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CONTENTS

ABSTRACT.....	II
KEYWORDS	II
1.0 INTRODUCTION	1
1.1 Methodology	1
1.1.1 Literature review on New Urbanism	1
1.1.2 Participant observation	2
1.1.3 Semi-structured interview with informant	3
2.0 TSUNAMI AND THE WASHINGTON COAST	3
3.0 OPTIONS FOR MANAGING TSUNAMI RISK	5
3.1 Community preparedness.....	5
4.0 SEABROOK – A NEW BEACH TOWN	6
4.1 Preparedness at Seabrook	8
4.2 Seabrook’s emergency management role	9
5.0 RECOMMENDATIONS FOR FUTURE ACTION	11
6.0 SUMMARY	11
7.0 ACKNOWLEDGEMENTS	11
8.0 REFERENCES	12

FIGURES

Figure 1	Evacuation map for Ocean City, Copalis Beach, Pacific Beach and Moclips (Washington State Department of Natural Resources, 2007). Seabrook (highlighted) is shown as an assembly area.....	4
Figure 2	A model of community preparedness and resilience (Paton, 2006).....	5
Figure 3	Master plan of Seabrook (http://www.seabrookwa.com/town_masterplan.asp)	7

PHOTOS

Photo 1	Crescent Park, a communal open space area within Seabrook. Photo: W.S.A. Saunders.....	10
Photo 2	One of the fire pits at Crescent Park. Photo: W.S.A. Saunders.	10

ABSTRACT

This report outlines the level of preparedness within the Seabrook community on the Washington State coast for a natural hazard event; and the associated preparedness for being a designated tsunami evacuation assembly point. The report is based on findings from a visit to Seabrook in early 2010 by the authors, where they stayed for a weekend and discussed the Seabrook philosophy with the marketing office (where the original developers of the concept also work), visitors, and residents from the nearby Pacific Beach community. In particular, specific information within this paper was provided from an interview with the marketing staff at Seabrook, who also live within the community.

Established in 2004 as a family venture, Seabrook is a 350 acre beach town which once completed, will incorporate around 800 homes on a wooded bluff above a mile long stretch of beach. A pedestrian-friendly, new urbanist community, the town is organised around a town centre, with plans for shops, a grocery store, swimming pool, parks, an outdoor amphitheatre, wooded trails, a beach front promenade, and a bistro.

Seabrook appears to have a good level of individual and community preparedness; however, further research is required to qualify this. Although highlighted as a tsunami evacuation assembly point, planning has not yet been undertaken between the authorities and Seabrook to manage this. An opportunity exists to develop (with Seabrook) a strategy to remedy this situation.

KEYWORDS

Tsunami, evacuation planning, preparedness, Seabrook, Washington State.

1.0 INTRODUCTION

Geological research over the last forty years (Wilson and Torum, 1972; Atwater et al., 1995; Walsh et al., 2000) has resulted in improved understanding of tsunami risk in coastal Washington. Since the early 1990s a wide range of mitigation activities has been undertaken by the State of Washington, in association with the U.S. National Tsunami Mitigation Program to improve preparedness for tsunami in Washington communities (Jonientz-Trisler and Mullin, 1999; Bernard, 2001; Bernard 2005; Johnston et al., 2005, 2007; Lindell and Prater, 2010).

The purpose of this paper is to outline the level of preparedness within the community for a natural hazard event; and the associated preparedness for being a designated tsunami evacuation assembly point. This paper is based on findings from a visit to Seabrook in early 2010 by the authors, where they stayed for a weekend and discussed the Seabrook philosophy with the marketing office (where the original developers of the concept also work), visitors, and residents from the nearby Pacific Beach community. In particular, specific information within this paper was provided from an interview with the marketing staff at Seabrook, who also live within the Seabrook community.

1.1 Methodology

A variety of methods were employed during this research, as outlined in the following discussion. Primarily, methods included a literature review, participant observation, and a semi-structured interview.

