this amount of area just to stabilize those soils underneath.

Chairman Block: I would like to suggest this, and I really don't know if it is feasible, but in light of the question, in re-establishing some sort of a canopy, is it possible for your landscape architect to sort of designate areas on the lots which will be suitable for restoring large caliper trees so that, I think what that would mean is that there would have to be areas on designated lots where there would be at least two or three feet of soil, in the cavity, just to sustain a root system.

Ray Gradwell: It would probably be easier for him to rule out areas than it would be, it's likely going to be the whole site, but I can have him look at the site, look at the test pit results, look at the soil material on top of the test pits, where bedrock is and determine where, or where not large caliper trees will stand.

Chairman Block: And I presume also that you are going to be specifying to the buyers some sort of a landscaping budget, and I'd like to suggest also that some large caliper trees, species by included in that so that we can have the expectation that over the years this will be more or less reforested.

Commissioner Zelek: When REMA gets a chance to speak to this, I'd like to have them just confirm for us that two feet of soil or whatever is going to be left up there, I'd like to hear it from the botanist if large caliper trees are going to be possible.

Commissioner Paskevich: I also had a question in prior meetings which I don't think was answered, that I saw. The blasting will be done and there will be a grinding trap rock machine on site? Going back to my question, I'm trying to remember it, I'm concerned about the grinding and the site specific areas in which it is going to be ground in relationship to the wetlands and if someone is going to provide distance and move that machine, or is able to move that machine away from the wetlands in consideration of residual material that is going to come out of it, and it's not going to be static material because obviously wind can carry so I'm concerned about residual, grinding, minerals or powder coming out of it and dispersing on the wetland directly.

Ray Gradwell: In the project plans there is a provision for dust control. So we do state what you need to do to control dust on site, whether you are doing general earth work or crushing rock, that's within the project plans but we can specify upland area where the crushing activities would take place with respect to rock, so rock could be placed in the fill areas. We can specify those for the Commission if that so be, that be a condition of approval, we could specify for Phase One, we could specify that, as far and as remote as possible from any wetlands. Phase Three, once again, specify as far and as remote from any wetlands, same as for Phase Four as well as Phase Two. There are areas on the site where we can specify and protect be it basin one, two, or three or Wetland One, Two and Three.

Commissioner Zelek: So now that we've touched on the subject of trees, I believe it was the CERT report, and it may be the Clemens/Calhoun best practices or recommendations that a 750 foot perimeter be left, a canopy of trees, intact, around a vernal pool. When you had your discussions with Mr. Logan, did you talk about that 750 foot perimeter and the canopy of large trees?

Ray Gradwell: I would refer that discussion to Ron and George themselves, kind of a wetland vernal pool expert rather than an engineer talking about something that he is really not comfortable talking about. So if you don't mind Mr. Zelek, I'd like to refer that question to Ron. Construction phasing, we've divided the construction phasing up to one additional phase, phase one, phase two, phase three, phase four, and then this kind of graphic kind of goes through where those phases are located. Phase One located here in white, once again we need that access road, that's why this Phase One includes an access road as well as the detention pond here on the west side of Russell Road. It drains a couple of catch basins that are within that access road. Phase Two, detention, Chris, do you have a question?

Chris Greenlaw: Mr. Chair, if I will, I believe the consultant is offering to put the rock crusher plan or locations on the erosion sediment control plans perhaps, and that is something that they could do and we could approve as far as the plans set. Just wanted to clarify that.

Ray Gradwell: That's a good question. Phase Two, shown here in white, storm water pond and then the residential homes built just to the east of the storm water pond. Phase Three shown here in white on the north corner of the site, roughly to the high point of Trap Rock, and then Phase Four, the very furthest west of the site, and as far north of basin number two as possible. What that does, you are always working and stabilizing small areas of the site, as recommended by the guidelines, Connecticut E & S Guidelines, so phase one, a very small area of the site, phase two once again a small area of the site, you are working in smaller areas in the site to clear, cut and fill the land, construct utilities, build out homes and stabilize the area as you are doing that. Also, that allows the wildlife on the site a little more time in open areas. Now this area will all remain open, in perpetuity, but as phase one gets built, phase two will remain open.

Commissioner Clark: Could you describe the margin of Rockville Road? Are the trees right up to the road, is there going to be a berm?

Ray Gradwell: Rockville Road right there, there will be trees all the way up, native existing trees. The limits of clearing are shown here in the light, light green, so the limits of clearing are as close to the right of way line as is humanly possible. We still need room to build out the road, and provide a right of way and sidewalk if necessary, we're not proposing a sidewalk on that side, we are only proposing a sidewalk on the east side, but we need room to build the road. We're working to the limits of the right of way in that area. We sloped Rockville Road to a high point which is a natural high point in the terrain right there, so we built up Rockville Road to that high point and that is why we're not clearing any excessive area outside of the limits of the physical road itself in that area.

Commissioner Sadil: Just a question, how do you handle animal control on such a project. Obviously some animals can not encroach onto those properties. Just a general question, I do't know if you are the person to answer that, but I was just, it was in the back of my mind, I mean, if you get this call, I've got this coyote in my front yard.....

Chairman Block: Just like they call from every other developed part of the town.

Commissioner Zelek: I'd be more concerned about domesticated pets like house cats, I mean, what is their impact on this ecological system that we have up there that we heard was quite well balanced today.

Ray Gradwell: Not my area of expertise.

Commissioner Zelek: Not your area, but I just wanted to throw it out while we are talking about animals.

Ray Gradwell: I had that deer in the headlight look, right?

Commissioner Clark: May I say something, because this is my area of expertise, is it possible to write into any of the documents prohibiting outdoor cats in this development?

Chairman Block: I think it's a suggestion that the applicant might consider.

Commissioner Clark: Outdoor cats are a huge burden on the songbird population, so I would love to hear that they would consider that.

Chairman Block: And as a veterinarian you don't consider that a (inaudible) on the cats?

Commissioner Clark: Not at all.

Ray Gradwell: Further along, the water budget, we hit on this a little bit. This is the predevelopment water budget work sheet, we've spent significant time with the team developing all categories with respect to hydrology within this water budget and the post development water budget work sheet, showing the predevelopment and post development flows on the bottom right hand corner, to the basin number two, or Wetland Number Two. Some further details that we talked about, in prior hearings, treatment train, the water stop, the trench, the treatment train we're proposing in respect to suspended solids on the site, and Ron will go a little further along in his discussion in respect to pollutant removal, and then here are some things that we have worked on in the past few days, preparing these documents to present to you tonight. The revised lot configuration provides a contiguous link between Wetlands One, Two and Three, or

Basins One, Two and Three, all disturbances that we are proposing are outside the 150 foot setback of Wetland Number Two or Basin Number Two as stated there. We are providing about three acres less of project disturbance based on this new plan, and providing another two plus acres, or approximately two acres of open space to the Town of Newington with this plan. The water budget as discussed before, the Basin, or Wetland Number Two is nearly identical to predevelopment conditions based on the tributary areas that are going there, ground water going there, evapotranspiration leaving there and then run off going there, and we added a further construction phase, an additional construction phase, Phase Four on the northwest part of the site to further reduce the development open land per each phase as the project is built out. So that summarizes my presentation and the documents we have been working round the clock since basically Thursday night, the night that we left here last week. We've basically worked around the clock to provide these revisions to the Commission and Staff and Mr. Logan for a look-see to review these plans.

Attorney Regan: At this point, I'm going to ask both Dr. Abrams and Russ Slayback to come up and comment as well, and their comments are not going to be so much a response to what, to all of REMA's report although we will put a written response in by Thursday, but because so much of what they are responding to and the changes that are involved in the new engineering plan, as opposed to REMA's original report which is on the original design, so what I am going to ask is that Ron and Russ come up and talk about how the changes in the plan have affected their various portions of the project. Russ will talk about the ground water issues and Ron is going to talk about some of the Wetland's issues, specifically as it relates to the changes in the project.

Chairman Block: I appreciate you jumping over the prior version.

Attorney Regan: And we are going to try, to the degree that we respond to REMA comments we're going to, all of our responses will be in the context of this plan that we are presenting now.

Dr. Abrams: Dr. Ron Abrams, Dru Associates, on behalf of the applicant: As you know, on November 30th, we submitted a series of answers to questions from REMA Ecological services and tonight we are reacting to a report that REMA wrote that was in response to all of our answers and came out on January 17th. I'm going to jump through, using the question numbers that were in that document, and I'm not looking to give you a lot of detail here, but as you heard, just to reflect on the progress that has been made on the various back and forth from the parties interested in making this the best possible project. The first question that had arisen was looking at did we do our studies in the appropriate years to understand the flooding and volume of the basins, and I think we have agreement that we have certainly seen the swings, the range of what goes on at the site in the 2011, 2012 seasons. The next one was about hydrology which I'll get to in conjunction with Russ. Questions, 3,4,8,9,15 and 16 explore how the research in the field was done, a look at the wildlife, the aquatic readings followed by better using the wetlands on the site, and again I think there is agreement at least that we had our major objective of our study which was concerning presence or absence of such species and an understanding of the relative activity and distribution of that activity. I think what we did in those efforts were to produce sufficient information for this board to have a good picture of how active this site is, for aquatic breeding animals and from that be able to make good decisions.

We looked at the issues of how many animals there were and after my initial estimate based on comments from the parties, ended up essentially tripling the estimate of the numbers and in response to both (inaudible) and generalized concerns we had first a herp tunnel to link wetlands two and three and due to improvements to the project, we have now eliminated that need and the open space that is going to be preserved now encompasses all of the wetlands fully connected to each other, and we had, that was number 6, and number 7, we have had a rigorous exchange back and forth trying to understand the big picture of the hydrology, we agreed without a doubt to be able to protect the water quality and the storm basin system that was designed and shown

up until the last hearing we felt met the Connecticut standards and we felt did an excellent job, but now, we're in a position to guarantee that by pulling way back, essentially nearly entirely out of the watershed that feeds Wetland Two, we feel that we have done everything that is possible to guarantee protection of the water returning to that wetland. First in terms of quality, I mean, quantity, I think Ray's analysis which was refined several times in conjunction with REMA's comments, we're pretty confident that while we thought we were pretty close in matching the quantity before, now we're within, and we are so close to matching the quantity, and in the natural pattern that originally exist, that the difference is just the margin of error, the natural margin of error.

Just to make sure you understand, the bio-swales and the retention basins and the storm basins, from the beginning and now for sure are designed to get that water back into the ground. That's the infiltrated deep into the native soil, as deep as it can go, and while some of it is concentrated along the northern edge of the open space area the bio-swales and the material that will be used in the bio-swales will ensure that that water percolates into the ground and thereby joins the ground water. Now it may start as run off, from the backyards, but it won't stay on the surface. The features that have been designed and discussed with REMA people will put that water back into the native soil and then we're in line on 150, to 200 more feet of percolation through native soils which are the best filters for ground water protection, or wetland protection, so we're using Mother Nature and a significantly larger setback than has been typically found throughout Connecticut, in recognition that this basin needs that extra protection.

As for the water quality, that is the management of compounds that might otherwise create some changes in the wetland itself which we wouldn't want, the water quality again will be protected so, by the same mechanism. You don't have to go to any inordinate mechanism. The red line around the watershed, that is the watershed that is feeding that wetland now, and significant, more than half of it is going to be just like it is today, and the rest of those areas that touch into the development will be specially treated with an array of measures, and these measures have been reviewed, we thought they were good before, and now they are a whole lot better because we have made changes, in conjunction with the discussion with REMA services, so we're even more confident. We have a tighter mesh in both quantity and quality.

This project started by having, oh, about forty acres of open space and then we revised and in response to that January 7th letter from DEEP we pulled back to the 150 line and increased the amount of open space and then again with this revision we now have more than sixty percent of open space on the site. That is quite an accomplishment in my experience of twenty-six years of working with residential developments. So those were questions 10 and 12 on, 7,10,12 on hydro budget and water quality.

Question 13 again goes to the issue of ground water and we agree now, we have achieved what we consider protection of the entire watershed, the original watershed and again we want to make sure that everyone understands that there are potentially three layers, the ground water, there is superficial water that runs along the surface, and percolates into the roots, six, eight, twenty inches; there is infiltrating water that has been termed as quick flow, it's also in the (inaudible) zone, and that is the water that goes down into the soil and can reach to a bedrock layer, and then there's deep ground water and that would be the water that is down deep, fifty, a hundred feet, in the bedrock, and that is the water, that is the true deep water table with which one drills wells, and actually you would have to go deeper than that, but just understand that we are capturing all of the surface water on the developed area and putting it back into native soil to take advantage of between 150 and 250 feet of filtration back to the wetlands through native soil, undisturbed native soil.

