

FLOOD RISK ASSESSMENT

REPLACEMENT DWELLING

134 ELMER ROAD
MIDDLETON-ON-SEA
WEST SUSSEX
PO22 6HJ

CONTENTS

1.INTRODUCTION.....	2
2.FLOOD RISK REGULATORY BACKGROUND.....	3
3.APPLICATION OF NPPF FLOOD RISK RELATED GUIDANCE	4
4.LOCAL FLOOD RISK POLICIES	5
5.STATUTORY CONSULTEES.....	8
6.APPLICATION OF MAIN RIVER BYE-LAWS, WATER RESOURCES ACT 1991 AND LAND DRAINAGE ACT 1991 (AS AMENDED).....	8
7.FLOOD HISTORY.....	8
8.CURRENT EXISTING RISK OF FLOODING.....	9
9.FUTURE RISK OF FLOODING.....	10
10. DISPOSAL OF RAINWATER	11
11. DISPOSAL OF SEWAGE.....	11
12.IMPACT OF THE DEVELOPMENT ON OFF SITE FLOOD RECEPTORS.....	12
13.RECOMMENDATIONS.....	13
14.SUMMARY.....	14
15.CONCLUSIONS.....	14
Appendices.....	15
1 - Location plan and published flood extents – drawing 50	15

Prepared for

Theatretech
The White Barn
Grayswood Road
Haslemere
Surrey
GU27 2DJ

Prepared by

Simon Jones-Parry BSc CEng MICE
Chartered Civil Engineer
Swan's Farm
Winchfield
Hook
Hampshire
RG27 8DB

18 June 2018

FLOOD RISK ASSESSMENT – REPLACEMENT DWELLINGS
134 ELMER ROAD, MIDDLETON-ON-SEA, WEST SUSSEX, PO22 6HJ

1. INTRODUCTION

Simon Jones-Parry, a chartered civil engineer, prepared this flood risk assessment (FRA) for the owners of 134 Elmer Road, Middleton-on-Sea, West Sussex, PO22 6HJ (the site) in support of their planning application for a replacement two storey dwelling ("the development") at that address.

Drawings describing the existing and proposed dwelling, and proposed elevations, are included elsewhere in the planning application. The details describe how the new dwelling will have a similar floor area to existing and the floor level will be set approximately one metre above the general ground level, similar to existing.

A plan appended to this report shows the location of the site, the local mapped extents of risk of fluvial and tidal flooding, and the local mapped extent of potential surface water flooding.

As recommended by Arun District Council in its response to the pre planning application consultation, this flood risk assessment has been prepared to address climate change impacts on coastal flooding and non mains sewage disposal issues in the Lidsey Wastewater Treatment Works catchment area catchment.

Principal current characteristics of the site are set out in Table 1.1 below.

Table 1.1 – Summary of principal drainage and flood risk related characteristics of the site

Characteristic	Details
Area enclosed by site red line	About 0.036 hectares.
General description of site	The site comprises a two storey dwelling, a car parking area, and a garden. It adjoins the foreshore.
Relevant topographical levels	The site is generally flat, varying in level between 4.8 and 5.0 metres AOD based on Environment Agency LIDAR DTM data.
BGS indicative soil types	British Geological Survey mapping advises that bedrock beneath the site is Newhaven Chalk Formation. "Beach and Tidal Flat" superficial deposits are indicated to be present under the site.
Watercourse presence	None.
Existing surface water drainage	Soakaway
Existing sewage disposal	Southern Water foul sewer.
Flood Zone classification	Flood Zone 1 (not at risk of tidal flooding in today's climatic conditions)

2. FLOOD RISK REGULATORY BACKGROUND

This report has been prepared in accordance with the "National Planning Policy Framework" (NPPF), published by the Department of Communities and Local Government (DCLG) on 27 March 2012, and which took immediate effect on that date, the "Flood Risk and Coastal Change" section of the on line "Planning Practice Guidance", and BS 8633:2011 "Assessing and Managing Flood Risk in Development".

The requirement for conducting a flood risk assessment as part of a planning application or a planning notification is set out in Footnote 20 on page 23 of NPPF, which states:

"A site-specific flood risk assessment is required for proposals of 1 hectare or greater in Flood Zone 1; all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency); and where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding".