1.1.1 Literature review on New Urbanism

Seabrook has been developed following a New Urbanism philosophy. New urbanism is development that incorporates the attributes of a sustainable community. According to the Charter of New Urbanism (CNU, 2001), new urbanist designs should support the principles of: diverse neighbourhoods in terms of use and population; communities designed for pedestrian and public transport as well as the car; cities and towns shaped by physically defined and universally accessible public spaces and community institutions; urban places framed by architecture and landscape design which reflects local history, climate, ecology, and building practice (CNU, 2001).

A new urbanist, high-density development pattern mixes different land uses including homes, shops, schools, offices, and public open spaces, with narrow, pedestrian friendly streets to encourage bicycling and walking in place of driving vehicles. Homes include specific design features including front porches and short setbacks from streets (not prominent garages and long driveways) to create streetscapes that are designed for people, not automobiles (Berke et al., 2003). Seabrook has been developed on these new urbanist principles.

New urbanism however, has been criticised across many levels – from the charette process used to gain community participation and input into the design process to its lack of hazard mitigation (Bond & Thompson-Fawcett, 2007; Ellis, 2002; Swearingen-White & Ellis, 2007). While the Charter of New Urbanism does not include references to natural hazards or

resilience, there is an opportunity to include risk reduction design features into new urbanist concepts and developments.

New Urbanist projects provide a more flexible, innovative context than conventional projects in which land-use planners can exert more influence over project design (Stevens, Berke, & Song, 2008). It has however been argued that as new urbanist projects feature higher residential densities than conventional low-density developments, they place more people, buildings and infrastructure at risk on an equivalent land unit exposed to hazards (Berke et al., 2003). Thus, some hazards such as flooding, may pose an even greater threat to new urbanist projects than to conventional low-density projects, making hazard mitigation even more important (Stevens et al., 2008). This argument does not appear to be relevant in the case of Seabrook, as it is outside the tsunami inundation zone, and is not subject to flooding.

1.1.2 Participant observation

A very brief form of participant observation was undertaken. Participant observation occurs when researchers become members of a group they are supposed to study. Some key characteristics of participant observation are (Sarantakos, 1998, p218):

- A commitment to studying everyday life events, which are studied the way they are experienced and understood by the participants;
- A perception of reality as constructed through interaction and communication of the participants;
- Performance of the study in the natural environment of the participants without changing it in any way; and
- Perception of reality in an interpretative manner, i.e. participant observation is set to study social events under all the above conditions, bringing data close to reality, the people living in it, and the way they construct and experience it.

This research was undertaken based on a very small experience of participant observation at Seabrook. The project team stayed at Seabrook for a weekend, which is usually the busiest time of the week in the community. It was also a clamming weekend, so accommodation occupancy rates were high. To experience a typical weekend experience at Seabrook, a project team leader walked the paths along the streets, and the unpaved forest parks, talking to people who were passing, or sitting on their porches (a design feature of many houses). Neighbourhood open spaces were also explored, along with the beach where we joined locals and visitors in clamming. The town café was frequented for meals, as was the grocery store and art studio, where one member 'painted a plate' and talked to the studio manager about her experiences of the area. In the evenings, the fire pits were lit, and project members joined locals around the fire for evening chatter.

This experience gave the project team an insight into the 'sense of community' felt by visitors and residents, and their perceptions of the tsunami risk. The managers of Seabrook were aware and supportive of our visit.

1.1.3 Semi-structured interview with informant

A semi-structured interview was undertaken with a representative of the Seabrook marketing team. Following a semi-structured interview methodology, questions were pre-circulated to the interviewee, however, these questions were used as a guide, with additional questions being asked in addition to the original circulated questions.

The semi-structured interview questions were based around:

- Number of permanent versus 'holiday' residents;
- Number of houses;
- If there was a high/low visitor season;
- Future plans to expand Seabrook;
- House details i.e. design criteria, price, on-selling process;
- Seabrook's designation as a tsunami safe zone and associated evacuation planning;
- Personal preparedness; and
- Staff accommodation.

During the interviews, other questions were also asked to probe further about the unique features of Seabrook.