Chairman Block: Excuse me, on this particular site, particularly after the recontouring is going to occur, please correct me if I'm wrong, but I was of the impression that it is not likely that the much area than is deeper than about two feet of soils above bedrock, am I right in that conclusion?

Dr. Abrams: Up in the developed area, and I believe that the engineers will be providing more specific data now, there were some specifics before but now we are going to have to revise those, and I think if you are asking me, that is up in the developed area, but as you transition from the developed area for instance along the northern edge of Wetland Two, the contours and the bio-swale will transition to the depth of soil that is there now.

Chairman Block: But again, it's relatively shallow isn't it? Above bedrock? We only have samples.....

Dr. Abrams: Well, actually we have good samples, we had a good test boring at the north end of the wetland in the buffer area and one just southwest of the wetland and they both showed between two to five feet of soil, and that's easy for you to revisit, and it was a little surprising to me, but bedrock in fact, beneath the wetland is reported to be eight or ten feet down. So, yeah, there are some shallow areas but remember that right now the water that is returning to the wetland now, within that red line, is going through whatever depth soils we have now, and the wetlands has benefited from that protection, and we are just going to mirror that protection.

Chairman Block: Right, but again, I'm more concerned with these areas here, and down here, which I admit is not a great portion, but that water is going to be traveling through perhaps the depth of two feet of soil or so.....

Dr. Abrams: Within the developed area.

Chairman Block: Within the developed area.

Dr. Abrams: Yes, but the important thing is, we will intercept it and recharge it, hold it, give it some time so that it seeps down into whatever native soils go between the development line and the wetlands. And because of the withdrawing which was one of the DEEP recommended 150 feet, you know, fifty more feet than it typically required, and we have gone even further in some places, in recognition that that distance, that linear distance from native soils is what we all believe is sufficient to protect water quality.

Chairman Block: That's to provide a natural recharging to its original characteristics.

Dr. Abrams: To put that water back in the soils in a pattern and we have spread it all around the site, in a pattern that will allow it to seep down as it does now. It's the microbiology and the plant roots and the invertebrate that do the processing of the water as it passes through and that water transitions to the quality that is reaching the wetland now and that is what we are expecting to mimic.

Commissioner Zelek: So, Dr. Abrams, did I hear you say that everything within that red line is the watershed?

Dr. Abrams: The red line, if I'm not wrong Ray, is the current watershed, if there was nothing on the site, that's the watershed that is there now.

Commissioner Zelek: That also contributes to, that's including the ground water watershed? I thought that.....

Dr. Abrams: Well, I

Commissioner Zelek: Let me finish, I thought that I heard that that red line was for surface water. So I would like to get clarification. Is that including entire watershed with ground water.

Ray Gradwell: Mr. Zelek, and Russ will elaborate on this a little bit, that is the water shed for surface water based on the topography of the land.

Commissioner Zelek: Thank you.

Chairman Block: On that point, I don't want to belabor it, but also want to make sure that I understand. It's been my belief that since this is on the top of the mountain, and it's a columnar basalt, which is according to testimony has relatively tight fissures down below any reasonable depth, there really isn't any true ground water serving wetland two, it's just the elevations don't lead itself to that as a substantial source of exposed water.

Ray Gradwell: That's a great question, and Mr. Slayback is.....

Dr. Abrams: Let's have our hydrologist answer, because there does seem to be some confusion about these terms.

Russ Slayback: For the record, Russ Slayback, hydrologist. First to your questions sir, we do not know the precise limits of the subsurface watersheds, however it's generally regarded in Connecticut and in topography of this nature that within a few tenths of feet, the boundary line between the surface watershed and the subsurface watershed is essentially the same and in any given watershed on one side there might be plusses, on one side there might be minuses, but the total area would not be expected to be (inaudible)

Commissioner Zelek: Okay, so how is it then that when REMA spoke last, they were able to tell us that there was thirteen acre watershed that contributed to the ground water?

Ray Gradwell: Mr. Zelek, I can answer that question. In red, the watershed for wetland number two is 12.18 acres, so roughly thirteen acres that Mr. Logan had mentioned during his presentation.

Commissioner Zelek: So I'll wait until Mr. Logan gets up and he can confirm whether or not this is inclusive of the ground water watershed.

Commissioner Clark: May I ask a question on the same point as far as numbers? So we have 12.9 acres inside the red, how many acres are the lots are now inside the red? So how many acres are we subtracting from our 12.9 original acres, how many acres do those lots represent?

Chairman Block: Well Dr. Clark, if you are talking about how much is going to be substituted from the 12.8, then you are not only talking about the gray area, but also this light blue area aren't you.

Commissioner Clark: Yes.

Ray Gradwell: The lots in the blue area and this white area, in the white area and the blue area equate to about four acres. It's about 3.7 acres, yes 3.7 areas.

Chairman Block: How much to you subtract for the light blue areas?

Ray Gradwell: The light blue areas are not on this worksheet, but that will probably equate to about an acre and a half.

Chairman Block: So there is a net gain there of about.....

Ray Gradwell: A net gain of about a tenth of an acre. 12.95 post development acreage contributing to wetland number two, and 12.81 pre development watershed contributing to wetland number two.

Chairman Block: That's why the dotted line and the blue line on the rainfall chart matched each other so closely.

Commissioner Clark: Right, but my point, what I'm just thinking is, just that while we're saying that the water is equivalent, you could look at that it is somewhat altered because it is not, in other words, four acres on this are not going to be acting the way that they would pre-development.

Chairman Block: And those four acres are going thru the bio-swales.

Ray Gradwell: Correct. Those four areas from the residential area lots here and here will be filtered through, collected through the yard drainage systems, through the bio-swales, and then lots 27 and 28 will be filtered through the bio-retention on the west.

Chris Greenlaw: Mr. Gradwell, Lots 17, half of 17,18, and 19 that gets diverted too?

Ray Gradwell: Correct, 17,18, and 19 will be collected through an inlet system right there, and drain across the road into the bio-detention area on the west side of 27 and 28.

Chris Greenlaw: So you are diverting that surface water into the bio-retention area, and therefore recharging the ground water soils and then it goes which way? Where does it go?

Ray Gradwell: That will drain toward basin number two, or wetland number two, so these yards and roofs will be collected through a drainage system in the back of 17, 18 and 19, drain across the road, be collected through another inlet system there and then drain into this bio-detention on the west side and then back naturally into the ground, just to the southeast corner of wetland number two.

Chairman Block: I know you may not be prepared tonight, but again would you please assess what is going to be happening to the watershed for basin number three. I just want to make sure that there is adequate water that is going to reach in there. I know that we talked about the fact of its marginal liability I believe is a fair way of saying it and I do want to ensure that we give that equal protection.

Russ Slayback: I think that's a question for Mr. Gradwell more than myself.

Ray Gradwell: What we're together with the team to identify that the watershed is draining into wetland number three.

Russ Slayback: I would like to touch on a couple of issues that you have been asking questions about. First of all this hydrologic budget, is based on large area and typical combined evapotranspiration especially on the uplands and wetlands, taking as a broad average. The reason why the hydro graphs show a lot of water still in the summer time in most years is that it really isn't there. The evapotranspiration from a wooded wetland area is substantially greater in hot summer months, so these water budgets are very broad proofs that we are not materially changing the watershed characteristics on a broad base, but they don't necessarily predict how much water is in the wetland at any given particular time. Secondly I would like to talk about the addition of the ground water component to the hydrologic budget. What I gave Ray and his staff was data from the USGS which says that on an average basis, throughout the Central

Connecticut, the USGS estimates that the average recharge, to till covered bedrock is about seven inches a year and it is reduced to about five inches per year in a one year in thirty drought. That does not account for the quick flow. I estimate and I don't have much history on this except for doing a water budget where you (tape change) seven to eight inches a year, in the average year and again, maybe two thirds of that value in a one year in thirty drought. For this particular setting, where the bedrock is not the typical bedrock in most of Central Connecticut, but is basalt which has a very tight texture except where the columnar jointing occurs and we do know that the upper part of the columnar jointing is more open than it is at depth, and the columnar joints are widely spaced, they are on the order of eight to ten inches apart or more and that means that the overall velocity and overall permeability of that basalt is rather low. So I believe that the amount of recharge to the bedrock here is probably less than the USGS averages and the quick flow, the water that flows through the soil and into, glides on top of the bedrock, flows on top of the bedrock is somewhat higher. I think that is just about all I have to say tonight. I think the most significant aspect of the redesigns that BL Companies have done is really getting the storm water detention and infiltration basins out of the watershed of wetland two, and further more adding the yard drains to further direct water where you want it to go.

Dr. Abrams: Ray will provide more detail on this subsequently by, wetland basin three in the eastern section, it's natural watershed is very small, I believe in the order of 2.3 acres. Most of that will not be altered, but part of it is going to be I think where the storm basins to the north is, and the water that gets directed into that basin, a portion of it will settle into the soil and some of it will return toward that wetland, but that area, the soils and conditions in that basin are not quite the same as basin two, wetland basin two. It's sandier, the water infiltrates better, and that's why we see it dry out so fast in the two seasons that we looked at it, so we feel that there will be sufficient, there will be water similar to what is going there now, but it really doesn't hold water well, that's our interpretation.

Chairman Block: Hearing you again tonight, I would like some clarification. This line is the surface contour of the watershed.

Dr. Abrams: Yes, understand, the red line is derived by looking at the topography of the land.

Chairman Block: We don't really know the permeability going from the higher elevation down across into two, we don't know how much of this ridge line is soil, and what the bedrock slope is, do we?

Dr. Abrams: I think, when I look at, what Russ just said, if this is where we put our red line and you have a surface that looks like this, partially, it would be here, a high point, between two sides, a ridge line and what we look at as the divide. So theoretically the water here is going to go that way, and water that lands here is going to go this way. The question that Russ attempted to answer was, we think this is theoretically rare that the volume would be underground, there could be a little leakage this way or a little leakage this way, but overall as you look at the entire area of the red line that balances out in experience and is generally accepted as a good enough indicator so that when we look at hydrological budgets that REMA asked us to work on, and they worked on with us, overall the accuracy is still maintained.

Chairman Block: I understand that in theory, when you are talking about large areas, that the bedrock geology would more or less mimic the surface geology. But in this particular area, since we are talking a very small area, there's no, is there any hard information as to whether or not there is any flow from three to two. The presumption is that there isn't. I understand that.

Dr. Abrams: Well, you have been out to the site, and what I just drew here is not meant to be detailed, but I've walked back and forth between these two locations I don't know how many times and if this is wetland basin two, it's not real steep, but it's steep enough to be noticeable and then it drops back down and this one, so if your question is, could some water land here and go this way or this way.....

Chairman Block: No, no.

Russ Slayback: Could I get a crack at this please?

Chairman Block: Let me get my two cents in and then, if we are talking about that, is there any chance that the bedrock geology is such that water comes down and gets down into the lower basin at all, do we know that, or are we presuming that?

Russ Slayback: I can't say that we know that, to a precise amount, but I think what you are losing touch with Mr. Chairman is that the boundary of that red line is out at the 100 foot setback line and that everything down to that wetlands at a lower elevation so it is highly unlikely that water could flow from wetland three to wetland two.

Chairman Block: Percolating through the soils?

Russ Slayback: I think that the very fact that you have a lot spot there says that that is a low spot in the traprock.

Chairman Block: So again, the very strong presumption is that there really isn't any subsurface flow between these two.

Russ Slayback: I think it's highly unlikely.

Chairman Block: I just wanted to make sure.

Commissioner Paskevich: I have a question for Dr. Abrams. The vernal pool as it is now, you have been there I have not, is there a tree line around it?

Chairman Block: Which one are you asking about, two or three?

Commissioner Paskevich: Three.

Dr. Abrams: Yeah, in fact there are some pretty good size trees providing canopy almost, in fact there is one thirty incher right on the edge of the wetland.

Commissioner Paskevich: Can you tell us what these species are?

Dr. Abrams: There is a pin oak, there is a some beech, red maple, and I'm accustomed to seeing willow, but I don't recall any, but they are the typical hardwoods in that woodland, and in that area there are some of the larger trees that are on the whole area, as if when this was used as a wood lot or when trees were taken off the land, some of the big ones were left right down in that low area. Not all the way to the bottom of it, but remember, this low area is very small, when it's, most of the time the mud is no wider than the table. Now, I did see it more full once, but that went down real fast, so it's not a large area so one or two good trees on the edge are going to shade it.