Essential content of a site specific flood risk assessment is explained in paragraphs 030 and 031 of the on line Planning Practice Guidance, which in the revision of 6 March 2014 state:

"030 A site-specific flood risk assessment is carried out by (or on behalf of) a developer to assess the flood risk to and from a development site. Where necessary (see footnote 20 in the National Planning Policy Framework), the assessment should accompany a planning application submitted to the local planning authority. The assessment should demonstrate to the decision-maker how flood risk will be managed now and over the development's lifetime, taking climate change into account, and with regard to the vulnerability of its users (see Table 2 – Flood Risk Vulnerability).

"The objectives of a site-specific flood risk assessment are to establish:

- whether a proposed development is likely to be affected by current or future flooding from any source;*
- whether it will increase flood risk elsewhere;*
- whether the measures proposed to deal with these effects and risks are appropriate;*
- the evidence for the local planning authority to apply (if necessary) the Sequential Test, and;*
- whether the development will be safe and pass the Exception Test, if applicable.*

"031 The information provided in the flood risk assessment should be credible and fit for purpose. Site-specific flood risk assessments should always be proportionate to the degree of flood risk and make optimum use of information already available, including information in a Strategic Flood Risk Assessment for the area, and the interactive flood risk maps available on the Environment Agency's web site."

3. APPLICATION OF NPPF FLOOD RISK RELATED GUIDANCE

The site is smaller than one hectare, it is located in Flood Zone 1, and it does not lie within an area where the local planning authority has been notified by the Environment Agency that there are critical drainage problems. Therefore there is no government planning policy that requires a flood risk assessment to be included in the planning application.

NPPF does not require a Sequential Test for development proposed on Flood Zone 1. NPPF does not require an Exception Test when there is no Sequential Test. As the site is located in Flood Zone 1, the Sequential Test, and therefore the Exception Test, do not apply to the development. Therefore neither Sequential Test nor Exception Test are addressed any further by this report.

4. LOCAL FLOOD RISK POLICIES

Three flood risk and drainage related policies in the emerging Local Plan Modified Arun District Local Plan 2011-2031, January 2018 consultation document, are relevant to the development.

Policy W DM1

Water supply and quality

3. Lidsey Wastewater Treatment Works Catchment Area

Major development within this area must also be accompanied by a full Drainage Impact Assessment which must take account of surface water disposal and foul water disposal.

Although minor developments are unlikely to raise significant flood risk due to the cumulative impact all development within this area must also be accompanied by a Drainage Impact Assessment that must take account of both the individual and cumulative impact upon foul water disposal; flood storage capacity and surface water drainage or flood flows within the Lidsey Wastewater Treatment Works Catchment Area.

Where surface water and foul water drainage systems are approved as part of the consideration of a planning application, conditions may be imposed upon the permission relating to dates for implementation or other detailed technical requirements. In order to discharge conditions, the developer will be required to submit a statement from a suitably qualified and experienced engineer that the measures have been adequately and satisfactorily implemented.

The existing development discharges its sewage to the local Southern Water foul sewer.

The replacement development is of similar size and will likewise discharge its sewage to the foul sewer. All rainwater will be disposed of on site.

Therefore the development complies with emerging Policy W DM1.

Policy W DM2

Flood risk

Development in areas at risk from flooding, identified on the latest Environment Agency flood risk maps and the Council's Strategic Flood Risk Assessment (SFRA), will only be permitted where all of the following criteria have been satisfied:

- a. The sequential test in accordance with the National Planning Policy Guidance has been met.
- b. A site specific Flood Risk Assessment demonstrates that the development will be safe, including access and egress, without increasing flood risk elsewhere and reduce flood risk overall.
- c. ~~The scheme identifies adaptation and mitigation measures. The sustainability benefits in the wider community are clearly identified~~
- d. The scheme identifies adaptation and mitigation measures.
- e. Appropriate flood warning and evacuation plans are in place; and
- f. New site drainage systems are designed to take account of events which exceed the normal design standard i.e. consideration of flood flow routing and utilising temporary storage areas.

The reports prepared as part of the criteria above must take into account contingency allowances, taking climate change into account as set out in Flood Risk Assessments: climate change allowances section of the NPPG.

In locations where strategic flood defence or resilient and resistant construction measures are necessary within the site itself, proposals will be required to demonstrate how measures have been incorporated as an intrinsic part of the scheme in a manner which is compatible with the latest Strategic Flood Risk Assessment.

All development proposals must take account of relevant Surface Water Management Plans, Catchment Flood Management Plans and related Flood Defence Plans and strategies such as the Lower Tidal River Arun Strategy. The council may require financial contributions from development on sites where measures to address flood risk or to improve the environmental quality of watercourses have been identified by these Plans and Strategies.