2.0 TSUNAMI AND THE WASHINGTON COAST

On the Pacific Coast, from southern British Columbia to northern California, people and property are at risk both from distantly and locally generated tsunamis. Recent studies indicate that about a dozen very large earthquakes (with magnitudes of 8 or more) have occurred in the Cascadia subduction zone west of Washington State. Computer models indicate that future tsunami waves generated by local events might range from 5 to 55 feet in height and could affect the entire coastal region.

<http://www.dnr.wa.gov/ResearchScience/Topics/GeologicHazardsMapping/Pages/tsunamis.aspx>

To mitigate the tsunami risk, warning systems and evacuation plans have been established to assist in educating the public, and in providing information on where to evacuate in the event of a tsunami. One of the assembly areas is at Seabrook, just south of Pacific Beach (see Figure 1).



Figure 1 Evacuation map for Ocean City, Copalis Beach, Pacific Beach and Moclips (Washington State Department of Natural Resources, 2007). Seabrook (highlighted) is shown as an assembly area.

Located at an elevation above the tsunami inundation area, Seabrook has the potential to provide life saving evacuation areas and welfare.

3.0 OPTIONS FOR MANAGING TSUNAMI RISK

There are four main options available for managing the tsunami risk to communities:

1. Emergency management, including warning systems, evacuation planning, response and recovery plans;
2. Land use planning, including restricting types of land use in high risk areas (e.g. buildings with post-disaster requirements, key engineering lifelines);
3. Building codes/engineering for structures e.g. tsunami defences, vertical evacuation facilities; and
4. Community preparedness, including involvement in determining tsunami evacuation routes and safe zones, exercising evacuation plans, and having a family emergency plan.

For different types of hazards, more than one of these approaches may be applicable.

Ideally, most risk should be incorporated into restrictive land use policies, to avoid and mitigate the risk before development occurs. This ensures that there is no increase in risk within a community. Where residual risk can not be incorporated into planning practice, then emergency management options should also be included with land use planning initiatives. Examples of this integrated approach include warnings of events, such as floods and volcanic eruption, where existing land users need to be aware of their hazards and their response to them.

3.1 Community preparedness

A number of studies have been undertaken internationally to determine what factors enhance community preparedness. A number of individual community and institutional factors have been identified as contributors to adjustment adoption. Figure 2 is a resilience model by Paton (2006) and outlines some of these key influences.



Figure 2 A model of community preparedness and resilience (Paton, 2006).

At an *individual level*, aspects such as a person's self-efficacy (a personal belief in the ability to do something about hazards/preparing), coping style (coping by undertaking constructive actions) and outcome expectancy (belief that preparing will ensure a good outcome after a disaster, rather than make no difference at all) can have a bearing on whether individuals will start the process of preparing for disaster. Critical awareness of hazards, reflected in the degree to which people think and talk about hazards and preparedness, is also an important

aspect which needs to be present in a population to motivate preparedness (McIvor and Paton, 2007; Paton 2003, 2007; Paton et al., 2005, 2006).

At a *community level* aspects such as collective efficacy, social support and capacity all have a bearing on whether people prepare for disasters (Paton 2006). Community participation in community activities and functions has been found to be a predictor of hazard adjustment in a variety of studies (Bishop et al., 2000; Lindell and Perry, 2000; Paton, 2006; Paton et al., 2001, 2006). Additionally, people with a 'sense of community', or with feelings of attachment for people and places, are more likely to desire to undertake preparedness actions (Bishop et al., 2000; Paton et al., 2000). The capacity for individuals and community groups to identify and define salient issues related to hazards, and to develop solutions for those problems, also plays an important role in developing a capacity to adapt (Paton, 2007).

Finally, the *institutional environment* must be supportive and act to empower citizens to prepare. Building trust in the community is important, so that individuals trust the recommendations of institutions about the need for preparedness in addition to how to prepare, and are therefore motivated to do it.

Agencies must work to develop these individual, community and institutional factors in a community to empower the public to both prepare for disasters and respond accordingly in an event.