Commissioner Paskevich: So I guess what I'm leaning toward is, are those trees going to remain?

Dr. Abrams: Yes, we're not touching, all the white area will not have any logging, cutting work, nothing, so it will be just like it is today.

Chairman Block: Then let's just ask the question on the other side. In these areas, here, are there any substantial specimens that are going to be removed.

Dr. Abrams: I'm going to say there are going to be a few trees, I can't give you a number. It's not a very dense forest. There is a lot of space between the big trees. I think that is part of the history, when they cut out the wood they wanted, the ones that were left spread themselves out.

Commissioner Zelek: So this is a vernal pool, number three. Is that right, it's a vernal pool?

Dr. Abrams: Yes, I would guess you would define it as such although.....

Commissioner Zelek: And Clemons and Calhoun is the accepted best practices.....

Dr. Abrams: What do you mean accepted?

Commissioner Zelek: Well, from what I understand with a vernal pool, and I think it was referred to last meeting as best practices vernal pool management 101, that you don't discharge any storm water into a vernal pool, within 750 feet of it, and you don't disturb the canopy within 750 feet.

Dr. Abrams: All right, I guess what I need to do, I was going to save that until the end, but I'll talk about it now. First let me describe the theory that exists about the lands around a pond in which aquatic breeding animals are dependent. There is broad agreement both regulatory and scientific that the first 100 or even 150 feet in a concentric circle, and this is an idealized concentric circle, are important for housing the majority of the animals that depend on that basin and the majority of the population that is thought to pretty much use the same areas each year, whether they come out to breed or not, and my own experience and quite a bit of literature shows that you know, I guess a preponderance of the population lives within that distance, but more of the population does spread out. Right now the scientific literature supports a critical core habitat of about up to 250 feet. The 750 foot recommendation that comes from Calhoun/Clemens is not verified by scientific research. What has been verified is that there are two psychologies in these animals. There are those and I have myself tracked them with radio trackers and I have read literature that has done similar tracking, about ninety percent of the population think they should stay at that pond. They remain in the vicinity of their home pond. That ten percent go a long distance, and the more research that is done, the further people find an individual salamander or an individual frog, so in forming their recommendation, Calhoun and Clemens, their best management practices was a volume self published by Michael Clemens in a program that he did out of his consulting office in, I think his office at that time was in southwestern Connecticut. I know he lives up by Litchfield now. What they did was, they wrote these recommendations based on their field experience that if you preserve 750 feet in an idealized concentric circle you will thereby protect more than, most of the population and some of the long distance migraters. Now long distance migraters have a different purpose. They are going somewhere else. The theories are in fact, (inaudible) from Cornell was able to show that there was a genetic basis to this migration and essentially it would be that salamanders who leave the population, approximately ten percent, are going somewhere else to find a new home and that is a mechanism for genetic distribution and exchange between the populations. By the way obviously any of those animals heading east here are in trouble because they are going to hit Russell Road and the highway. But, in addition to providing the space for the animals, the 750 is to ensure protection of the watershed, so a generalized 750 is what they recommended. In reality, what we have done here is to preserve as much as is feasible of the core critical habitat that is in the 200, 250, and in lieu of just providing a

42 acre circle in which the water quality would be protected by (inaudible) hole with no mitigation measures because 750 feet of native soil, you're sure to filter anything. No doubt about it. What we have done here is to design a project that does the best it can to get in that direction and protect the water quality and the water quantity and what we will do to protect the animals who want to migrate a long distance is use an exclusion barrier, a well proven technology that has been used in New York, New Jersey and many places and that will keep the animals who just want to wander eastward in the 47 acres of wooded habitat that will be left after the project is done. Because there was a concern expressed during the exchange between REMA and our team about what happens during construction and how can you maximize the opportunity for the animals who are in the upland developed area to get out of there before they are hurt by the construction or what ever, and that's where the phasing program comes in. Improvements made to the project include careful thought to how the phases are staged so that you start in one corner and that maybe scares the animals, induces them to move away, and you time it with their breeding season, so that in each phase, you start your work say, at a point in time where when it comes migration time and that is readily determined either by following what is happening with herpetologists elsewhere in the state, or actually looking at the site, you time it so that once you feel that the animals have moved out of the disturbance area, you install a barrier so they can't get back. And that would be a phase and stage mitigation measure so that those animals who had moved out to the eastern side are induced to the best of our ability to move out of the development area.

Chairman Block: Are you saying that you are proposing that in the construction notes that the start of construction in each of the four phases should not be in a particular month?

Dr. Abrams: No, no, we will, this discussion happened yesterday. I wrote a little bit about it in my November 30 statement, and we got some comments back from REMA in the last few days and then yesterday there was an extensive discussion about how to time this, how to phase it and time it. We can't tell you the answer yet, but there will be.....

Chairman Block: But it will be there.

Dr. Abrams: But there will be, and we've said, even if we don't have the answer for you on all these answers in detail, we will commit to following such a protocol which will take maybe more time to work out with REMA, but the concept was fully vetted and we are all on board.

Commissioner Paskevich: I want to expand on this. It's kind of moving in a little bit of a different direction. I read in one of the reports, there is so much to consolidate, keep on board, but I do believe that I remember this, in writing that your phasing plan is also contingent upon economic marketing conditions.

Dr. Abrams: Well, yes.

Commissioner Paskevich: And not just, which can be seasonally any time.

Dr. Abrams: That came up in the discussions yesterday. Mr. Logan was talking about his view of this, and we were responding, there was a back and forth about how much time would be needed between phases to effectuate what we are talking about to protect the animals. At this point in time, the developer has agreed to work this out, because as Ray said to you, it's looking like we have a four year period over which to do this. That would mean multiple seasons for each area to let the animals, quote, escape. So again, I can't give you the actual schedule yet, and the economics of how much time would be needed for the animals versus how the developer would want to proceed, they seemed to come to an agreement yesterday, short of putting it on a schedule.

Commissioner Zelek: So you said that Clemons and Calhoun recommends a 750 foot buffer to protect the watershed, is that correct?

Dr. Abrams: Their 750 foot is, was a recommendation that would encompass protection of all of the elements to make the system whole.

Commissioner Zelek: Okay. So why aren't we doing that for this particular vernal pool?

Dr. Abrams: Well, there are two answers. 750 foot circle would obliterate the development entirely, and it's possible to meet the need of the watershed protection without the 750, and it's possible to protect the population without the 750. Again, in exchanges back and forth with REMA, we've talked about the various scientific studies, and we've looked at the literature and this is a conclusion that we feel takes us from what we thought was a good design to begin with, to one that we now feel we've really gone as far as feasible and necessary to make this work and it's been quite a process and I believe that we were able to make as many changes and grab as much more space.....

Commissioner Zelek: Okay, so if what I heard was you're disregarding the 750 foot buffer, in order to develop the area, so you are disregarding that, and then you also said that there was, in your opinion, I believe it was a 250 foot woods critical area...

Dr. Abrams: I don't know if I made myself clear, the 750 foot recommendation from Calhoun and Clemons has not been researched or supported by scientific evidence. The scientific publications available now today, that I have seen, show that 250 is the core habitat and that agrees with part of what Calhoun and Clemons wrote. They too.....

Commissioner Zelek: Okay, so there are two differences then. I'm sorry I don't want to interrupt you, I don't want to do that, but there are two different things here. We have a 750 foot buffer for watershed and a 250 foot for critical habitat.

Dr. Abrams: I, that's, yeah, I guess you could put it that way.

Commissioner Zelek: Then.....

Attorney Regan: Could I interject for a minute? I'm a little concerned about the constant referral to a 750 foot buffer which is in Clemons and Calhoun as a theoretical science argument, and I want to make it clear that there is no regulation that I am aware of that requires a 750 foot buffer from a vernal pool. More importantly, I would like Dr. Abrams to answer if he knows any, and I'd like Mr. Logan at some point to answer the same question, if they are aware of any jurisdiction that requires a 750 foot buffer around a vernal pool.

Chairman Block: Mr. Regan also, and I just asked Mr. Gradwell about this, there is a, your original watershed diagram I believe shows the existing watershed for that pool and I think that in trying to compare the recommendation from that report to what we actually have at this location, I think we should get back to what the figure is.

Attorney Regan: Thank you Mr. Chairman. If I could just make one other comment, which is really the reason I came up, I just want to be clear that not only has Dr. Abrams categorized wetland three, but Mr. Logan was pretty clear on the record the other night regarding his characterization of wetland three, and I think that record shows, so I just wanted to make that point.

Dr. Abrams: And I will answer the question Tom, I am not aware of any scientific study or a regulation of 750 anywhere to my knowledge, anywhere as a matter of code.

Commissioner Paskevich: I'm not clear on who Calhoun and Clemons are, are they affirmed scientists?

Dr. Abrams: No, Calhoun is a biologist from Maine and Michael Clemons is a biologist who lives in Connecticut. They collaborated on a piece that was funded by the Wildlife Conservation Society and a private grant to Michael and he published this himself. It wasn't sent for peer review, it wasn't published by house, but it was his and Arum's opinion and best judgment. What is interesting is that their 250 critical habitat zone is supported, there are papers that recommend that from scientific research. Nobody has gotten that far with the 750.

Commissioner Paskevich: Who would their peers be if they wanted a review?

Dr. Abrams: Well, most of the papers that we refer to as scientific literature go through a process where the paper is submitted to a recognized scientific journal. The editor of the journal sends that paper to a select board of editors who are experts in the given field, the paper is either accepted, edited, or rejected, and then goes back and gets published. It's that peer review process upon which science relies for literature that is quote, bonafide.

Commissioner Zelek: Thank you. So, you are saying that 250 is the critical area. Can you show us what's 250 look like on this map?

Dr. Abrams: I think some of the circles show that.

Commissioner Zelek: For number three.

Ray Gradwell: This is the wetland basin number three, wetland number three, this is the 50 foot line, this is the 100 foot line.....

Commissioner Zelek: Where is the 250 line?

Ray Gradwell: 200 would be roughly here, 250 would be roughly there.

Commissioner Zelek: Okay, so that there is activity within that.....

Ray Gradwell: 250 there, 250 there and 250 to the east obviously includes Russell Road and the residences across Russell Road.

Dr. Abrams: And there is one more comment, Calhoun and Clemons volume has a rudimentary ranking procedure in it, and they essentially identify basins with less than twenty-five egg masses as marginal to unimportant. Now those are my words, I can't quote from the book, I don't have it with me, but in that instance I don't find the need for an extended setback because the activity in the basin is so limited. What's more, since we are protecting almost the entire watershed for each of these wetlands, in terms of protecting the physical chemistry of the wetland, 750 would make no difference.

Attorney Regan: Dr. Abrams, can you comment on your actual observation and your examination of basin three as far as the habitat and the distance around the habitat.

Dr. Abrams: Well actually basin three was a bit surprising. It's currently barren for ground cover in all directions. There are a couple of shrubs on the northern and eastern end, but otherwise

there is no aquatic or emerging vegetation in that basin because it doesn't stay wet long enough in the growing season for that to happen. My first year there, which was a wet year, it was filled I would say that the actual water was one and a half times the width of this table, and we found I think two or three egg masses. Then when we went back in one week, it had drained all the way down and those egg masses had disappeared. One of the reasons that researchers consider, or one of the ways researchers look at the activity of the basin is in the number of egg masses and whether they can complete the breeding cycle, and in the second year there wasn't even enough water at any time for any egg masses that we observed. So our opinion was, it's marginal, it's pretty easy to protect in terms of the watershed and I don't think we are going to see any change in it with this development because it's not going to be starved for water, it's not going to be disconnected from where we know there are active animals, I think we have done what we really should to protect it.

Commissioner Zelek: To follow up on the question that Attorney Regan asked regarding the (inaudible) can you give me an idea, is there a tree canopy around this now?

Dr. Abrams: Yes, basin three has, like I said, right on the edge of the basin there are about four good size trees with full canopy and of course a big tree with a full canopy is more than enough to shade something of this size.

Commissioner Zelek: So where those detention pools are going to go, to the north and east, those would require part of that tree canopy?

Dr. Abrams: Well, they are outside the 100, so they won't affect in my opinion the shading or the condition of the soil through which water would percolate. I will point out that the storm system to the right is on a slope facing away, that section doesn't now drain to that basin. The amount of area that drains to that basin is very small. We have provided that information for review.

Commissioner Zelek: Will removing those trees affect the habitat for the animals in that area?

Chairman Block: I'm a little frustrated because I asked Mr. Gradwell that, unfortunately that is not in this presentation. What I would like to suggest that we take a five or ten minute recess. I do recall that you prepared drawings for area three.