The site is shown by the SFRA as being at risk of future flooding. The emerging Local Plan has yet to be adopted. Therefore Policy W DM2 does not yet apply. Nevertheless this flood risk assessment has been prepared on the basis that climate change affects flood risk to the site. Details of flood risk are addressed later in this report.

Policy W DM3

Sustainable Urban Drainage Systems

To increase the levels of water capture and storage and improve water quality, all development must identify opportunities to incorporate a range of Sustainable Urban Drainage Systems (SUDS), appropriate to the size of development, at an early stage of the design process.

Proposals for both major and minor development proposals must incorporate SUDS within the private areas of the development in order to provide source control features to the overall SUDS design. These features include:

- Green roofs
- Permeable driveways and parking
- Soakaways
- Water harvesting and storage features including water butts.

Proposals for major development must also integrate SUDS within public open spaces and roads, reflecting discussion with the appropriate bodies. SUDS must therefore be integrated into the overall design of a development and must:

- a. Contribute positively to the appearance of the area, integrating access to allow maintenance of existing watercourses and the system.
- b. Effectively manage water (including its quality)
- c. Accommodate and enhance biodiversity by making connections to existing Green Infrastructure assets and
- d. Provide amenity for local residents (ensuring a safe environment) and
- e. Retain the existing drainage network of the site and the wider area, and
- f. be maintained in perpetuity, supported through a Maintenance and Management Plan/Regime, including its financing, agreed with the Local Planning Authority.

In order to ensure that SUDS discharge water from the development at the same or lesser rate, as prior to construction, developers must:

- f. Follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations and the SUDS manual produced by CIRIA.
- g. Undertake up to six months groundwater monitoring within the winter period.
- h. Undertake winter percolation testing in accordance with BRE365.
- i. The proposed drainage system must be designed to ensure that there is no flooding on a 1 in 30 year storm event.
- j. The design must also take account of the 1 in 100 year storm event plus 30% allowance for climate change, on stored volumes, to ensure that there is no flooding of properties or the public highway or inundation of the foul sewerage system. Any excess flows must be contained within the site boundary, and within designated storage areas.

SuDs is dealt with under the section dealing with rainwater disposal.

5. STATUTORY CONSULTEES

Under Statutory Instrument 2015 No 595, neither the Environment Agency nor West Sussex County Council in its capacity as Lead Local Flood Authority (LLFA) are statutory consultees to the Local Planning Authority for the planning application.

6. APPLICATION OF MAIN RIVER BYE-LAWS, WATER RESOURCES ACT 1991 AND LAND DRAINAGE ACT 1991 (AS AMENDED)

The site is located considerably more than the bye-law width associated with the Elmer Rife, which is the nearest main river, and therefore is not subject to main river bye-laws. The site is not part of a designated artificial fluvial flood storage area. The raised earth bank on the southern side of the site no longer is considered to be a formal coastal defence, and therefore the site is more than 15 metres from the landward side of the nearest coastal defence. Therefore the development is not subject to flood defence consent of the Environment Agency.

The planning application does not include any proposal to divert or culvert an ordinary watercourse. Therefore the development is not subject to the consent of West Sussex County Council in its role as its role as Lead Local Flood Authority.

The site might lie within the area of the South East Internal Drainage Districts, but this is not a material consideration, as the Drainage Districts, are part of the Environment Agency Southern Region, and relevant bye laws have no affect on the site or the development.

7. FLOOD HISTORY

Following completion in 1993 of the current tidal (wave) defences comprising eight near shore rock islands built by Arun District Council and the Environment Agency, the site has not been subject to tidal flooding. The beach between the site and the foreshore has reached equilibrium and is generally stable, though some shingle redistribution is required after major storms.

High rainfall in June 2012 caused significant flooding at Middleton-on-Sea, including to Elmer Road. It is not known if the flooding affected the site, probably any local flood water was directed by East Road into the sea and no significant build up of rainwater occurred on the site.

8. CURRENT EXISTING RISK OF FLOODING

The definition of Flood Zones for tidal situations such as exist at and near the site is summarised in Table 8.1, below.

Table 8.1 – Flood Map for Planning Land Designations (fluvial flooding)

Flood Zone	Description	Annual Probability of Tidal Flooding
3	Flooding from the sea without defences	0.5% or greater (ie 1:200 or greater)
2	Extent of extreme flood	Between 0.1% and 0.5% (ie between 1:1,000 and 1:200)
1	Not annotated. This Zone comprises all areas which are neither Flood Zone 2 or 3.	Less than 0.1% (ie less than 1:1,000)

Thus in tidal situations such as the locality of the site, Flood Zone 3 represents the extent of land that would flood from the sea on average more often than once in two hundred years, Flood Zone 2 the extent of land that would flood from the sea between once in one thousand years and once in two hundred years, and Flood Zone 1 land that is not considered to be in tidal flood plain.