4.0 SEABROOK – A NEW BEACH TOWN

There are numerous beach towns along the Washington State coastline, many of which service holiday makers from Seattle and surrounding towns. Established in 2004 as a family venture, Seabrook is a 350 acre beach town which, once completed, will incorporate around 800 homes on a wooded bluff above a mile long stretch of beach. A pedestrian-friendly, new urbanist community, the town is organised around a town centre, with plans for shops, a grocery store, swimming pool, parks, an outdoor amphitheatre, wooded trails, a beach front promenade, and a bistro (Seabrook, 2007a). Figure 3 shows the master plan for the town.

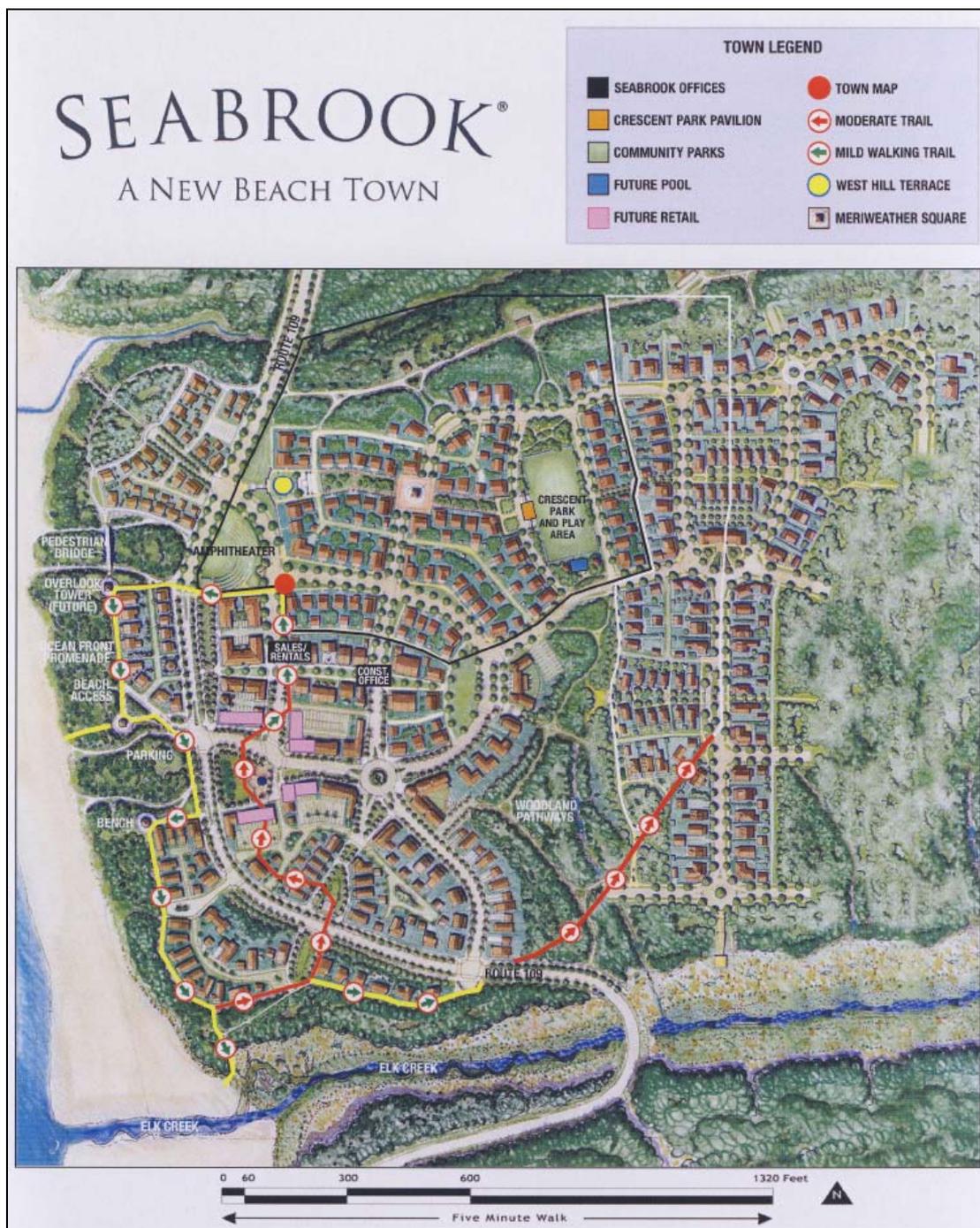


Figure 3 Master plan of Seabrook (http://www.seabrookwa.com/town_masterplan.asp)

The township of Seabrook is aimed predominantly at holiday makers (as owners and holiday rental occupiers), but also full time residents. The 'high' season begins in late May with the Memorial Day holiday, and goes through the summer, the Labour Day holiday, and into late August. During other times e.g. Thanksgiving, Christmas and New Year, occupancy is also high. Currently, approximately 150 of the originally planned 400 homes have been built. There are however plans to increase the number of homes beyond this original 400 dwellings to approximately 800 residences, including condominiums.

Key features of Seabrook include:

- The beach, café, marketplace and future town centre, all within walking and/or cycling distance of each other.
- Beach accesses via engineered walkways down to the beach have been constructed to allow for low impact access to the beach
- The establishment of walking and cycling pathways through the development and nearby forest land.
- Parking in lanes at back of houses, and the creation of car-free environment.
- Detached houses on small sections, with gardens designed for minimal maintenance by planting with natives.
- Communal parks and gardens. The main park, Crescent Park, includes skittles, children's playground, two fire pits, and a future pool. Smaller neighbourhood parks also include petanque areas and fireplaces/pits.
- Amphitheatre.
- Different neighbourhoods with different housing sizes.
- Naming of every house.
- A strong sense of community with residents and holiday makers alike.
- Seabrook Foundation – 1% of all sales goes back to the local community via the school. Also a house is being built and sold, with the proceeds going back to the local school.
- Being the only coastal community in Greys Harbour County located in a tsunami safe area.