Ray Gradwell: I can delineate it based on, it's in the drainage report, but I can delineate it for you. There is a saddle of land roughly right there, that basically whatever flows into wetland number three overflows and spills to the east, Russell Road and then the Russell Road drainage system. So that saddle of land kind of controls the drainage for that wetland number three. That saddle, you take that and run it about up to there, and then follow the water on the west side of this line will flow west to this wetland number two, the water on the east side of this line will flow east to wetland number three, so the delineated drainage area to wetland number three is roughly like this, and then from the saddle of the land to that, so it's a small area, and if Chris can grab the drainage maps, we are not impacting that significantly. That area as Ron as stated is a very small area today, it's only a couple of acres, and that couple acres will remain around wetland number three, the 50 foot and the 100 foot wetland buffer.

Chairman Block: Mr. Gradwell, and please correct me if I'm wrong, is that somewhere around through here there's another contour line that delineates that, from here it goes this way, from here it goes somewhere else up there, and the same thing down here more or less at the road is pretty much the limit of the contour of the three, so physically you don't have 750 feet around it to protect.

Dr. Abrams: You are absolutely right, and ironically the watershed that feeds this wetland isn't even the entire open area that you are looking at. The eastern end of that open area actually starts to drain away, where Ray was pointing to the saddle. Most of the water that gets to that wetland is the left hand side or the western half of about the 100 or 120 foot area, so in that sense, we captured it all.

Chairman Block: This is why I asked earlier whether or not the soils here and here were going to be of a permeable, semi-permeable material so that there would be a chance for some bleed through, if you will.

Dr. Abrams: Well, the topography on the east side, not, that won't happen.

Chairman Block: The bedrock won't allow it?

Dr. Abrams: Well, just the shape of the land and the way that they are going to shape that basin. Could some water come from the basin into the north into the soils and reach down, yes. If that basin fills full in a storm, and then the water sits for a day or two, some small percentage will go downward, reach into the soils and then seep towards the wetland.

Chairman Block: And that is going to be the function of the outflow pipe.

Dr. Abrams: How much water it holds and how long it holds it, yes. That's an engineering function.

Chairman Block: So again, getting back to the question that I had requested, is to give us some information on the water budget for this area. You might be able to play with that, the geography, the geometry of it, to make sure that there is going to be at least as much water there then, after development, as there is now.

Dr. Abrams: Yeah, that is something that can be managed. If after RAMA's review of the detail that was worked out yesterday, they have the opinion that more water needs to be held there, there are measures that we can use to send more water there. Then I think we might be defeating what is going on naturally now.....

Chairman Block: And I'm not too sure that that isn't a bad idea, but that's my two cents.

Commissioner Clark: I have a question about I don't know the size of the trees, I haven't seen them, but when the detention basin is dug and the road is dug, it's likely to affect root systems of some of the trees close to the road to their detriment.

Dr. Abrams: I can't give you a specific answer I mean, by common sense you can imagine that some trees will be affected by the development.

Commissioner Clark: Not trees that will actually be cut down or dug out, but.....

Dr. Abrams: Within the canopy drip line will there be some effects? I would think there would be a few. You know, except for certain spots closer to the wetland, or down on the whole northwestern portion there's not a lot of really large trees on the property. There's some, and in my opinion the aerial photos show that this area lost most of its trees and the period when it happened all over the northeast.

Chairman Block: I think we can resolve that issue and some of the other if your landscape person would give us a report, and perhaps later on we can make it a condition, to indicate if there are any specimen trees, on the site that can be saved, and if so, where are they?

Dr. Abrams: Yes, and the technology for saving a tree from root impact exists, so that's possible.

Chairman Block: I once remember a subdivision there where we found a beautiful copper beech, right in the middle, and it was worth, as you say, limiting the development and protecting it during construction, so it became a focal point to the development. Again, my own recollections and what I know of the site is, I think anything of that caliper was taken out. But if there is something there that is novel and substantial, let's find in and make sure it's protected.

Ray Gradwell: Mr. Chair, I believe the plans state that the perimeter of each phase of construction activities would be staked in the field, and that perimeter would be walked and then on that line, the construction limit could be, we could look for and identify any specimen trees that we could potentially move the limits of construction in to avoid that tree. That's what the project plans I believe identify.

Chairman Block: That is what I would suggest, thank you.

Recess 9:10

Meeting reconvened 9:25.

Dr. Abrams: Ray has put up the watershed, the existing watershed map that shows, I call it 2.3 but it's 2.226 acre watershed that supplies that area. To the north of the wetland outside of the 100 foot area doesn't drain to that wetland, the area to the south does, but because it's such a small watershed, it won't be difficult Mr. Chairman for us to do what you were suggesting and that is to supplement the water flow from that northern storm basin if it was decided that it would be a good idea.

Chairman Block: I think I can suggest that it should be weighted evenly as being a good idea. As you said, it's a marginal area, there are questions of it being a true vernal pool because it dries out substantially, am I correct?

Dr. Abrams: Well, the word vernal pool is spring fill up pool, that's where it originated. The folding into the understanding that vernal pools with all the ecology and aquatic breeding herpetofauna is something that goes beyond just the simple definition, so strictly speaking, it does get water in the spring, after the snow melt, it will have more water and then you will have that curve that drops off in the summer. So, in that way, it does meet the definition. In terms of activity of wild life, it doesn't rise, in my opinion, of being a very active vernal pool.

Chairman Block: A comment was made to me during the break that there was provision to make an additional water, wetlands area down below the level spreader area at the south end.

Dr. Abrams: Yes, I made that recommendation early on. Originally when I was told that the project thought that they would fill wetland basin three, I said, well, in order to compensate the wild life for the potential loss, we did a preliminary design and discussion of a basin down where Ray was showing, down in that area, we dug, we did some test digging, we did some watershed analysis and we looked at several different places on the site where we might do such an extra basin. I do not claim to be able to create a vernal pool, the science of that is difficult, but I've built and created many wetlands and we feel we could, in an area that would require taking out, I don't think any specimen trees, and the vegetation in the area was kind of sparse in that I didn't see anything of particular importance, we could create a basin. We never finished discussing in any

detail that, we asked Mr. Logan his opinion of it, he hasn't actually given us a real response in terms of whether it is necessary or not, although he didn't seem excited by it, and he can comment to that himself, but yes, we did talk about it and we did some preliminary development. Now of course that we're not touching wetland basin three and it's not disconnected, so that if animals want to go there or come from there, they are free to do so and that reduces the purpose of the original mitigation proposal.

Chairman Block: Thank you, anything further?

Commissioner Igielski: Does that mean that the addition of that wetland is off the table, out of the plans?

Dr. Abrams: Well, we kind of asked Mr. Logan that yesterday, he didn't say yes or not and we really haven't gone, to answer that question. I still think it has value. It would link basin two to a wetland basin south of the property where we found aquatic breeding herpetofauna. It's an unanswered question at this point.

Attorney Regan: It's certainly something that the Commission or Mr. Logan or both want us to do we'd be happy to do it, we've offered it before, we'd be happy to do it. Unless anyone has any questions for our team, I think that concludes our initial presentation of the revised plan.

Chairman Block: I would just like to ask George if he has had an opportunity to come to any conclusions or questions about this amended proposal at this point. I would really like to point out to the Commission and the public again that Mr. Logan hasn't had this before him for more than a day or so, am I correct.

George Logan: That is correct, and I will be specific about it. Couple of little housekeeping things before I go to the bulk of the comments. In our haste the last time, apparently Appendix A, didn't make it stapled into the report, so for you folks who have the report, these are the pictures, very important. Other item is, we have some extra reports that were left over if they need to go into the record. You have to understand that we were actually writing the report within less than forty minutes of arriving here, so there were some little mistakes that were more typos than anything else, so we have a (inaudible) sheet which is indicative of being in a hurry, some minor corrections.

What I would like to do is take you through what happened since last Thursday, briefly and then some things that I am seeing so far and maybe some things that I haven't see yet that I'm hoping to get between now and not too long from now, hopefully Thursday before noon.

I think it was on Friday, must have been on Friday, that I received a call from the applicant asking me whether or not it would be possible for us to meet for them to present to me some alternatives that they had been considering, and they were in the process of putting together. So we agreed for us to meet, after I called town staff and town staff gave me the green light to do that, I met with the applicant's team, or most of the team, some by phone, Dr. Abrams and Russ Slayback by phone, at the Meriden office of BL and they presented an original version that was similar to this, they made some changes to come to this since the time we met. Sometime this afternoon, actually it was early afternoon 1:30, 2:00 o'clock somewhere in there, several of these plans were sent to me and also the revised water budget analysis. I spent some time and obviously we didn't have a lot of time to go through the details. I spent most of my time looking at the plans and some of the overall areas that were of importance to me. So, if I can say this, and this has been a quite challenging review obviously, I'm heartened by the fact that the applicant has taken some of my comments to heart, and they are attempting to address it. So as you might remember from the last time that I was here, there were several core issues that were put on the table, a lot of little detail things here and there that, such as the water quality basin planting, but the core

issues had to do with, what was the application doing, what potential impacts would it have to physical characteristics of the wetland, particularly wetland two. As so we talked about water quality and the (inaudible) budget and I will give you the opinion that I was not satisfied with what I was looking at because the flashiness of the water that was apparently going to be had in the post development condition in wetland two, for that was water quantity related, and then we added the water quality related issue, that was another core issue that would also cause impact, and the resource, and there were some spin-offs from there, some of them had to do with direct chemical alteration, therefore a physical impact to wetland two, some had to do with the change of the mineralogy and chemistry that the cottonwood, the threatened cottonwood population has and we talked about the Turf Management IPM program, we got some answer on that, at that point, and then the third core issue had to do with the impacts to wild life which are connected then to physical impacts to the wetland itself, so if you impact the wild life population to a certain extent, you have a cascade effect into changing the physical characteristics of the wetland itself. So those were the things, the major things that we looked at, and I think the applicant got that message, apparently, from what they have done, and so what they have tried to do is move those issues through the goal posts, if you will. So what we need to do before Thursday is to assess, for us to assess as reviewers how close they have gotten to the goal, or if in my opinion, they have gone over the goal posts, scored in a sense, I know this isn't an athletic term, satisfying me as a reviewer that there isn't going to be a physical impact to the wetlands in these three categories.

So the first one that I want to talk about is the (tape change) the as far as the work is concerned, I mean, the major thing that happened here which is heartening to me is that they took basin number three from where it was before and they've put basin number three there, and what they have actually ended up doing is making sure that any of the perhaps more concentrated flows that are coming off of impervious surfaces are not actually not being discharged to wetland number two, so we have this little blue area up here which is end driveways for these lots, and that is diverted to this area. Now that means you are losing some area within the red line which we had defined to the best of our ability to be both the surface water shed and the ground water shed since we lack specific data with conditional test pits to tell us whether the bedrock is settled in in one particular way or another. Also, the same thing happened here, the light blue area, that is going to this detention which I think is number four. They no longer have the outlet in this location which, remember was a split discharge which had its own problems which we didn't really review, and they have taken their outlet further down the hill to satisfy the Connecticut DEP that said they didn't like discharges to slopes that are more than five percent. I understand that it's less than five percent, just below here. Then in an effort to balance the face that they were losing in this area here and this area here, they have added some additional areas that are outside of the watershed. These lots, 17, 18 and 19 this area here, I question whether this is coming in or not, that's something that I am going to have to figure out, and then of course we have some watershed that goes off the site, it's not here, which we can talk about too. It might be small numbers that we are talking about here. So what I did to prepare myself for looking at this, and I will pass this with a map, mine is slightly different. What I have done in preparation for tonight is sort of wrap my head around what is going on, is I colored these watersheds. The green on the map is proposed developed area that is going to be in the future wetland number two watershed. That's the remaining, what remains in the watershed and also what is added, so what is already in it and also what is added which will be these blue areas that you see. I did not include this area, so the number might be a little bigger once we discuss that with the applicant and I didn't include again anything off site which is again probably a small number. So these green areas are (inaudible) .45 acres, that's about twenty-nine percent of the watershed which we're defining as the 12.8. The reason that I had a different number, I remember that that question came up, mine, as you remember from the other map was 13.1 or something like that. I just happened to delineate my watershed a little different than they did. They took a job and I took a zag, or something. That's what happened, but it's essentially the same.

Commissioner Paskewich: I have a question for that. In that delineation, do you not go to the highest elevation to delineate the watershed?

George Logan: Yes we do.

Commissioner Paskewich: So why would it be different?