Flood Zone designations take no account of the presence of defences where they exist, or climate change. Their principal purpose is as a planning tool to guide the application of NPPF flood related planning policies to development.

The plan in the middle window of drawing 50, included at Appendix 1, shows that the entire site is classified as Flood Zone 1.

Comparison of today's 100 and 1,000 year tide levels with topographical levels suggests that the extents of Flood Zones 2 and 3 take some account of wave attack.

Although Flood Map for Planning which gives the definitive extents of flood zones advises that the site does not benefit from defences, at this location wave attack is mitigated by the near shore rock islands, which were constructed specifically to help defend Elmer from tidal flooding.

A bank located on the southern boundary of the site gives very localised and limited defence against wave attack to the site.

The location of the nearest local main river to the site, the Elmer Rife is approximately 0.7 kilometres to the east of the site.

The plan in the bottom window of drawing 50, included at Appendix 1, shows that the site is not at risk of surface water flooding.

FLOOD RISK ASSESSMENT – REPLACEMENT DWELLINGS
134 ELMER ROAD, MIDDLETON-ON-SEA, WEST SUSSEX, PO22 6HJ

Published extents of flooding mapping shows that access to the site is not constrained by flooding.

There is no flood warning scheme covering the locality.

9. FUTURE RISK OF FLOODING

Arun District Council's Strategic Flood Risk Assessment Appendix D includes a map showing the extent of anticipated coastal flooding resulting from the impact of climate change on future sea levels. This map advises that the site would be flooded by the sea in extreme events occurring in the lifetime of the development, which for the purpose of this assessment is taken as 100 years.

Current government guidance on future sea level rise in South East England advises that a cumulative increase in level by 2115 is 1.21 metres compared to the 1990 base line date should be allowed for. The adjustment for 2115 compared to the predicted sea levels given by the Environment Agency for 2008 is 0.07 metres less, ie 1.14 m.

Table 9.1, below, sets out the estimated sea levels at the site in 2008 and in 2115 for five return periods in the range 100 to 10,000 years.

Table 9.1 – Extreme sea levels at the site, 1990 and 2115

<u>Return period /years</u>	<u>2008 Extreme tide level /m AOD</u>	<u>Increase to 2115 /m</u>	<u>2115 Extreme tide level /m AOD</u>
10,000	4.31	1.14	5.45
1,000	4.02	1.14	5.16
500	3.93	1.14	5.07
200	3.82	1.14	4.96
100	3.74	1.14	4.88

Ground levels on the site, not including the bank on the southern boundary of the site, are in the range 4.8-5.0. As the sea defences protect against waves and not high tide levels, based on the tide levels in Table 9.1, the site could suffer tidal flooding in extreme tide heights with calm conditions within its lifetime. Waves could increase the levels and velocities of sea water at the.

Table 9.1 shows that the ground floor of the development, which will have a minimum level of 5.8 m AOD, is sufficiently high that would not be flooded in calm sea conditions in a future flood irrespective of return period.

In the absence of new flood defences being built or the current offshore islands being raised, in future significant waves occurring simultaneously with future extreme high tide conditions are expected to give a risk of flooding at and above the 5.8 m AOD proposed ground floor level.

The current shoreline management plan policy is "hold the line". Therefore it is likely that the current sea defences will be supplemented /improved to compensate for future

FLOOD RISK ASSESSMENT – REPLACEMENT DWELLINGS
134 ELMER ROAD, MIDDLETON-ON-SEA, WEST SUSSEX, PO22 6HJ

increases in tide level and storminess, thus ensuring that tidal flood risk to the site does not increase over the lifetime of the development.

Climate change in the lifetime of the development is predicted to increase peak rainfall by up to 40% compared to today. This is likely to increase the risk of surface water flooding at the site compared to today, but such flooding would not affect the interior of the proposed dwelling due to its elevation.

Fluvial flooding as a result of climate change is not a risk to the development in its lifetime.

In future years access to the development in times of extreme flooding could be problematic.

10. DISPOSAL OF RAINWATER

Proposed disposal of rainwater from the development will be by soakaway, as existing. The development does not increase impermeable drained area significantly, and due to the local geology which suits infiltration drainage, no problems with this solution are anticipated.