As the development grows, so too will the commercial part of town. Future plans include a communal pool, vegetable garden, farmlet, attached housing and apartments. Seabrook is quite different to the surrounding communities, with its connectivity, infrastructure, quality and scale of development.

4.1 Preparedness at Seabrook

At this stage of the Seabrook development (i.e. March 2010), a relatively small percentage of owners live on site, with the predominate clientele being holiday makers. Any preparedness measures need to take this transient population into consideration.

Seabrook is boarded by two creeks on either side, and it is unclear if the bridges over these waterways would be operational after a tsunami event. If not, Seabrook will be isolated from the south, and from its near neighbours in the north.

From a personal preparedness view, the residents of Seabrook report that they are relatively well prepared for hazard events, in particular storms and associated power outages. Many home owners have opted to install their own generators for when the power fails. Three heating options are available – central/gas heating provided by propane gas tanks, electric heating (backed up with a generator), and fireplaces. These three options ensure that if electricity is severed, heating and other services can be retained.

Informal preparedness planning is being undertaken within the community, as highlighted by the following quote from a full-time resident at Seabrook:

I rent here currently and ... [my landlord's] home has a generator and we have a plan between the two of us – my house on her property does not have a fireplace or the generator hooked up, however if the power goes out she has let me know we will hook up the generator to our house and take a break from her home. And she does have a woodburning fireplace as well – a wood stove in fact that will heat her home – so we have to band together, we have to work together in order to perpetuate through natural disasters even as small as power outages, so again it builds community. And if we have already built that community from a day-to-day basis it makes it much easier.

Further research is required to ascertain if this is a common occurrence within the community and whether the overall level of preparedness is high. When talking to people at Seabrook, there was a very strong perceived sense of community, even with those who were staying short periods of time. This perceived sense of community may contribute to overall preparedness with neighbours and others within the community. As seen in previous research, sense of community can contribute to preparedness and resilience for disasters (Bishop et al., 2000; Paton et al., 2000) so it is possible that sense of community is an influence in the case of Seabrook.