George Logan: If my line is slightly off all around, or theirs is slightly off, that is the difference, so it's within a margin of error, if you will. It's a very small number.

Commissioner Paskewich: I would think so.

Chris Greenlaw: Mr. Chair, also given the scale of the map that they are working, either the pen width or the illustrative markings that they are utilizing, whether you are holding the inside or the outside of a line at this scale.....

George Logan: The other thing is they are using fancy software and I'm using not so fancy, it's basically a PDF reader with the ability to look at things. So anyhow, that's those numbers and then the peach/beige color that I have on the map that shows in front of you, those are proposed developed areas that are taken out of the wetland number two watershed and that's in my estimation, 1.2 acres. Then I have another number because I realized that the green includes both what is in the watershed and what's outside of the watershed that is being added, so I wanted to tell you based on what you see in my little plot here, is that they have 1.14 acres of watershed that they are bringing in an effort to kind of balance the watersheds and their water budgets. So, coming to that, I started with water quality and I'm going to return to water quality, I have another graph, you might recognize that from the last time. It's very, very similar to what the applicant produced but I figured since I gave you a table the last time that showed quite a difference I would show you the same table exactly the same look which showed the new numbers and how they compared with the old numbers, and so you will see that I have added a column on the right side of the table that has the old percentage differences if you will. You saw, I was showing how the numbers were, the percent difference was between say 23.2 percent and 945.8 percent which were significant numbers. Now if you look at what they have done now, again, they are pretty small numbers. We could argue, Mr. Slayback pointed out correctly that when you, they have the potential evapotranspiration that is basically based on what the temperatures are in a particular month of the year, but if you wanted to be more specific, as to what the wetland might be, as far as the first quarter, these numbers would change, and then we could argue whether the ground water was one way or the other but I think if you just compared apples to apples from the last time to this time and looked at their numbers even taking the inflow of ground water out, and the graph would probably look very, very similar, and that is, the numbers are quite similar so you don't have this flashiness of the water coming into this wetland anymore. It's going to be mimicking as close as possible the existing condition, so based on that, and again, I have a few questions that I will be asking of Mr. Gradwell probably tomorrow morning to further interpret the information that I got this afternoon, that I'm still kind of working through, but it appears, based on the numbers that I have been given that this is a true statement. Going back to water quality, one of the things that was obviously a concern, even though they have taken the (inaudible) charge out, and the split that was down here, you still have, there is still some quote unquote discharge, but the discharges are now diffuse, and Dr. Abrams did say they have gone even further in their objective of trying to infiltrate water, so when the water is generated, it's a very close (inaudible) so they have the bio-swales in the back of these lots here, and they have the bio-retention area. Now, I'll go back to the bio-retention area in a minute. So the bio-swales I mean, I like the concept, I've seen what they have produced before, but again what I will probably need to do between now and Thursday, to be asking some questions about the sizing of them, how they are getting water, maybe some of the amendments, I notice here

that this one looks like more of a rain garden, so this one is larger, I want to see what the volume of water that they are hoping to infiltrate was going to overflow, etc., so those are the kinds of things, and yes, they discussed about what happens here, and of course as I'm looking at this plan today in a little more detail, I realize that we still have to answer the questions regarding the utility trenches and the storm water trenches, so I don't know if those are the same, and of course the issue is, what is that doing to potential ground water in this area, and of course in that area. There are probably some solutions, but we need to know, look at this a little more carefully because again, we don't know how much outside of this red line the ground water is coming towards the wetland. So I would rather be a little bit more on the conservative side when we are looking these kinds of things. Now, for these lots here, 17, 18 and 19, in an effort to balance what they were losing, from the light blue areas, they've, catching some water, bringing it to a yard drain and then they are coming across, and coming to the bio-retention area. Now, one of the things that is still missing from the application, and I know that we have had this discussion, it would certainly make me feel a lot better if I had a Turf Management program to look at. I've seen many over the years and there is a wide variety of them out there and I'm not saying that they can't come up with a good one.....

Chairman Block: Can you explain what a Turf Management Program is.

George Logan: Turf Management and integrated best management program basically gives you both cultural and chemical or non-chemical practices as to how to take care of your turf grasses, how to deal with infestations of say, mold, or some pests that might be hitting the turf grasses or your landscaping area would talk about fertilization of these lawns, what's needed, what's not needed, needing phosphorus, how much nitrogen you would need, those kinds of things and if you remember the DEEP was kind of adamant, saying that it didn't want any pesticide application within the watershed that is draining to vernal pool two and the wetlands. So, having something that we can work through and particularly when the standard is so high, now I'm not one hundred percent sure that one can achieve one hundred percent no pesticides application, however what you can do is you can limit broadcast pesticide, herbicide application, you can go to spot treatments, and there are a lot of things that you can do before we get to the need to have the harsh chemical that could remain in the environment for some time. Again, can that be something that can be worked on later? Yes, but that depends on the Commission and how they view that. So in this particular case, realizing that there might be some fertilizers and chemical applications that happens here, I recommend that they use the bio-retention basin. A bio-retention basin is just another term for a fancy large rain garden. Basically you have a filter media, that's a compare filter media that is at least twenty-four feet, twenty four inches deep, from the surface. It has very specific specifications, there are several formulations depending on what you want to take out, so you can target it. Maybe you want to take more phosphorous out, maybe you want more nitrogen out, they do extremely well for TSS removal, 89, 90, 93,94 percent a lot of them, and they do extremely well for just across the board. Basically the water comes in, goes to a certain depth, this is your water quality depth, of course you have additional capacity in there for larger storms, it filters through this media and reaches the, some kind of an under drain system, and then the under drain system basically meters the water into your ground water or you might have an outlet somewhere which is very minimal or small and not a lot of water or you would have 150 feet going down the slopes. Now if it's very small, the idea probably would be better to have your under drain basically blend in with your soils and then an emergency overflow of some sort. You aren't talking about a very large area, I think I said this was .81 acres and then you have .87, then 1.6 acres, a little more than 1.7 acres, fed by the retention area and I think there is plenty of room. That's about the best we can do as far as best management practice, to take out certain nutrients and certain other things to protect.....

Commissioner Sadil: Where are you suggesting that these would go? Through remediation....

George Logan: If the bio-retention area was right there, you kind of see that it's a sizeable area, that would work.

Commissioner Zelek: Is it possible if they minimized the footprint of the lawns, would that minimize the amount of fertilizers needed? You know, I think of like a Devonwood in Farmington where you are within a wooded area, and you kind of minimize the need for all of this pesticides, fertilizers, etc.

George Logan: The smaller the lots become the less the lawn will cover the overall property, and the sizes of the houses that you are looking at here, you will have minimum lawns to start with. Certainly if you have a Turf Management and a pest management program there and you have an association you have some tools that they follow, and some monitoring which we will probably also recommend, and that is water quality monitoring that will tell us if anything is getting down there.

Commissioner Paskevich: The yard drains, those may collect pesticides?

George Logan: Yard drains are usually very structural, they can come with a sump or not, a minimal sump or not. Basically what they do is more of a collection points and distribution points to a pipe. In this particular case, they have one down here, I believe it is going to be hard piped across the road, to another hard pipe and eventually to a swale, and down into the retention area. So, they don't trap much of anything. I mean, they could trap some coarse stuff, maybe in the initial establishment of lawns where you might have a little washout, because the lawn wasn't established right, so it's not a bad idea to have a little sump to them, but it wouldn't be much.

Chairman Block: The landscaping that Jeff was referring to, I normally characterize that as natural landscaping, as against lawns, in this subdivision, where there is so much recontouring that is going to go on, is it feasible to try to recover that natural landscape attitude within a reasonable length of time as against having straight lawns.

George Logan: If money is no object, sure. I mean, and maybe this is something also that you as a Conservation Commission can recommend and then the TPZ can also look at, but there are opportunities, even though the lots look small here because we are dealing with a small map, we can do a whole bunch of landscaping, I mean, you can have sizeable trees in certain areas, maybe at the corners between lots, which is also I'm sure the neighbors would like that, so, like behind here for instance, and the more shade you have obviously, it has benefits, and of course it has some benefits, not ecological also but environmental since trees do certain things with chemicals in surrounding areas at night, exceed some recommended dosage.

Chairman Block: Well the applicant did say that the landscaper is going to be reviewing this proposal.

George Logan: I think that is a good idea.

Commissioner Clark: My question is, most of the bio-retention ponds appear to be on one lot, lot 27, does that homeowner have additional responsibility? I know it's on the homeowners association but is that a problem for that homeowner? What if it needs to be dug up at some point to be serviced or checked?

George Logan: Sure, these things don't last forever and one of the things we would recommend is some specific monitoring and maintenance for these things. Now that we have something that is new, that wasn't here before, we'd have to look at some monitoring specific maintenance, so

yeah, these things, if they are done correctly have a life span of twenty to thirty years, so somewhere down the line, someone is going to have to do something because what happens is, they might even have to go in, if a sufficient number of vines come into the detention area, then it starts clogging, because you have a media and the vines come into the media and clog it up, so you would have to make sure that it always drains within 72 hours. Once you have reached that threshold of more than 72 hours then you know something is quite wrong and then some specific things that you can do, you can come in and take the top layer out and replace it, and replant it, but that's going to be a grassy, specialized turf grasses that don't need any fertilization. So yeah, there has to be obviously some very diligent maintenance of any of the systems here or else they are going to eventually, not necessarily fail, they could, if they are designed correctly I don't think the failure is the issue, but it's the fact that they become more ineffective over time. Some other things that we were looking at, oh yeah, talk about the mineralogy. We did a test, we gave them to the UConn laboratory, we called this afternoon because we were promised the data, and apparently they found out that the particular part of the machine that they have has to be shipped from Germany.

Chairman Block: Overnight express.

George Logan: I don't think it's going to happen overnight, but it's probably, we're not going to get the data within the period that we were hoping. However, the good news is that the applicant's effort to maximize the area that is actually contributing ground water and minimize the chemical contributions, it probably is making this issue less and less of an issue. Then we come to well, the one that is probably the most difficult of the three issues that I have talked about, and that has to do with wild life impacts. I haven't done the various calculations to see how much more land we've gained, but I heard probably about three acres so you know, the forty percent probably went down, to some other number, thirty-five percent, thirty-six percent, and then of course we talked about the phasing. The reason for that is, I'm not one hundred percent sure that this particular issue is going to be advanced to the goal post. I'm not sure it can. However, the thing that I keep looking back at is you have two issues, one is in the area of ecology, so if this was an ecology board and you were looking to maximize your population, make sure the population in the wetland would do well over time, then you would probably be looking at the Calhoun and Clemons best management practice quite seriously, and not that I'm saying that you shouldn't. However if you are looking to look at physical impact that's kind of getting a little fuzzier, this is not the black and white, but the gray area. Fortunately, or unfortunately I've had quite a track record with this issue and the particular case that I was involved with actually started this whole thing, and that was the Avalon Bay versus Wilkin where Dr. Clemons was on one side of the issue, and I was on the other side of the issue. The law came about, bad or good, they're not going to argue that, but basically what they said was what the critters are doing in the upland really doesn't matter, you can't look at their upland habitats and say well if you impact their habitats they are going to have a physical impact to the wetlands, they left a little footnote, can't remember if it's number nine or number twelve, in that case that said that the court recognized the possibility that a lot of the critters were taken out, that it could have a physical impact by changing the bio-chemistry basically of the vernal pool. That's not very helpful necessarily. Then came the Preserve case, as I said before, the Preserve where the court decided that if there was enough of a change of population of the keystone species, in this particular case, the keystone species that we were looking at were the wood frogs, that it could have an impact on the bio-chemistry of said pool, and so it is kind of this gray area. So what I'm trying to do, obviously my main points that also have to do with critters have to deal with water quality. By pushing to address those two issues you are also in an indirect way, somewhat addressing the issue with the amphibian population. But it might be that it cannot be addressed to the ecological point of view, which obviously I would like it, but that's not necessarily a wetlands issue. So in an effort to try to figure out what could be done, and making it reasonable, fair and something that is defensible, and I could talk about Calhoun/Clemons, but I won't at this point, I have some

disagreements with Dr. Abrams about methodology not being valuable, it is valuable. In order to address the impacts on the population, the idea here is you start, you have a period of four years when the development is phased from one site, from place to the other so you take a quarter, another quarter, whatever the numbers might be. You start out here, which is farthest from the vernal pool as possible with the exception of up here, if there are critters there, you try to time it in a way so that when the critters do their annual pulse migration down to the pool, at that point you erect a fence and if any stragglers are left in, you might want to check the fence because some of them don't all come to the pool at the same time, not the entire population comes at a particular time, in a particular year, there are always some that are going to be left behind, ones that don't feel that they want to breed or maybe they are still young, and therefore what you do, you are saving a portion of the population and you allow for some recovery to happen over a period of four or five years. That is in the hope that there is enough recovery and another recruitment with additional reproduction that you are not going to have a dipping to dangerous numbers of the population, potentially putting it out of existence, or getting it to a point where it's so minimal that then it has the physical impact on the chemistry of the vernal pool itself.