Details of rainwater disposal can be dealt with by condition.

11. DISPOSAL OF SEWAGE

Disposal of sewage from the development from the development will be to the Southern Water foul sewer, as existing. This satisfies the emerging Local Plan policy on non mains sewage disposal in the Lidsey Wastewater Treatment Works catchment area catchment.

Details of sewage disposal will be dealt with under Building Regulations.

12. IMPACT OF THE DEVELOPMENT ON OFF SITE FLOOD RECEPTORS

Table 12.1, below, summarises the adverse impact of the development on flooding of third party land, to off site drainage pipes and sewers, watercourses, the local river system, and on the ability of the authorities to maintain or improve flood defences post development.

Table 12.1 – Impact of the development off site

Conceptual impact on receptor or place	Actual impact on receptor or place
Changes associated with the development cause extra rainfall run off from the site to flow into surface water drains, sewers, ordinary watercourses, ponds, lakes, other artificial water bodies, or main rivers. This increases flood risk at those receptors and places	None.
Changes associated with the development cause extra rainfall run off from the site to flow overland from the site. This increases surface water flooding off site.	None.
The development changes or obstructs existing drains, watercourses, rivers or over land flood routes, or reduces the volume of an existing flood storage area. This causes additional head losses and/or displacement of flood water to other places, leading to flooding occurring or being exacerbated elsewhere.	None.
The development makes maintenance of existing tidal defences more difficult.	None, as the proposed dwellings do not constrain access to any existing tidal defence
The presence of the development has an adverse impact on future tidal defence improvements.	There is adequate space on the existing beach and foreshore to carry out future defence improvements should they be necessary. The proposed dwellings do not create a greater constraint on such activities than the existing dwelling.

Table 12.1 confirms that the development does not increase flood risk to third parties.

13. RECOMMENDATIONS

This report makes seven recommendations to the developer:

1. Note the contents of this report and pass it to successors in title;
2. Construct the ground floor at least 1.0 metre higher than the garden level;
3. Do not remove any part of the former flood bank on the southern boundary of the site;
4. Ensure that the structural elements of the dwelling are constructed robustly to withstand possible attack by tidal water in very extreme conditions in future years;
5. Treat the building envelope, particularly doors and windows, similarly;
6. Never store anything in the void below the ground floor level which would be expensive to replace if damaged by water;
7. Do not change the design of the development significantly with regards to flood risk without reference to the author of this report.

14. SUMMARY

The owners of 134 Elmer Road propose to demolish the existing detached dwelling on the site and build a new dwelling in its place. The location of the new dwelling on the site is very similar to the existing dwelling. Both the existing and proposed dwellings have ground floors which are a metre or more above garden level.

The current dwelling benefits from the near shore rock island wave defences, and the new dwellings will benefit equally. The Shoreline Management Plan policy of "hold the line" at this location should ensure that the performance of the local coastal defences does not deteriorate with time and climate change. However extreme sea levels predicted in 100 years time are likely to be over a metre higher than today. Such future extreme sea levels could cause the development gardens to flood. The ground floor of the proposed dwelling, although a metre above garden level, could be subject to wave attack in future extreme conditions. Structure, doors, glazing and finishes of the proposed dwelling will be designed to resist such attack, giving the new dwelling a much better performance in extreme future conditions than the existing dwelling.

No significant surface water or sewage related flood risk to the development has been identified. Surface water will be disposed of to soakaway, sewage to foul sewer, both similar to existing.

15. CONCLUSIONS

Flood risk is a salient factor in deciding if the development should be granted consent. The facts are that it is very unlikely that the development will impede future flood defence improvements, and the development will be significantly safer than the existing one in future years when climate change could cause tidal flooding of the garden and mild wave attack on the dwellings. As such, the performance of the specially designed development will be much superior under these adverse conditions than the current development.

The proposed development does not change flood risk to third parties.

Accordingly flood risk does not prevent the grant of planning permission.