There is an onsite generator within the community which is used to ensure water pressure. Sewerage is managed via a step system, where each lot has a large holding tank, reducing the need for sewerage to enter the district sewer system immediately.

In the future, Seabrook is proposing a community vegetable garden with chickens, so that residents can be as sustainable as possible. Due to regular storm events and associated power outages, residents often stock up with food, and plan to go to the supermarket weekly or less often.

4.2 Seabrook's emergency management role

As outlined in Section 1, Seabrook is designated as an assembly point for tsunami evacuation. The Seabrook marketing team are aware of Seabrook's emergency management role as an evacuation-safe zone for tsunami, and it is promoted as such on the Seabrook website, as noted below:

⁶

Is Seabrook prepared for a Tsunami?

Seabrook's spectacular topography does more than allow for great vistas - Our western facing bluffs and higher elevations provide one of the safest locations on the Washington coast. While the majority of the developed Washington coast is 20 feet or less in elevation, over 90% of Seabrook is at or above 70 feet. In fact, Seabrook has been designated by the local and state emergency response services as an evacuation destination for locals who live in some of the lower, more vulnerable elevations, should the need ever arise.

http://www.seabrookwa.com/news_faqs.asp

There is however no formal evacuation plan for Seabrook (i.e. management of evacuees), and no exercises for emergency evacuation have been undertaken.

Seabrook has a number of flat open space parks available for evacuees to congregate on if required, but no specific place/space has been highlighted as a place for evacuation purposes. An example is Crescent Park, the largest of the parks, shown in Photo 1. This park also has two fire pits on the periphery (see Photo 2), which could be used for heat, light, and cooking food.



Photo 1 Crescent Park, a communal open space area within Seabrook. Photo: W.S.A. Saunders.



Photo 2 One of the fire pits at Crescent Park. Photo: W.S.A. Saunders.

As discussed in section 3.1, Seabrook residents may have a high level of baseline preparedness, with alternative sources available for heating and power. With consultation and participation with the management team and owners at Seabrook, an evacuee management plan could be developed which incorporates the existing preparedness infrastructure.

5.0 RECOMMENDATIONS FOR FUTURE ACTION

The following future actions are recommended to ensure the local community is tsunami-ready:

- Draft a plan for using Seabrook as an evacuation assembly point, with input from the community of Seabrook. The plan should include:
 - location of places for evacuees to go,
 - facilities required e.g. welfare, shelter, food etc....,
 - educating permanent residents versus short-term holiday makers of the tsunami risk.
- Exercise emergency evacuation procedures with surrounding community.
- Assess the bridges over the two waterways for their ability to withstand a tsunami or storm even, to ensure Seabrook does not become isolated.
- Assess levels of preparedness within the community.

6.0 SUMMARY

Seabrook appears to have a good level of baseline individual and community preparedness; however more research is required to qualify this. Future research could involve administering a survey to residents to identify the exact preparedness measures undertaken by residents and what the key influences of preparedness are in that community. Anecdotal evidence suggests that a number of key community influences are at play, such as sense of community, community participation and possibly collective efficacy, which contribute to Seabrook's resilience. The identification of the key drivers of preparedness will allow future emergency management and educational initiatives in the community to be targeted to areas that require development the most (e.g. whether it be at individual, community or institutional levels).

Although highlighted as a tsunami evacuation assembly point, planning has not yet been undertaken between the authorities and Seabrook to manage this. An opportunity exists to develop (with Seabrook) a strategy as outlined in section 4 to remedy this situation.

7.0 ACKNOWLEDGEMENTS

This paper is based on information gained during a site visit to Seabrook in March 2009 and 2010, which included interviews with residents, visitors, and the Seabrook marketing and sales office. Particular thanks are extended to Darci Keefer, Jennifer Lampe and Stephen Poulakos of Seabrook Land Company, Pacific Beach, Washington State, U.S.A.; Washington State Emergency Management Division.

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Online Resources

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