Commissioner Sadil: So basically you are relying on migration using a system of phasing. You are kind of relying on self migration.

George Logan: In essence what you are doing is you're not taking the entire population over however many acres all these phases are if you open them up all at the same time, you take a lot of critters out, so if you take a portion at a time, you allow for some recovery to happen, so you don't lose forty percent of the population, or whatever the magic number might be, which could have a significant impact on the population and it might not recover.

Commissioner Zelek: So I want to get a clarification why we are doing the phasing. You had the discussions with the phasing done to protect the ecology, because I thought I heard earlier that the phasing was done more for economics.

George Logan: Well, we're doubling up so what we have asked the applicant to consider is the timing of each phase. Instead of starting whenever, start in a way that allows us to allow for the migration of as many salamanders and wood frogs as possible down to the pool, erecting a barrier that allows them to, doesn't allow them to come back into harm's way, a portion of those will re-orient and find other places to breed. I think Sigrun wants to say something later, she's holding up a sign.

Commissioner Clark: Can I ask a question about that? Are you talking about barriers that exist just during the construction period or in perpetuity?

George Logan: The barriers will be for a temporary period and we would have to define what that is, but it would be to a certain point of the phase and then at the point of the annexing of the next phase, another barrier would be put at the right time of the year. So that barrier will move for the critters, so if this was phase one, you'd have a barrier that isolates this area, all the way down here. When this is done and you are ready to move to the next phase, if this is the next phase, then your barrier is going to be coming over here. And then it will, by doing that, it will include this area, so as long as there is activity and the project keeps going on, the barrier will continue. The barrier is very simple, silt fence. These animals can't negotiate over silt fences as long as the silt fence is kept in good order, which it should, for sedimentation and erosion control perspective, then there will be a very minimal possibility that the animals will move back into harms way.

Commissioner Clark: Once the construction is completely done, the silt fence is gone, is anything to prevent them to attempting to colonize areas that are not appropriate for their survival?

George Logan: No, and I mean, dispersal into areas which are marginal by salamanders happens all of the time. But what happens is that over time the, there is less and less encroachment into unsuitable habitat by the population. It stabilizes and they kind of figure out, well if they go out into harm's way, they are not going to survive. That doesn't mean that there is not going to be a dispersal of salamanders into these area, there will be. I can't guarantee that there won't be, so that is where the education comes into view.

Chairman Block: You have to point out I think that the curbing of streets are going to recreate substantial boundaries after the silt fence comes down.

George Logan: True, and that is the thing that we haven't discussed. Now maybe Dr. Abrams has discussed this and I just don't remember it, there's two ways of going about. One is to, once your construction is done and everything is stabilized, then you allow animals to come in, or you decide not to allow animals to come in. The problem with that, well, there are pluses and minuses. There are other animals that might benefit from coming into back yards, which the neighbors might not like there I suppose that are smaller vermin, you might call them, small animals which couldn't also negotiate any barriers that you put up for salamanders and wood frogs. And then of course, you have animals moving, we talked about cats moving in, so in general there is going to be a discussion, probably tomorrow as to what, I'm not of a particular opinion yet as to whether you should isolate it or not.

Chairman Block: Mr. Logan, also, the present amount of mulch and debris that is on the mountainside is what makes this a habitat that is conducive to salamanders living there. When they are finished with this, again, depending on whether or not they used a naturalized landscape technique or they go for lawns, the lawns are not going to be a suitable habitat anyway, so that is naturally going to exclude this as far as migration is concerned.

George Logan: It will exclude it for a certain segment of the population, but it might not exclude it for some that kind of head out. Now, it's still unsuitable and a portion will go there no matter what you do, so the question is whether you want to isolate them or not. It's something that we can certainly discuss.

Chairman Block: But if this becomes yards, by and large, it's a salamanders desert.

George Logan: It's an unsuitable habitat.

Chairman Block: It's unsuitable.

George Logan: So, the one comment that I had at this point that the applicant can consider, he has phase two here, and I know that might come and be a little bigger, I would rather have phase two here. So you do phase one and two and the furthest, further out phases and then you do phase three and phase four. The closer you get to the vernal pool with the habitat of the, the higher the stakes are if you will.

Some other things that we looked at, that there are a lot of little details that I'm not sure whether or not, how much is going to be able to be reviewed between now and Thursday. Both from the perspective of the applicant producing the information and from us being able to review it. Obviously the more they can do, but some of the things that I have put down, that we don't have answers for now, or details might be missing, we talked about the bio-swale details, the planting plan, and the sizing, the Turf Management Plan, we need to talk about the bio-retention details, the sizing, where the spillway for that is, etc., basin design details in general, for all the basins, remember I had some comments about all of them, and all are important because all eventually drain into surface waters. There are some details that I need to discuss as to what is going on

with this, what is going on off site, I see some issues with the way that they have delineated some of these things, maybe the watershed of the blue is a little bigger here, etc., the details....

The wetland three is important as far as figuring out if we have a water budget, make sure that we don't make it any worse. I would agree with the Chairman that if you have a little more water there it probably wouldn't be the end of the world. It's all going to want to go out that way anyhow, so unless you wanted to raise the outlet, you might be able, if you have a little more water going through you might be able to keep it a longer hydro period there and also if you take too much water out of it, then some of the trees that are acclimated to the hydrologic condition might get stressed out, that are right at the edge. We have to be very specific about the details for the phasing, when it starts, when they finish, what's the overlap, if any? There was a question and maybe this is a recommendation from this Commission if the Commission saw fit to approve this in some form, to consider reducing the pavement width of all the roads to lesser than it is now, maybe down to 24 feet. The less impervious surface the better obviously and then that also allows for more infiltration in the areas that are within the watershed. And of course we also talked about the animal control issue. Pets. It's fairly well known that cats in particular can have a tremendous impact on small animals and birds.

Attorney Boorman: Speaking from a technological point of view what physical characteristics (inaudible)

George Logan: From an ecological point of view mostly. Cat's really.....

Attorney Boorman: So they would have an effect on the physical characteristics?

George Logan: It would be stretch for me to say that, but if you are looking at the ecology, if you are looking at functions of wetlands, and the function of this particular wetland would include that you have a robust herpetofauna bird population, and suddenly the birds are starting to be missed, obviously you will have some impacts as we said in our report, and that's more the ecological point of view.

Attorney Boorman: Physical characteristics that we are talking about specific information that you can forward to us....

George Logan: Right, so we talked about the water quality and water quantity and if the amphibian population plummets to where it has an effect. Those are clear, the other ones are more toward the function of the wetlands not from a physical perspective but looking at an ecological integrity or habitat or those kinds of things.

This is what we have come to now. There are still some details that we are hoping that over the next day or so, thirty-six hours we will be getting more information and be able to come back to the Commission, and give more of our thoughts.

Commissioner Paskevich: It sounds like one of the key items to address, the water budget, is that accurate?

George Logan: I think the water budget, I mean, I have some questions if the numbers are correct and if they can be by adjusting some of their inputs move dramatically one way or the other, then I think that they have done as best as they can, possibly can within reason. But again, I have to look at the details and ask them some questions, get some understanding of some of the inputs, and again, usually like to go and crunch some of my own numbers, I couldn't do that this afternoon.

Chairman Block: That was to wetland two, wetland three, they need to provide that information.

George Logan: I think this will benefit the Commission in realizing whether we are going to have a significant change to the water quantity, three, absolutely, and I think that since they have already done the exercise to wetland two, it wouldn't be too difficult to do it for wetland three, and if it looks like we have an issue then, we can discuss how we can bring more water. Obviously what is going on here, we have a real, so it might be that they can look at their plan and see if there is some grading that they can do, or some of the lots on the other side can be pitched similar to what they are doing over here, and bringing water to an infiltration device here. We are not necessarily married to this particular connection has to be exactly there, it could be there, and that might give them some room to do some bio-retention infiltration basin there. So, there are potential solutions but obviously it is important for them to look at it.

Commissioner Paskevich: I don't know when this data is going to be coming forth, and I'm not speaking to the schedule because I don't do that, but we have another proposed meeting coming up soon?

Chairman Block: Thursday.

Commissioner Paskevich: Thursday. I'm not telling you what to do but.....

George Logan: I know I can do nothing else for the next week.

Attorney Boorman: I'd also, in terms of that list that you read off, in terms of the items that you check off with the applicant's experts, and I apologize if I am stepping on anyone's toes, but it seems to me in the course of the discussion that it's very manageable items to address before Thursday, and you know what your time table has got to be like in terms concentration, but it's not something that necessarily projects out to a schedule that wouldn't make it for Thursday.

George Logan: No, I think, there are some things that they can't possibly do, they're not going to come up with the Turf Management program, and they might not be able to come up with a full fledged landscaping/planting plan for each, every single basin that satisfies any of my concerns, but those are things that the Commission could consider as conditions, but I'm looking for more of the mundane stuff.

Attorney Boorman: That's kind of what I was talking about too, and we'll hear from the applicant too, in terms of your list, and the timing of those too.

George Logan: Don't forget the utility trenches, ninety-two, find out what is going on with those. One other thing that I wanted to say about the Clemons and Calhoun, it's my understanding, if I had, I think it went into the issue, but there is a significant bibliography in the back and of course it's a little dated because this publication is 2002, but I can't recite it off the top of my head, but there are several publications since that time that are peer reviewed that show similar trends, that these critters do, what Clemons and Calhoun tried to do at that point is to say that based on what they're research had been done, and looking at peer review papers, that eighty percent of the populations of these salamanders and also the wood frogs were within that 750 feet. So we have a little difference here with Dr. Abrams. We might come up with a list of several publications that are more recent that point to the same thing, but it might not be necessary.

Chairman Block: I've scanned that report, and I get the impression that that 750 feet was in relationship to that topography, and I thought, I was trying to make a point, please correct me if I'm off base, but that margin, isn't that margin more related to (inaudible) of absolute distance?

George Logan: No, it's a distance, I mean, he does talk about (tape change) I think indirectly it goes to the water quality, but we've talked about making sure these basins don't attract and

become decoys for amphibians and so we'd have to do something with these basins now since they are more annex that of course here, but those are relatively easy solutions.

Chairman Block: Any other questions. Well thank you until Thursday.

George Logan: You're welcome.

Sigrun Gadwa: I wanted to talk about the invasive species

George Logan: And that might somewhat be connected with the physical impact because if you drastically change the components in the habitat, then you change the wetland.

Sigrun Gadwa: Although there are a continuing series of scientific papers showing that invasive species infestations occurs mostly within three or four hundred feet of the edge of a forest. It doesn't occur in the deep interior. And here in wetland three, wetland one, we have amazingly invasive free plant community and the mechanism for that seems to be mostly that the edge birds poop the seeds and that is how the invasives get into the forest edge, within three, four hundred feet, but there are different birds that are in the middle of the forest, so we are going to have, even in the revised plans, it doesn't get as close, it's not going to be a much colonization by invasives right on the wetland edge or in the wetland, but there, I wish they were all, as far as the upper portions all 250 to 300 feet, but there are things that can be done like very prompt stabilization of bare soils, and then going out and weeding the plants that come in. We'll write more about that in the report, that's a concern and it's interesting to me there are also are, I ran into a paper by DeMattia, I think it is, talking about reduced viability and density and problems with the amphibians in the edge zone, next to residential areas or next to (inaudible) area. So again, the interior forest is a better quality, not just for the birds but also for the amphibians.

Chairman Block: In this area we heard the applicant say that the landscaping is going to be a function of the homeowners association, so in that regard are you suggesting, proposing a series of rules if you will, for the homeowners association to follow as far as both preventing invasives during construction phases but also controlling them post construction.

Sigrun Gadwa: That's a very good idea. I also, since we have trap rock soil and there is a lot of beautiful and very good species, not a lot, but a dozen or so, that are adapting to this condition and I'd be glad to give them a list so we can have them.

Commissioner Clark: I have a question. Are you speaking of, we develop up to Line A, but invasives are likely to develop within 300 feet because the area has been disturbed and developed you are likely to get a line of invasives outside the development zone into what is currently pristine, it can't stay that way because invasives do their own thing.