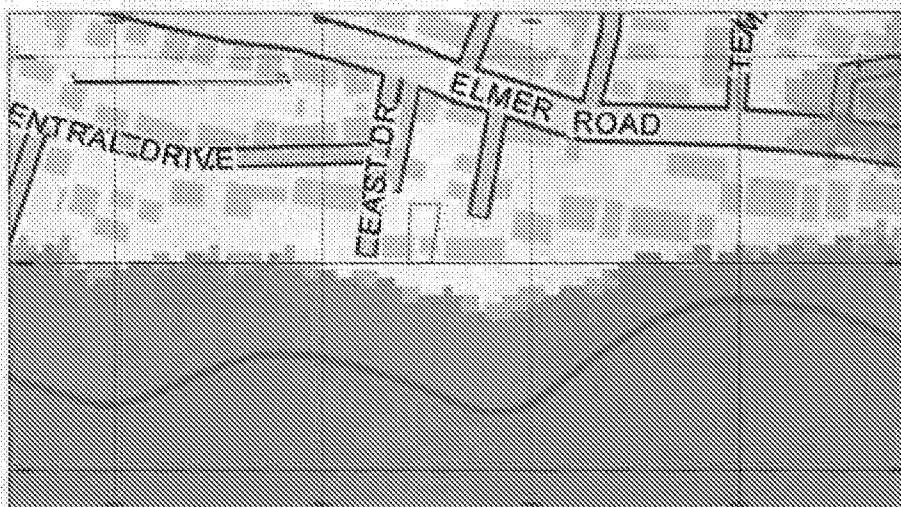
**FLOOD RISK ASSESSMENT – REPLACEMENT DWELLINGS
134 ELMER ROAD, MIDDLETON-ON-SEA, WEST SUSSEX, PO22 6HJ**

Appendices

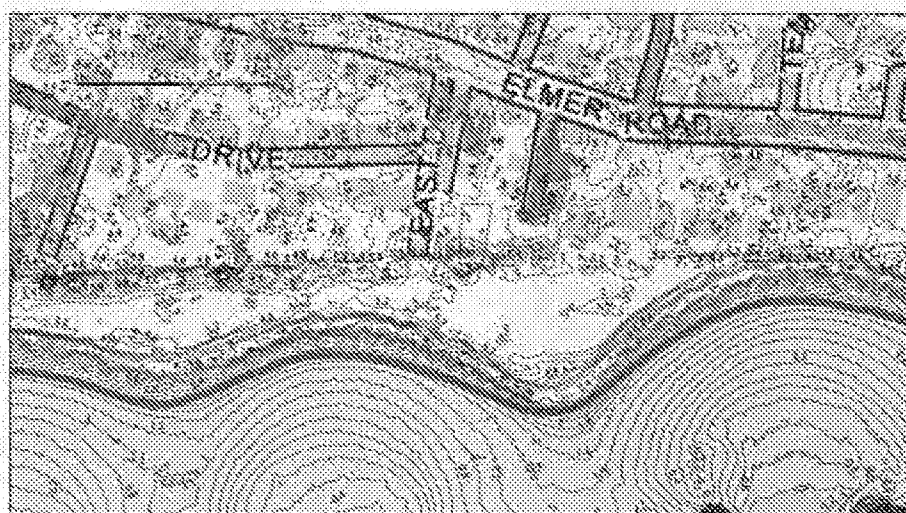
1 - Location plan and published flood extents – drawing 50



00000000000000000000000000000000
00000000000000000000000000000000
000000

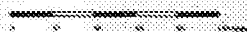


NATIONAL ACADEMY OF SCIENCES
 NATIONAL ACADEMY OF ARTS AND LETTERS
 NATIONAL ACADEMY OF MEDICAL SCIENCES
 NATIONAL ACADEMY OF POLITICAL SCIENCES
 NATIONAL ACADEMY OF SOCIAL SCIENCES



1. The first step is to identify the problem or question that needs to be addressed. This involves understanding the context and the specific requirements of the task.

1. THE RECEIVING OR SENDING OF SUCH MESSAGE OF THIS CHAIRMAN DEPENDS THE APPROXIMATE TIME SCHEDULE.
2. THE CHAIRMAN TO BE READY TO COMPARISON WITH THE RECORD FOR REASSESSMENT RECORD.
3. CONSIDER THE THIS CHAIRMAN ARE SENDING OF A LETTER VERTICAL INTERVIEW CASES ARE RECORDED FROM COMMUNICATION AGENCY LEADY WITHING 20M



Green Arrowberry, 8100 King Street Seattle, WA 98148 Phone 822-7659 Fax 253-2660 11/20/2001			LOCATION: PLAYS AREA FLOOD DAMAGE EXTENT OF FLOODING		
REPLACEMENT DRAINAGE 1/4" ELMER ROAD Middleton, ON, CAN 01/27/01 (G-1)	Date 01/27/01	Date 01/27/01	Date 01/27/01	Date 01/27/01	Date 01/27/01