Sigrun Gadwa: That's right, the comment on the edge, the edge zone....

Chairman Block: Correct me if I'm wrong, what you're saying is, particularly as to area two, at the moment it's not developed therefore it's relatively free of invasives. When the development comes in the margins of that area, as they will then be, become inviting to invasives. So it's going to be up, the suggestion is that it is going to be up to the homeowners association to patrol, maintain, remove those invasives in order to try to maintain the integrity of the wetland as it now is. Am I correct?

Sigrun Gadwa: Yes.

Commissioner Clark: Are we talking about property that will now belong to the Town of Newington?

Chairman Block: It is, yes, but I think also the homeowners association, since it is their neighborhood, I'm sure we can figure out, allow them to have that function to maintain the status of the wetlands. Whose best interest is it?

Commissioner Paskevich: Who is going to train them?

Commissioner Clark: I think most homeowners wouldn't know an invasive if it hit them in the face.

Chairman Block: The homeowners association is going to hire out landscaping crews to do all the landscaping throughout the whole subdivision.

Commissioner Clark: But that would still be outside the subdivision.

Attorney Boorman: I would like to suggest that we wait until that portion of the report comes in and we'll have plenty of time to discuss that post public hearing, but she's indicated that she is going to prepare, as part of her report, recommendations that would include several conditions that may be appropriate may not be appropriate and you will have the opportunity to discuss that at that time.

Chairman Block: I'm sure Attorney Regan is going to think about it as well. Thank you. Anything further?

Sigrun Gadwa: I had just one, the 750 feet that's not a distance within which nothing is supposed to happen, there are some management tools and they are recommending no more than twenty five percent inhospitable cover within that 750 feet, so if you have really treed lots, and small lawns you can (inaudible.)

Commissioner Zelek: And what percentage do we have here with this proposal. If it is twenty-five percent, should.....

Sigrun Gadwa: I think it was thirty-five.....

Commissioner Zelek: So it is over the twenty five percent.

Sigrun Gadwa: It is over it, yes.

Commissioner Zelek: Is there any way that the applicant can adjust it so that it is more in line with the twenty-five percent?

Chairman Block: Wait, I'm confused now. Is more than twenty-five good, or more than twenty-five is bad?

Sigrun Gadwa: It should be no more than twenty-five. It probably would be hard to do so without losing lots.

Commissioner Zelek: Okay, second question, raised a concern earlier about large trees, the amount of soil that they need, the applicant said that they were going to have about two feet of top soil left, is that enough for the indigenous species that are up there now?

Sigrun Gadwa: Well, it depends on the tree species. Some trees have deeper roots, tap roots, and some more shallow, the black birch are shallow, but one thing you will notice, trees can, in the wild on the bedrock grow extremely slowly, if you take a tree core of a big tree on a bedrock knoll, it's 200 years old, and it grows much more slowly than a comparable size tree in the valley.

Commissioner Zelek: So disrupting the ecology does it have any impact eventually on the physical characteristics of the wetland?

Sigrun Gadwa: I don't think disrupting the, disrupting the take away trees in the developed area I think that's a stretch except that we are developing one area, we are pushing the edge back, and then we have different birds in the forest than the wetland area, and fewer birds because there are a couple of species and they don't like each other, they're territorial, where if you have many different species they coexist better. So you can, you'll have less ambiguity, there are not papers on that to quantify. It's a concern and it is a physical impact if there is tree damage and foliation but at this point there is nothing in the reports, no court cases and considered to be marginal.

Commissioner Zelek: So, in my opinion, regarding the twenty-five percent developed area within this 750 foot area, to me, this is like the applicant is on the one yard line, if they could get it down to twenty-five percent it would be more acceptable.

Chairman Block: You are agreeing with that Sigrun?

Sigrun Gadwa: Yes.

Chairman Block: From an ecological point of view.

Attorney Boorman: From an ecological point of view, we will discuss that more as time goes on.

Chairman Block: Attorney Regan, do you want to respond to anything at this time? You don't have to.

Attorney Regan: I think for the most part I'm good and thank you to George and Sigrun for all the work that they have done in the last couple of days to get here. I did just want to point out, I am very familiar with (Inaudible) and Preserve and did just want to point out one key component, in Preserve, one of the biggest issues was a golf course and it was that the wetland was going to be isolated. We did have a very similar instance here when we had the road connecting the two roads, the removal of that road and the constant wetlands corridor now, that's a substantial change and that makes it a substantially different case than the Preserve, but I just wanted to note that, but other than that, I would characterize George's description of the cases and case law as fairly accurate.

Attorney Boorman: On thing that I would ask you to do is coordinate with George as he indicated, he understands that he has nothing to do for the next couple of days....

Attorney Regan: Neither does anyone on my team.

Attorney Boorman: Would you agree that his list appears to be manageable.

Attorney Regan: His list is very manageable. The one issue which George correctly noted and Ron also noted is the Turf Management Plan which can't be done but that is actually more appropriate at post development condition anyway, because it is something that has to be done once the plan is finalized and field tested in order to be developed. We have no objection to that, we said at the last meeting we intended to do one as well. That's not something we can really do

in advance, but we certainly will do one and that goes hand in hand with the homeowners association handling the landscaping, so we have no issue with it. That was the only issue I think there's nothing we can do at this point, it would have to be post development. Thank you.

B. Public Participation

Gary Bolles, 28 Burden Lane: Lifelong Newington resident. At your meeting of January 8, 2013, the developer produced a letter from the Army Corps stating that Toll did not need a permit because there was no filling of the wetland. I did not have a chance to respond at that meeting because of illness, but wish to submit the twelve copies of this letter to the Commission which will further serve to clarify the issue regarding permits and wetlands. You see ladies and gentlemen, the Army Corps is much like the Internal Revenue Service. It's a governmental agency which has broad powers with respect to its jurisdictions. With both agencies, if you follow the law they will not bother you, but break the law and they will eventually catch you. The Cedar Mountain wetland mimics the wetland across from my home that is not connected to navigatable waters, but ACE jurisdiction applied there. I point this out because I do not want the Town of Newington to be found liable once the developer has left town, should the wetlands be compromised in any way shape or form, and I'm saying that as a courtesy to this Commission and a town that I really do care about. You have had much testimony from the Connecticut Environmental Review Team, REMA Associates and blasting persons, all experts that you hired so that you all could have an excellent read on the situation. They have all produced extremely creditable information. You now need to determine if you are going to trust their finding versus the developer's findings. Cedar Mountain is a God given treasure, that which God has created let no one put asunder. Do you realize that the many obstacles on this site render it not suitable for real houses? Who would in their right mind would have zoned this property residential? In closing to further prove my theory, I have put together this interpretation of Cedar Mountain replete with its natural beauty. Let me just get it out for you. The only toll houses that should be allowed on Cedar Mountain are these, made exclusively by me, from Toll House Cookie Dough. I give you these extra Toll House Cookies as food for thought.

Gail Bedrako, 21 Isabelle Terrace: Every time we meet our understanding of the complexity of the wetland ecosystem of Cedar Mountain continues to grow. It seems we learn, the more valuable the wetland becomes. Considering all the good wetlands do, the direct and indirect benefits not saving even the smallest patch of wetland amounts to pouring precious resources down the drain. There is no precise formula to determine the accurate dollar value of this wetland but the more we learn, the higher the value. Many species of birds and amphibians rely on this habitat for breeding, foraging, and cover. Migratory birds depend on it as well as the swamp cottonwoods. As forested wetland in such close proximity to the turnpike also serves as an environmental buffer. As amazing as the wetland is, and for all its ecological contributions they do have their limits. A damaged wetland can only partially meet it's potential. A badly degraded wetland will lose its usefulness forever. For wetlands to continue to perform their ecological functions we have to do our part to protect them. Maintaining the natural hydrology of a wetland is key to protecting it. Any small change in flow patterns, or flow composition can cause huge changes in the way a wetland will function. Toll Brothers has responded to concerns by designing and building expensive storm water control and water purification devices. Human engineering however is not nearly as elegant or as successful as Mother Nature. One of my biggest concerns however is that no amount of engineering is going to protect the wetlands from degradation after the Toll's are gone and the home owners move in. People buy luxury property and they want it to look good. Undoubtedly this development will attract home owners who will want the greenest lawn, the biggest roses, the biggest pools and the cleanest cars. These homeowners will balk at home owner association regulations on the type or quantity of fertilizer that can be used, or guidelines on when they can wash their multiple cars, to minimize polluted runoff, or prohibitions against draining chlorinated pools from their backyard into the woods. By

the time these infractions get discovered, it's going to be too late. The attitude is going to be, this is my property, I paid big money for it, so sue me. Human's can create different types of disturbances that can affect the performance of wetlands. In addition to the fertilizers, insecticides, oil, road salt, pet waste and pool chlorine human activities themselves will harm these wetlands. Already on the mountain there are motorized and recreational vehicles, add forty-eight families with children with lots of open space in their back yard, and this will increase the number of off road vehicles, snow mobiles and mountain bikes. This will tear up the soils and vegetation and destroy wild life habitat within the wetland and its protected buffers. Wetlands are often used as garbage dumps for old refrigerators, and stoves, tires and bikes and every other imaginable refuse. Newington Walk home owners are literally going to have open space and wetlands in their back yard. What a convenient place to dump used motor oil, shrubs, land fill, grass clippings, leaves, branches and wood chips. Believing that these activities can be controlled by regulations in a HOA is delusional and wishful thinking. Will the town assume responsibility for regularly monitoring cleanup to preserve the wetland and its buffers, and who is going to assume the expense of that? If you could place a dollar value on these homes and the tax revenue that it will generate it's more difficult to place a dollar value on the wetlands because their benefits aren't readily appreciated or apparent. Economic comparisons between the two don't consider future values. The decision to risk wetlands based on economics in the short term always favors development. In the long term however, the destruction of these wetlands by this development will remove their ecological function forever. In light of our current knowledge, it makes much more sense to preserve and protect these wetlands rather than try to minimize damages. In short, we have to rely on good stewardship and this is what this Commission is entrusted to do, to be good stewards of our wetlands.

Roy Zartarian, 25 Stuart Street: I really hadn't planned to speak tonight, but to borrow a line from the Godfather, just when I thought I was out, Dr. Abrams pulls me back in. I find it ironic that Dr. Abrams criticizes Calhoun and Clemens work, best development practices especially when both the CERT report and Elizabeth Harper herself have stated that he misused the research published by Harper and others. Last Thursday I spoke a bit on the Calhoun and Clemons work, my comments are in the minutes which Norine did an absolutely fantastic job in getting published this morning, and in my formal statement which I presented for the record, late Thursday night, so I'm not going to repeat all that, other than to note once again to the Commission that best development practices was designated by the Army Corps of Engineers as a recommended resource to avoid and minimize impacts to vernal pools. I also provided to the Commission last Thursday copies of an annotated bibliography sent to me by Dr. Calhoun. It was a bibliography that he used successfully in 2010 to defeat the Governor of Maine's attempt to overturn vernal pool regulations. Divided into sections, each section not only lists the article but provides an abstract which is a nice synopsis generally provided by the authors of the article, and in the communication that accompanied the bibliography Dr. Calhoun said that the literature cited there and newer studies, that is since 2010, support best development practices and that quote we are finding that migrations, dispersals and life zones are, if anything, larger than we expected. Please don't drink Dr. Abram's cool aid. Thank you.

Holly Harlow, 11 Edmond St.: If the applicant really wanted to build a development that respects the value and uniqueness of this wetland habitat they would have done that two years ago, but they didn't, and they probably wouldn't have if it wasn't for this Commission hammering away at the things that are important to keep the integrity of the wetlands and, I don't know what else I want to say about that, but I want to say something about conditions again. I want to repeat something about my concern about using conditions to remedy problems with a plan that have consequences, serious consequences to the wetland. I think conditions should purely be for non-consequential issues that can be resolved easily. If there is an issue with this plan that can only be resolved by placing a condition on it, otherwise the wetlands would be seriously impacted, I would disagree with that and I would hope that the Commission would see the same thing.

John Bachand, 56 Maple Hill Avenue: I'm a local water proofing contractor. Anyway, as you know, I've been trying to concentrate on the water related issues, and I'm going to stick to that. I usually don't refer to the handout I give you, but I'm going to for a second here. I came up with this term here, you see it is on the first page in bold letters there, localized confined aquifers within and perched on top of the fractured basalt trap rock. That I think categorizes and defines what is going on. I think Mr. Logan said it best when he said it is a local system. Very important to understand that, it is a local system. It has nothing to do with the deep ground water to that is associated around the rest of the town, dig down so many feet and you hit the water table. That one rises and falls in a fairly uniform manner. This is very different, as opposite ends of the spectrum as you can get. It's the exact opposite of that. So even in this system there's local systems within this local system, so you've got some areas where you've got perched water sitting on bedrock, you've got some areas where you've got water in the fractured rock, you've got some areas that are running on top of the fractured rock, so I just wanted to get that out there. I think that's substantially accurate, that description that I made there. This big word, evapotranspiration, I tried to think of something, an analogy to use for that, and I think of an oil lamp, you know, the old oil lamps where you have the fluid down below, you have a wick up above burning the flame and that's a wicking action, same thing. I'll get back to that after anyway. So if you look at the thing that I handed out, we will refer back to that I guess, just the pictures though. On page 3 you see another view, this is from, the snow, Saturday or Sunday. You can see this is looking due north from right behind the well in wetland one and you can see the flow, you can see the snow has melted all around and there is a substantial amount of water and the path that it has made. You can also see, interestingly enough a stream, another small spring coming in from the side. This is the evidence of the artesian spring system that is there. It is an artesian spring system because the water does actually push up out of the ground. For that to happen, you have to have a confining layer. A definition of an aquifer does require there to be enough water to produce, you know, to supply a well or a spring. You have that too. That's where I came up with that terminology. So you have aquifers, you have artesian effects, that means there are confining layers, you have unconfined layers obviously, you're going to have unconfined layers sitting on perched rock. So, I just wanted to say that. Mr. Slayback has left, but I just want to say, I don't disagree with him, fractured basalt is not going to hold a lot of water, but it does hold water and if you look at that picture on page 3 I believe it was, you can probably figure out where that is, that's right on Cedar Street. This was a very productive flow. This was on Saturday I believe. Notice how it comes out of this, this cliff here is about twenty feet high, and this layer of water is coming out about ten feet below the surface. It's not a quick flow, it's not a surface flow, it's a flow inside the rock. Page four, a picture inside the wetlands. You see where a tree has fallen, the root balls, saturated almost to the exact surface and again Mr. Logan alluded to that, when he said, even when it looks dry it if you look at the floor all around there it looks dry, but it's actually completely saturated all the time so there is a lot of water going on in there. The other thing, I just put this in for interest, that's a picture of a great horned owl, I don't know if any of you have ever seen one, I surely never have and I was shocked to find it. So, let me draw my picture up here again, the best way for me to describe it. I've been saying you can't appreciate these things by looking at them in a plan format, you have to see it in a profile, but really to appreciate this local system, you'd have to have a full 3-D rendition of it because it is so varying. You have the peak of the mountain, come down into the valley which is wetland one, basin one, come back up and this bowl is wetland two. It comes up pretty dramatically here, about 30 feet high, levels off and then comes way back down here and keeps going to Russell Road. I haven't paid much attention to wetland three. I'll let the others do that. This is important, this small detail here, I probably should just focus on this point right here, which I could do that right here actually. You come up, this is the bowl effect that is wetland two, comes up about 30 feet, levels off and then gradually comes back down to Russell Road. If you remember from the beginning I kept talking about, this may not be to scale, it's just an illustration to give you an idea, kept talking about this, I learned the word, potentiometric line that anywhere

that you have water in the ground here, they refer to the watershed from the peak of the contour lines on the topographical map, so they would call the watershed here, only from here down. My point is that you could have watershed beyond that and Mr. Slayback has put into the record that this rock is fractured thirty feet down, approximately, could be up to thirty feet. You see in the picture there, it's at least ten feet down. It's more than that in some places but also I talked to the guy that they referred to in one of the, in that back and forth questionnaire that went back from REMA to Dru, and his name is DeVecchi, something like that, he's a sedimentologist at Eastern State University, called me on Sunday, I had sent him an e-mail and I asked him specifically because he's the one that came up with, he didn't come up with it but he has been doing work on the porosity of basalt, trap rock, fractures and how it can hold water. He's not a hydrologist but he told me that it is pretty much understood, and I asked him specifically, I said, can this be considered watershed. He said not traditionally, but from the work that they have been doing, you've got all these fissure, all these cracks, some of them come to well, this is the surface of the ground. It's pretty much understood that under the surface of the ground is going to be the rock, the bedrock. Over here it comes right up to the face because you can actually see it. It's going to be much thinner here, is going to come down and be a little thicker down here. It's about two feet, four feet, five feet. So you have all these cracks in here, all these fractures and fissures and just look up at the mountain, some of them could come down thirty feet. This is thirty feet. They intersect, there is no right way or wrong way for them, they come all different ways, and somehow water could fit, it's a matrix of cracks and pours and openings, so my theory was from the beginning that water could be coming into here, this area here, that this possibly should be considered part of the watershed. Anyway, so, this is what I keep mentioning. I said that at the beginning, I still think that you should ask the professionals to look a little more into that and see what affect that has because that's where a lot of the construction is going to be in this area. This is due east. The watershed to the northeast is much more gently rolling, it's not as high as this, but it still has that potential, so I asked that gentleman, the sedimentologist if that could be considered watershed and he said anywhere where the head, the hydraulic head is higher than the point that you are looking at, or the wetland, that would have the potential to feed water into there, so about the lamp thing, I believe it's quite a complex water, ground water system, there. You have the little wetland in the middle. Obviously there is nothing to the west because it drops off but all around to the northeast, east and somewhat to the southeast you have a big area there that I believe is holding, storing water, we know it's storing water in the rock. You can see it coming out of the ground, you can see it coming into basin one through the well in the spring, and so I believe that it is part of a whole complex system there and kind of like that evapotranspiration, the wetland is kind of like the wick, that's the point, the tip of the iceberg if you will for the water. Just wanted to make that point. Mr. Logan said, I think was he was saying is for this to be considered watershed that bedrock would have to be canted, I think he meant tilted or canted back this way, but I don't believe that is necessary. Most likely the bedrock is like this, there are going to be innovations in there, there are going to be all pockets and stuff, it's not going to be perfectly flat like this, but I don't think you have to have a reverse. I am just going to jump around a little bit more, they showed the movement of the discharge from the detention pond and this would be the southwest corner. They moved it so it's not draining directly into basin two, but if you look at the contour lines there it's going to come out, go on flat ground, reconstitute eventually, look at the contour lines, it flows directly into basin one now. Now you are talking about impacting basin one. You avoided basin two, that's great, that's the more productive wetland, vernal pool and all that, but you are going into what you refer to as a wetland yourself, so you might want to consider that.

Commissioner Sadil: So what's your opinion on bio-swales since you are a water expert?

John Bachand: I was just going to get to that. The bio-swales, it's a great idea, on paper but don't forget you have some places two feet of fill on top of the bedrock and you are going to excavate that put sand in there, say you even have three, four, five, whatever, it's not a big,

there's not a lot of bio there to do the filtering, so you are going to go right through there, you are going to shoot through there very quickly, you're going to hit the bedrock, either flow on top of the bedrock or stay in the pores of the bedrock, in the trenches of the bedrock, and eventually you are not going to be doing a lot of filtering. I would say that the applicant did a lot of work and they did try to mitigate, they mitigated quite a bit, but they didn't mitigate everything and the reason that is important, if we were looking at Piper Brook, that's a contaminated thing already, been impacted for a hundred years. This, on the record, this is considered pristine. I used that word, someone else used the word, it's basically unimpacted. So any amount of impact, or any amount of degradation or whatever you want to call it, if it was in there it is going to show up, you know, it's going to be, I don't know the right term, but it's going to have an effect, let's put it that way. In other words if you were testing it, right now you would test it and there is nothing man made in there, go back there in five or ten years there is going to be a lot of man made materials or chemicals or whatever, decaying man made you know material in there. That's my opinion on bio-swales. Good on paper but I don't think it's going to do a lot in this case because of the unique situation, remember, that local, everything is localized here, this little mound, you've got flat ground all around it, here's this little thing, sticks up like this, that's why there is none of this deep ground water going on there, it can't be, it's not there, everything is localized there, an important word to keep going back to. So Mr. Block, you brought up the question, I think you were referring to that, right, if that could possibly be a watershed area outside of those contour lines. Traditionally you draw watershed lines from the contour, from the maximum contour point, you could draw a point right between them. Then they do an underground flow path thing, normally those flow point lines do intersect the contour lines at ninety degrees, going in the direction of the topography. I'm just saying that it doesn't have to be like that because this is a unique, sure the majority of it is going to shoot down that hill. Obviously if you have a grade going away from the peak of that hill, it's going to shoot down the hill, but the water doesn't care about that hill, doesn't care that there is a big giant rock there, it has a path to follow, either through confining layers, remember we talked about the confining layers, or just the regular water table that gets in that thirty foot zone, it's going to move both ways in there, so.....

Commissioner Paskevich: I have a question. You are referencing a lot of information here, and this sedimentologist, what is their background, I'm not familiar with that term.

John Bachand: I don't know exactly what it means, but he was cited in the questions that REMA put to Dru and the reason that I called him is because it said he had done work on the porosity of rock, or, I believe that is the right term.

Commissioner Paskevich: So did he reference your material?

John Bachand: No, he said he has worked on the fault lines on Cedar Mountain, he charted fault lines, he's done some of this work. You can call him. I know the letter that Gary Bolles gave you, he's got the number of the lady from the Army Corps of Engineers in there, I actually personally talked to that Clemens that you have been discussing, this Clemens guy, and the first time I called the Army Corps of Engineers they gave me his number, so, sorry if I went off your question, a sedimentologist, I'm not sure exactly what that means, has something to do with rocks. He's not a hydrologist, he told me he wasn't a hydrologist, he gave me a number.....

Commissioner Paskevich: I guess what I'm leading to, I'm not too sure what their certification is, and.....

John Bachand: Well, he is the one referred to in their question about the porosity and the storage capabilities of basalt, of fractured trap rock.

Chairman Block: John, if I can suggest, for you to make reference to things that he told you is commonly called heresay, and what he publishes is one thing, to be quite candid, if he came forward and expressed what you are conveying to be his opinion, that would be direct evidence for us, so I appreciate.....

John Bachand: Well, let's drop him out of the whole point, it's pretty logical that you can see, if you have water in the ground, it's going to move, you know how water moves through the ground, you have to understand it's potential, just because the rock is in the way, that big rock sticking up, that doesn't prevent water from moving. If the hydraulic head is higher.....

Attorney Boorman: You have made that point three times.

John Bachand: I think it's central to the discussion, but if the hydraulic head is higher here....(tape change)

Chairman Block: Is saying that although there might be fissures in the rock, that the density of this particular rock is such that the amount that is flowing from three to two is going to be a rather minor component.

John Bachand: I'm not talking about flowing from three to two, I'm talking about water from the eastern plateau into two, or three, or one, or whatever, I'm mostly concerned about this vernal pool.

Chairman Block: But again.....

John Bachand: And it doesn't have to be a lot of water because we are talking about a very small local system.

Chairman Block: The question is how much of a fraction....

John Bachand: I don't know, I said I don't know, it's an unknown.

Chairman Block: That unfortunately is the point of the issue.

John Bachand: You could ask the applicant to do a flow path, but to do a flow path in bedrock is going to be pretty difficult. Just let me say one more thing, and this goes back to that, they had a lot of time to look at all this stuff, no one has even raised the question about the well or the spring, that's pure bonafide evidence of underground water system. They are trying to claim that it's a quick flow or a flash flow or whatever, but this is absolute proof of a storage capacity of that, in that same area and metering out slowly. I'll just say one final thing, you know, it's kind of like, to use a football analogy since it's football season, you know when it's fourth and one and they go up to the line and they act like they are going to snap the ball, they try to get the other side to jump off, and I think that is kind of what Toll did here. By the original proposal, by discharging the storm water from the neighborhood into a productive vernal pool wetland which is so absurd to think that they would ever have done that, and now at the last minute come in here with this new plan that is completely revamped and completely different. It does mitigate that problem there but now you can't look at these other issues, and I'll just leave it at that.

Chairman Block: Is there anyone else. Seeing none, at 11:17....

Commissioner Sadil: Are we going to have a meeting Thursday?

Chris Greenlaw: For the record Mr. Chair, we have made accommodations to have the meeting here Thursday the 25th, 7:00 p.m.

V. COMMUNICATIONS AND REPORTS

None

VI. ADJOURNMENT

Commissioner Sadil moved to adjourn the meeting. The motion was seconded by Commissioner Zelek. The meeting was adjourned at 11:17 p.m.

Respectfully submitted,

Norine Addis,
Temporary Recording Secretary